REPRESENTATIVE PATENTS RELATING TO MECHANIZATION OF SILVICULTURE

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and

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GREAT LAKES FOREST RESEARCH CENTRE

SAULT STE. MARIE, ONTARIO

REPORT O-X-328

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DEPARTMENT OF THE ENVIRONMENT

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Information Office,
Great Lakes Forest Research Centre,
Canadian Forestry Service,
Department of the Environment,
Box 490, Sault Ste. Marie, Ontario.
P6A 5M7

ABSTRACT

Patent descriptions of silvicultural machines from two major wood-producing and wood-consuming countries (Canada and the United States) have been collected and classified according to the disclosures made in each. The purpose of this study is to take stock and to indicate the level of inventive activity and the direction of interest with respect to mechanization of silviculture in the forest industry.

RÉSUMÉ

Les descriptions des brevets d'invention de machines sylvicoles provenant des deux principaux pays producteurs et consommateurs de bois (le Canada et les Etas-Unis) ont été colligées et classées en fonction des découvertes réalisées en ce domaine dans chacun de ces pays. L'objectif de cette étude consiste à dresser l'inventaire et à indiquer le niveau de l'activité créatrice ainsi que l'orientation de l'intérêt en ce qui concerne la mécanisation de la sylviculture dans l'industrie forestière.

FOREWORD

The original object was to locate, and group by common subject matter, patents disclosing various aspects of silviculture so that anyone interested in this field could readily obtain the information contained therein.

A similar project was undertaken for field logging operations and resulted in reports entitled "Patents Relating to Mechanization of Timber Harvesting". Timber harvesting equipment is unique in that there is little, if any, overlap with other fields of technology. Silviculture, however, overlaps so many other fields of well developed technology that with the funds available it was impossible to list all the patents that might be of interest.

This report is therefore limited to samples of a few recently issued patents for silvicultural equipment. Included also is a guide to the classification system used by the Canadian and United States patent offices. With this information it is felt that the reader can conduct his own search in the patent offices for items that are of particular interest to him.

Numerous patents are granted every year throughout the world and these patents contain a wealth of information. It is often advisable, before embarking on the development of a new product, process or machine, to have a state of the art search conducted so as to avoid wasting time reinventing something that has already been invented. In Canada approximately 25,000 patents are granted annually and they run for a period of 17 years unless declared invalid by the courts. The invention covered by a patent is defined in numbered paragraphs called "claims" which describe in explicit terms that which the patentee regards as new and in which an exclusive property or privilege is claimed. During the time in whi h a patent is in effect, the manufacture, use or sale, by unauthorized persons, of items falling within the scope of the claims constitutes infringement of the patent and such unauthorized persons may be held liable for damages caused by the act of infringement. It is recommended that those who find themselves in such a position contact a patent agent for advice.

This report contains three main sections. The first deals with patents for site preparation equipment, the second with patents for regeneration equipment, and the third includes copies of the pages of the classification manuals of the United States and Canadian patent offices for the classes applicable to the field of silviculture. With respect to site preparation, sample patents are included for machines for harvesting individual trees, machines for swath-clearing an area, machines for clearing trash and vegetation, machines for removing stumps, machines for disposing of trees and slash, and machines for working the soil. In the patent office classification manuals this field is generally covered in classes 37, 56, 144, 172 and 241. In the section dealing with regeneration there are patents for machines for seeding, for growing seedlings, for harvesting seedlings, for extracting large plants,

for transplanting trees, for transporting plants, and for planting seedlings, as well as for hand tools for planting seedlings, for plant containers and for vegetation control. In the patent offices these areas are generally found in classes 37, 47, 111, 137, 171, 221, 241 and 405. There will, of course, be other applicable classes and the classification section of the patent offices can provide directions for searching in a particular field of interest.

This report consists of copies of pages from classification manuals of the Canadian and United States patent offices for the most relevant classes applicable to silviculture. The classification is a priority system with the degree of priority indicated by indentation. For example, Canadian Patent Office class 144 includes patents granted in Canada which are related to woodworking. Subclass 25 in class 144 contains patents for methods and/or machines for harvesting trees. Subclass 26 also contains patents for tree harvesting methods and machines but is limited to harvesters that include a chipping function. Subclass 27 is limited to harvesters that include the function of felling a tree (or trees) or bucking and subclass 28 is further limited to include a delimbing function.

Patents are placed in the various classes and subclasses on the basis of the claimed subject matter: i.e., on the basis of what the patentee considers novel. In almost all instances, however, there is also disclosed in such patents additional subject matter that is not part of the invention. Hence, it is necessary when searching to peruse not just one, but in many instances a number of subclasses. Anyone interested in tree harvesting, for example, should search subclasses 25 to 36 inclusive and if one is particularly interested in bark removal one should search subclasses 8 to 23 inclusive as well.

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PART I Site Preparation - Tree Felling, Land Clearing and Cultivation

This section contains excerpts from patents for equipment for clearing brush, weeds and the like. Attention is directed to group 100 of the report entitled "Patents Relating to Mechanization of Timber Harvesting" and particularly groups 101, 102, 103, 104 and 104.1.

This section includes machines for harvesting individual trees, for swath-clearing sites, for trash and vegetation clearing, for stump removal, for tree and slash disposal and for earth working.

Harvesting Individual Trees

(11) (A) No. 1009123

(11) ISSUED 770426

(52) CLASS 144-33
C.R. CL.

(19) (A) CANADIAN PATENT

(54) TREE HARVESTING APPARATUS

(72) Windsor, Robert N.,
Australia

Granted to Eaton Yale Ltd.,
Canada

(21) APPLICATION No. 203,184
(22) FILED 740624

(30) PRIORITY DATE Australia (3,805) 730622
U.S.A. (449,045) 740307

No. OF CLAIMS 17

1009123

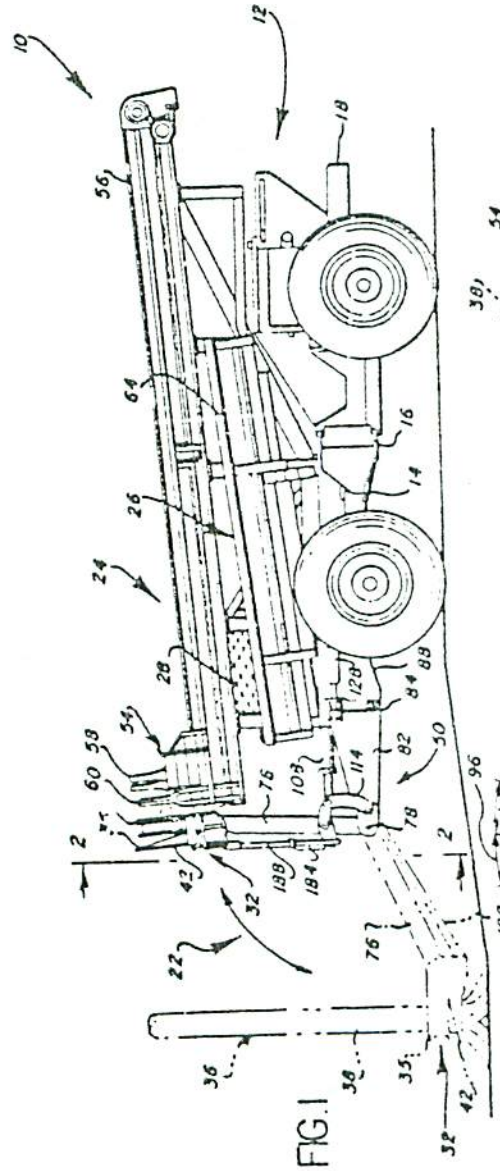


FIG.1

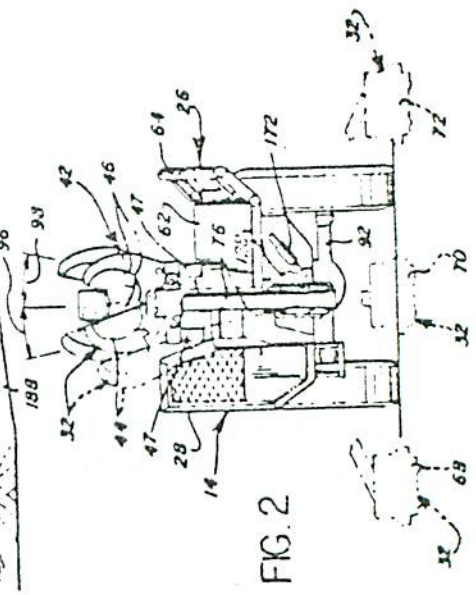


FIG.2

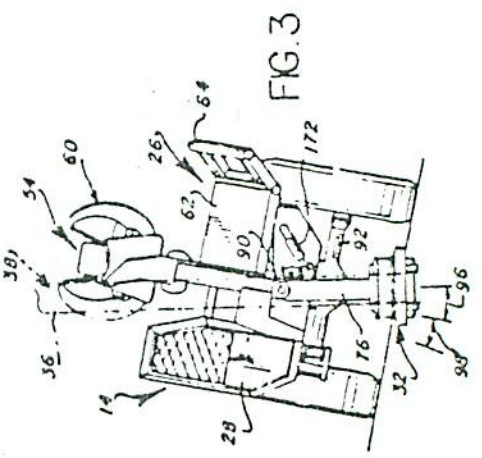


FIG.3

United States Patent [19]

Harmon

[11] **4,067,369**

[45] **Jan. 10, 1978**

[54] **WHOLE TREE EXTRACTION DEVICE**

[75] Inventor: **Grady R. Harmon, LaFayette, Ala.**

[73] Assignee: **Weyerhaeuser Company, Tacoma, Wash.**

[21] Appl. No.: **646,465**

[22] Filed: **Jan. 5, 1976**

[51] **Int. Cl.²** **A01G 23/06**

[52] **U.S. Cl.** ..... **144/34 R**; 37/2 R; 144/2 N; 173/49; 214/3; 254/132

[58] **Field of Search** ..... 214/3; 37/2 R, 195; 144/2 N, 34 R, 34 E; 173/49; 254/132, 124

[56] **References Cited**

U.S. PATENT DOCUMENTS

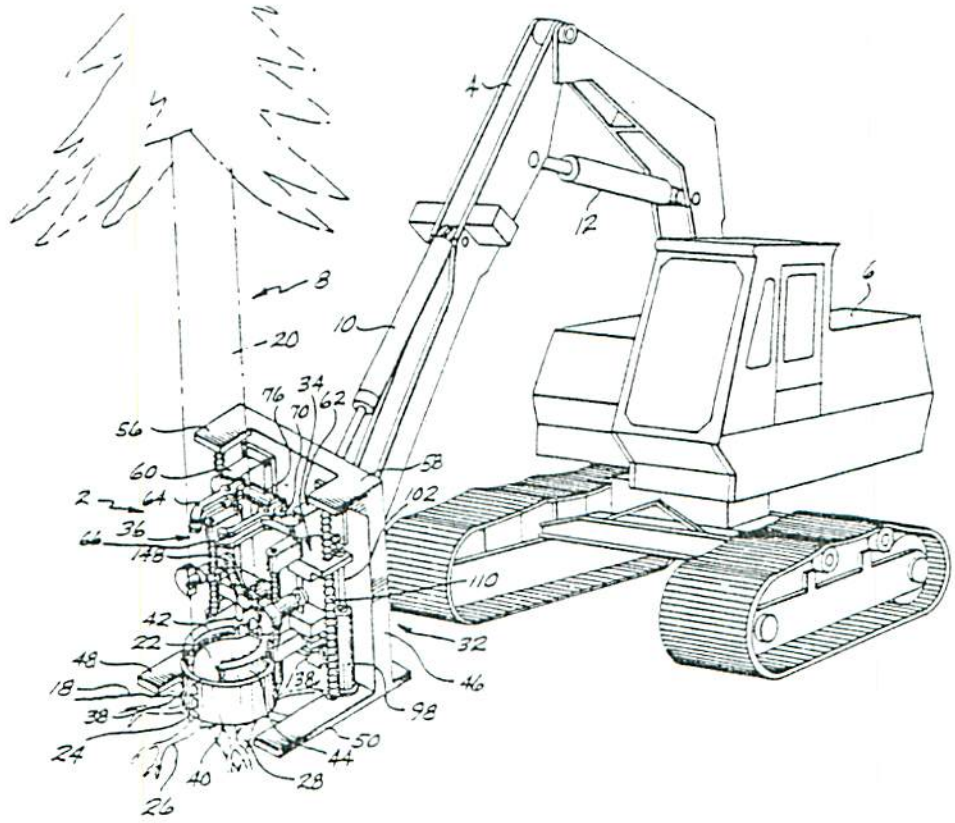
3,336,082	8/1967	Bodine, Jr.	37/2 R
3,738,401	6/1973	Wiklund	144/34 R
3,914,883	10/1975	Bodine	37/2 R
3,933,188	1/1976	Boivin	144/3 R
3,936,960	2/1976	Clegg	37/2 R
3,958,613	5/1976	Herz	144/2 N

Primary Examiner—Othell M. Simpson
Assistant Examiner—W. D. Bray

[57] **ABSTRACT**

A whole tree extraction device is mounted on a prime mover. The extraction device is comprised of a load frame which is carried and supported by the prime mover. Slidably mounted on one side of the load frame is the power frame to which is attached at least one power cylinder for moving the power frame with respect to the load frame. Mounted on the power frame forwardly thereof is a vibrator frame to which is attached a pair of cooperating shearing blades together with a pair of cooperating gripping extractor arms. A pair of upper gripper arms are mounted on the load frame and open and close in response to a command signal independently of the shearing blades and gripping extractor arms. Means to vibrate the shearing blades and the gripping extractor arms relative to the power frame in a substantially vertical plane during the shearing and extracting modes are operable on a command signal. The vibration imparted to the shearing blades enhances shearing of the lateral roots while the vibration imparted to the gripping extractor arms both enhances lifting and aids in soil removal from the root system.

13 Claims, 7 Drawing Figures



101
102
105.2
306.4

(11) (A) No. 1014828

(45) ISSUED 770802

(52) CLASS 144-29
C.R. CL.

(19) (CA) # CANADIAN PATENT

(54) TREE HARVESTER

(72) Busch, Thomas N. and Hoadley, Cyrus E.,
U.S.A.

Granted to Youngstown Sheet and Tube Company,
U.S.A.

(21) APPLICATION No. 055,150
(22) FILED 690623

(30) PRIORITY DATE U.S.A. (739,766) 680625

No. OF CLAIMS 7

1014828
6-1

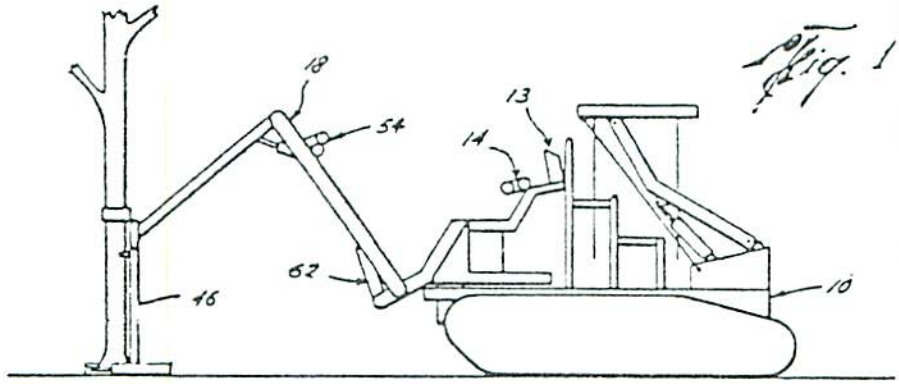


Fig. 1

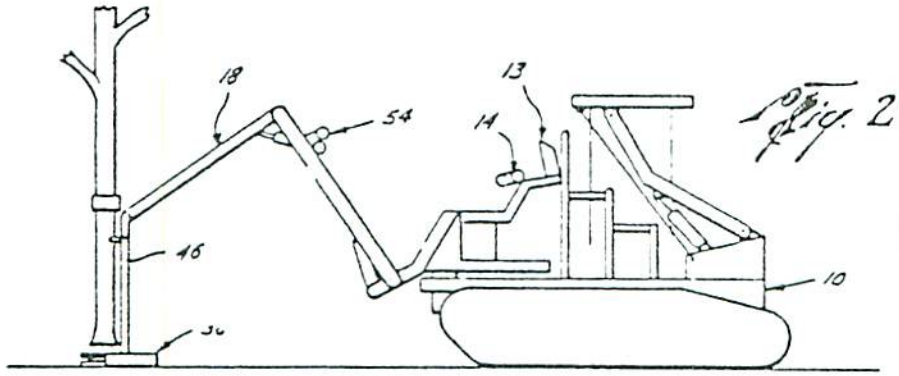


Fig. 2

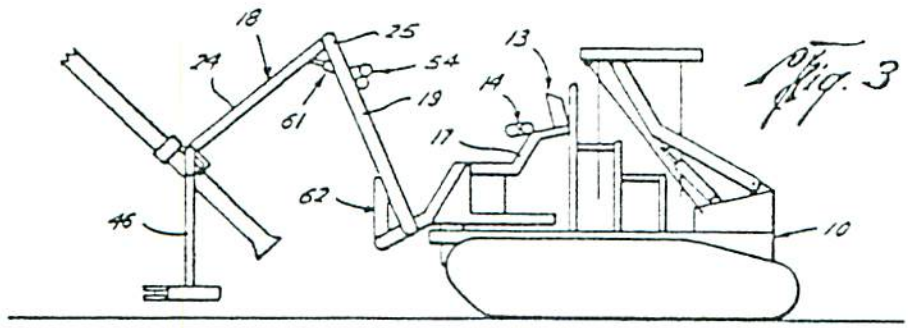


Fig. 3

101
102.
302.1

(11) (A) No. 1007546

(45) ISSUED 770329

(52) CLASS 144-34
C.R. CL.

(19)(A) CANADIAN PATENT

(54) MOBILE TREE PROCESSOR

(72) Larson, Robert W., Canada and Lundberg, John P., U.S.A.

Granted to FMC of Canada, Ltd., Canada

(21) APPLICATION No. 047,332
(22) FILED 690331

(30) PRIORITY DATE U.S.A. (727,431) 680508

No. OF CLAIMS 27

1007546
2.1

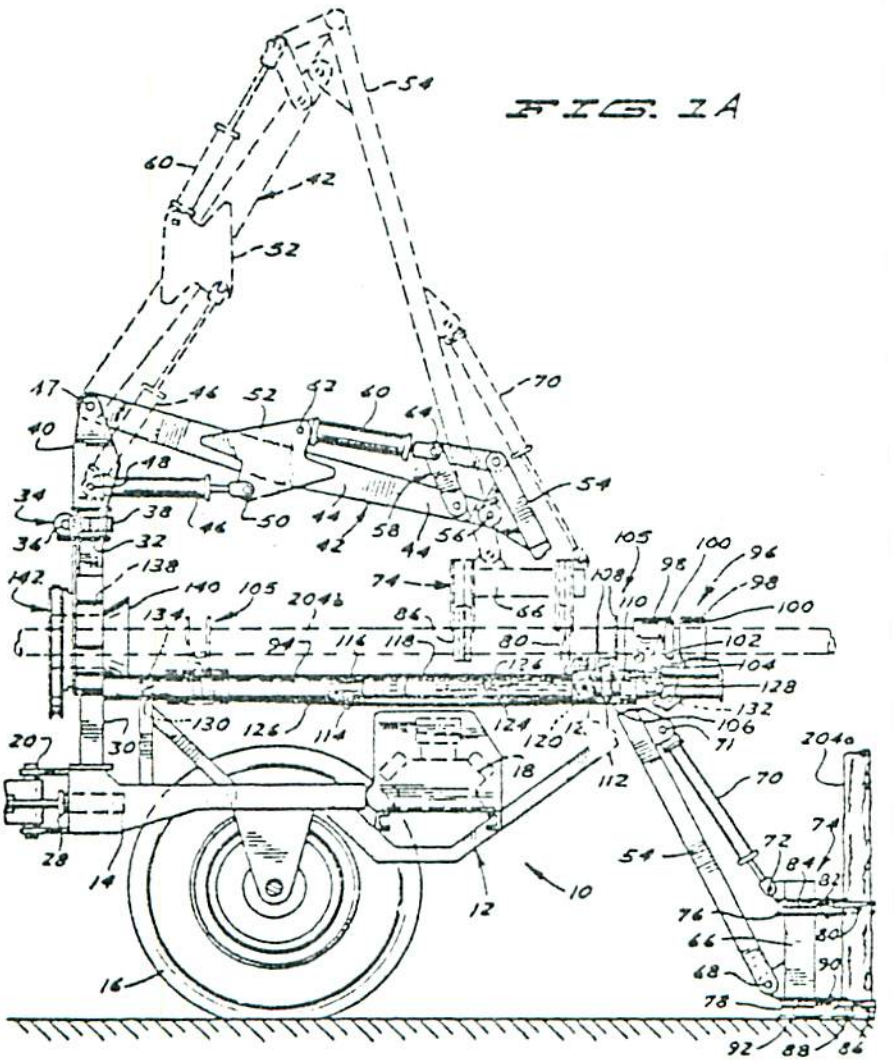


FIG. 1A

(11) (C) No. 1011625

(15) ISSUED 770607

(52) CLASS 144-33
C.R. CL.

(19) (C) CANADIAN PATENT

(54) METHOD AND MEANS FOR REMOVING SURFACE MATERIAL FROM TREES

(72) Puna Erich,
Sweden

Granted to Brundell och Jonsson AB,
Sweden

(21) APPLICATION No. 208,627
(22) FILED 740906

(30) PRIORITY DATE U. S. A. (395,856) 730910

No. OF CLAIMS 54

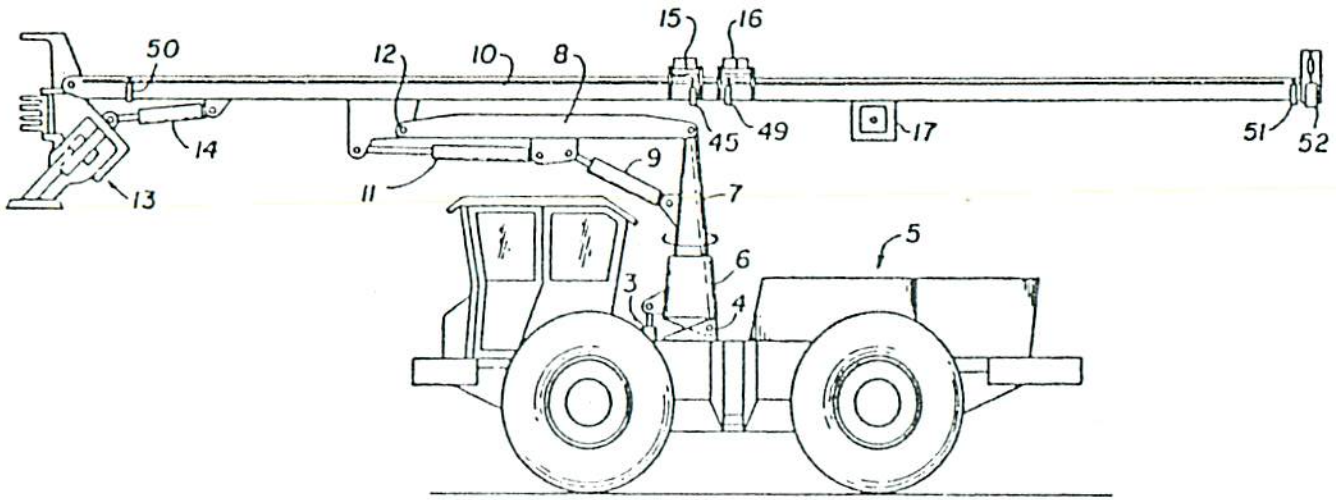


FIG.1

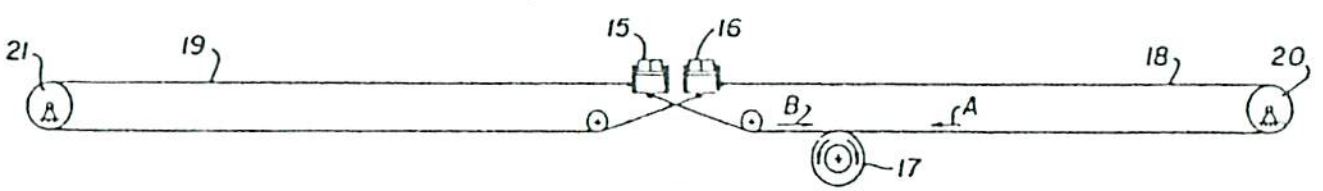


FIG.3

1011625
4-1

(11) No. 1026213

(11) ISSUED 780214

(52) CLASS 144-24
C.R. CL.

(19)(CA) CANADIAN PATENT

(54) TREE AND STUMP EXTRACTION

(72) Herz, Alvin E.,
U.S.A.

Granted to The L.B. Foster Company,
U.S.A.

(21) APPLICATION No. 236,938
(22) FILED 751002

(30) PRIORITY DATE

No. OF CLAIMS 8

1026213

3-/

Fig. 1.

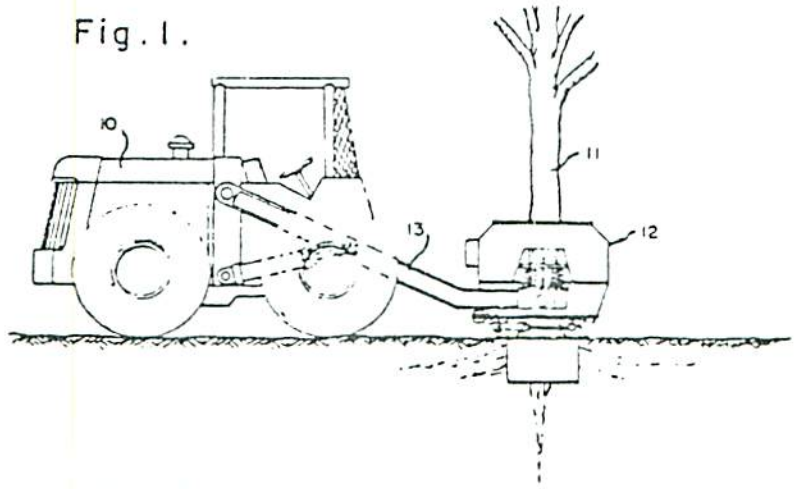
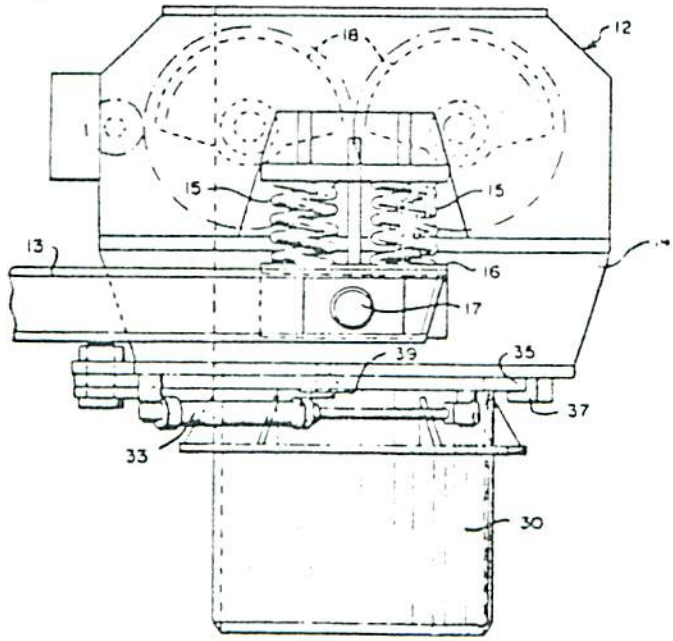


Fig. 2.



(11) (C) No. 1018048

(45) ISSUED 770927

(52) CLASS 144-25
C.R. CL.

(19) (CA) CANADIAN PATENT

(54) TREE SUPPORT AND CONTROL DEVICE IN A TREE PROCESSOR

(72) Boivin, Joseph J.R.,
Canada

Granted to Logging Development Corporation,
Canada

(21) APPLICATION No. 233,143
(22) FILED 750808

(30) PRIORITY DATE

No. OF CLAIMS 8

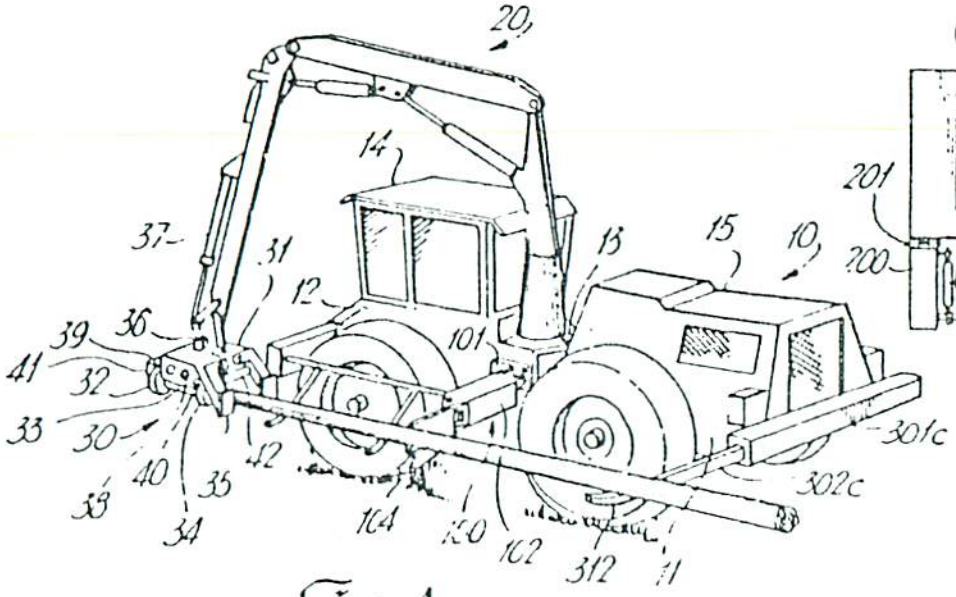


Fig-1-

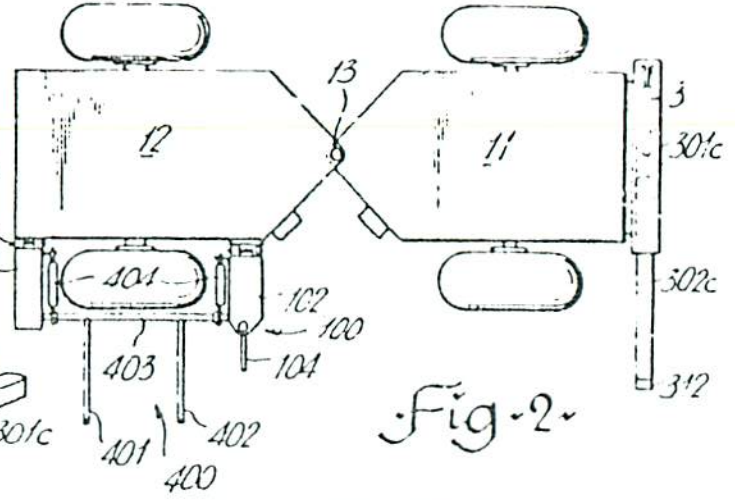


Fig-2-

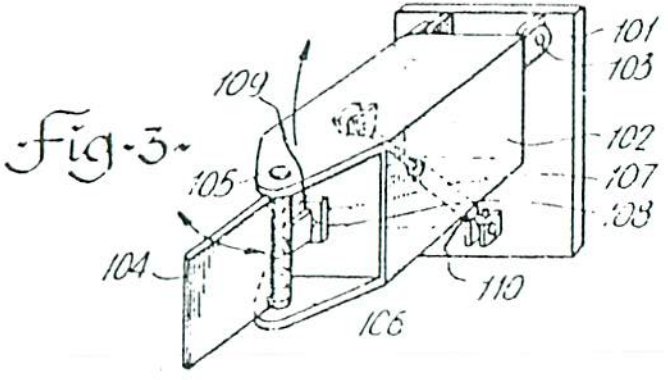


Fig-3-

1018048

2-1

13

United States Patent [19]

Smith et al.

[11] 4,090,540

[45] May 23, 1978

[54] TREE CUTTING APPARATUS

[76] Inventors: Dale A. Smith, 724 Main St., Mount Vernon, Ill. 62864; Cyril Barton, R.R. 1, Waltonville, Ill. 62894

[21] Appl. No.: 725,455

[22] Filed: Sep. 22, 1976

[51] Int. Cl.² A01G 23/08

[52] U.S. Cl. ..... 144/34 R; 30/379; 83/471.2; 83/743; 83/928

[58] Field of Search ..... 83/471.2, 483, 485, 83/743, 928; 30/379, 379.5, 341, 373; 144/34 R, 312, 309 AC

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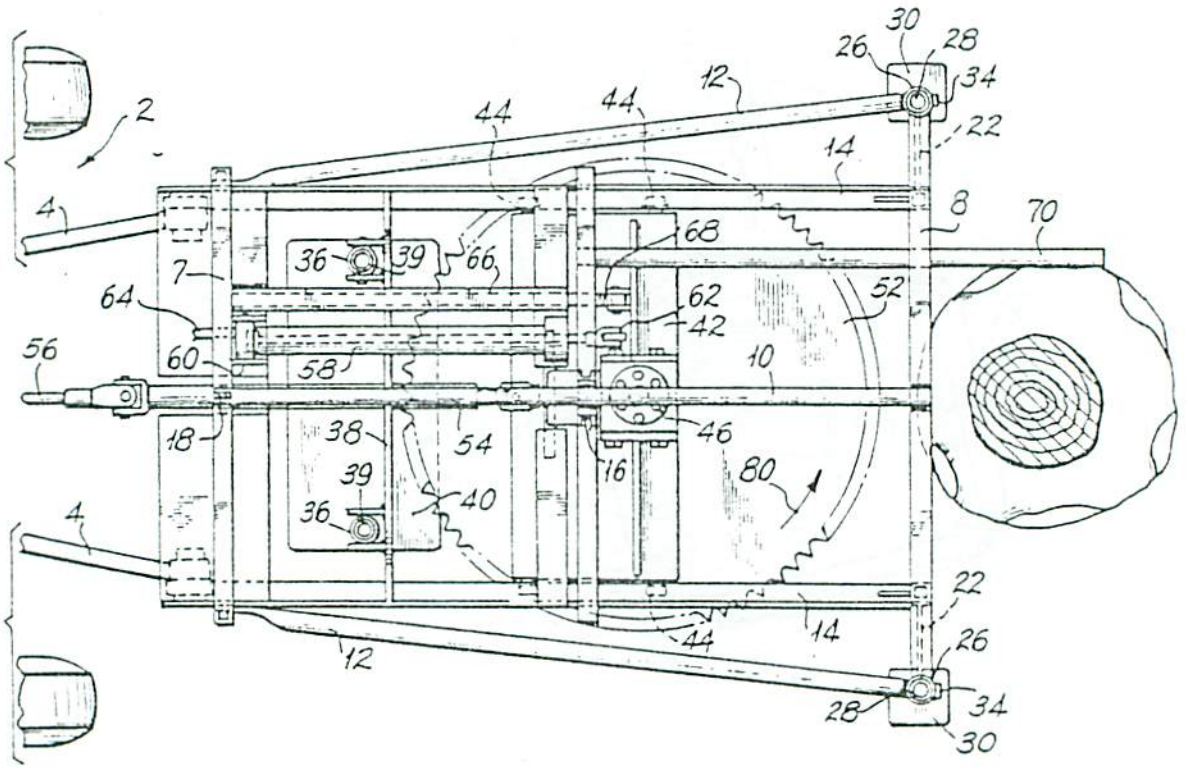
2,462,314	2/1949	Fuqua	144/34 A
2,474,037	6/1949	Cuthrell	144/193 R
2,664,925	1/1954	Jacobs et al.	144/34 R
2,672,171	3/1954	Jones	30/379
2,695,041	11/1954	Tourneau	83/928

Primary Examiner—Othell M. Simpson
Assistant Examiner—W. D. Bray
Attorney, Agent, or Firm—Bacon & Thomas

[57] ABSTRACT

A framework mounted on a tractor has separate vertically adjustable feet to support it from the ground at a desired angle of tilt so that a circular saw, slidable on the frame and driven from the tractor, can be moved downwardly and forwardly to sever a tree along a slanting plane below ground level. The frame has a member engageable with a side of the tree to resist the tendency of the frame to move laterally due to reaction from the cutting load on the saw. A hydraulic motor advances the saw while the tractor remains stationary.

6 Claims, 6 Drawing Figures

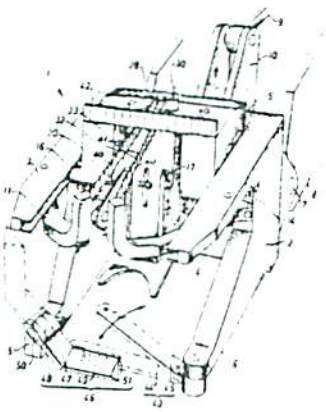


4,116,249

APPARATUS FOR CUTTING, FELLING, AND DEBRANCHING TREES

Lars Gunnar Högberg, and Bo Gunnar Ekeborg, both of Bonassund, Sweden, assignors to Mo och Domsjo Aktiebolag, Ornskoldsvik, Sweden

Filed Mar. 10, 1977, Ser. No. 776,385
Claims priority, application Sweden, Mar. 15, 1976, 7603282
Int. Cl.[2] A01G 23/08
U.S. Cl. 144—3 D
14 Claims



1. An apparatus for cutting, felling, and debranching trees combining tree-holding, tree-cutting and tree-felling means with tree-debranching means in one felling head, comprising, in combination, a mobile crane; a felling head pivotably mounted on the mobile crane; the felling head comprising means for holding a tree, means for cutting and felling a tree, and means for debranching a tree; the felling head being pivotable between a first position in which the tree can be held by the holding means, and cut and felled by the cutting and felling means; and a second position in which the felled tree can be moved along its longitudinal axis past and debranched by the debranching means, and the debranching means comprises first debranching means, second debranching means and third debranching means and a support means movable reciprocably with respect to the felling head and carrying at least in part the first, second and third debranching means and a holding means, the holding means, debranching means and support means being coordinately and combinably movable with respect to each other, so as to embrace a tree therebetween.

(11) (A) No. 1028931

(45) ISSUED 780404

(52) CLASS 144-25
C.R. CL.

(19) (CA) # CANADIAN PATENT

(54) TREE HARVESTER

(72) Savage, Donald D.; Chambers, Robert V. and
Mills, Maurice T., U.S.A.

(21) APPLICATION No. 182,247
(22) FILED 731001

(30) PRIORITY DATE U.S.A. (293,482) 720929

No. OF CLAIMS 20

1028931

18-1

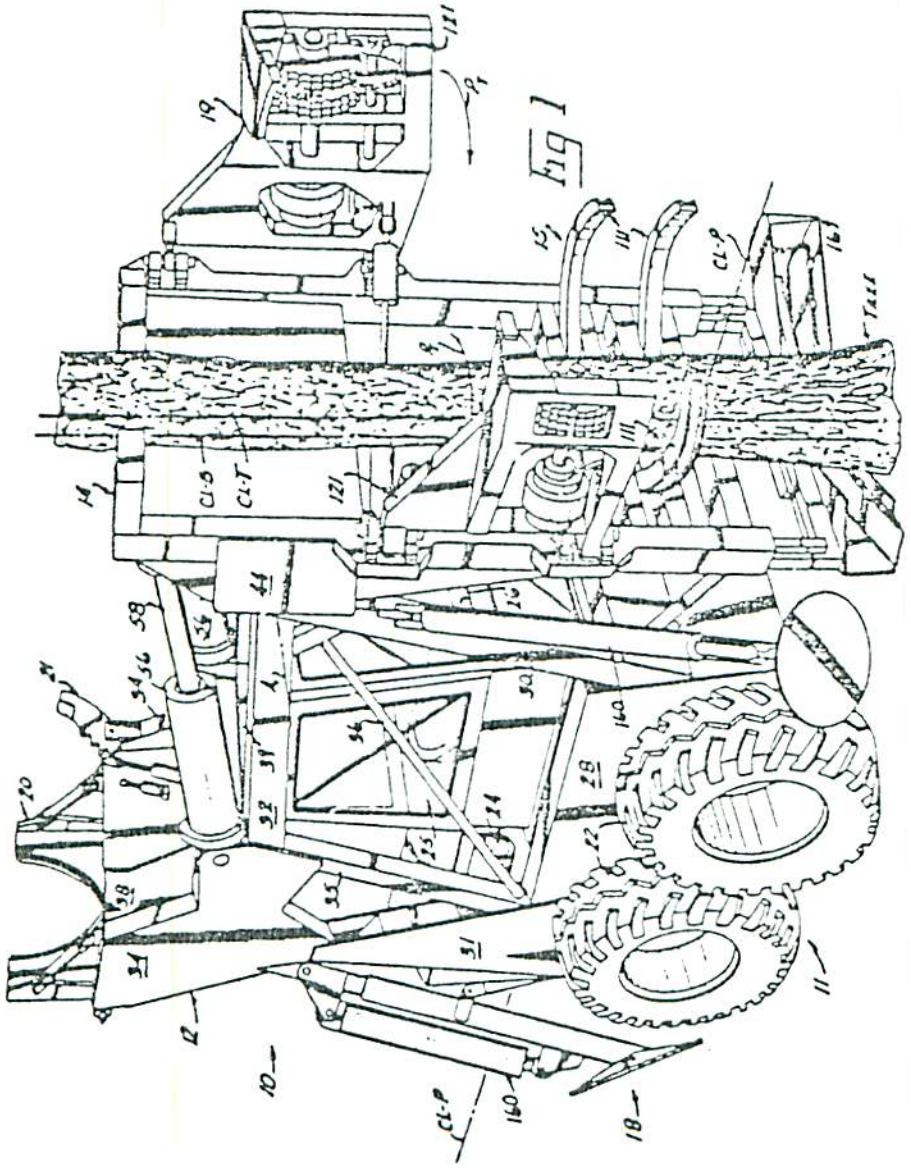


Fig 1

(11) (C) No. 1008340

(45) ISSUED 770412

(52) CLASS 144-27
C.R. CL.

(19) (CA) # CANADIAN PATENT

(54) TREE FELLING APPARATUS

(72) Bruun, Lars O.,
Sweden

Granted to Bruun System AB,
Sweden

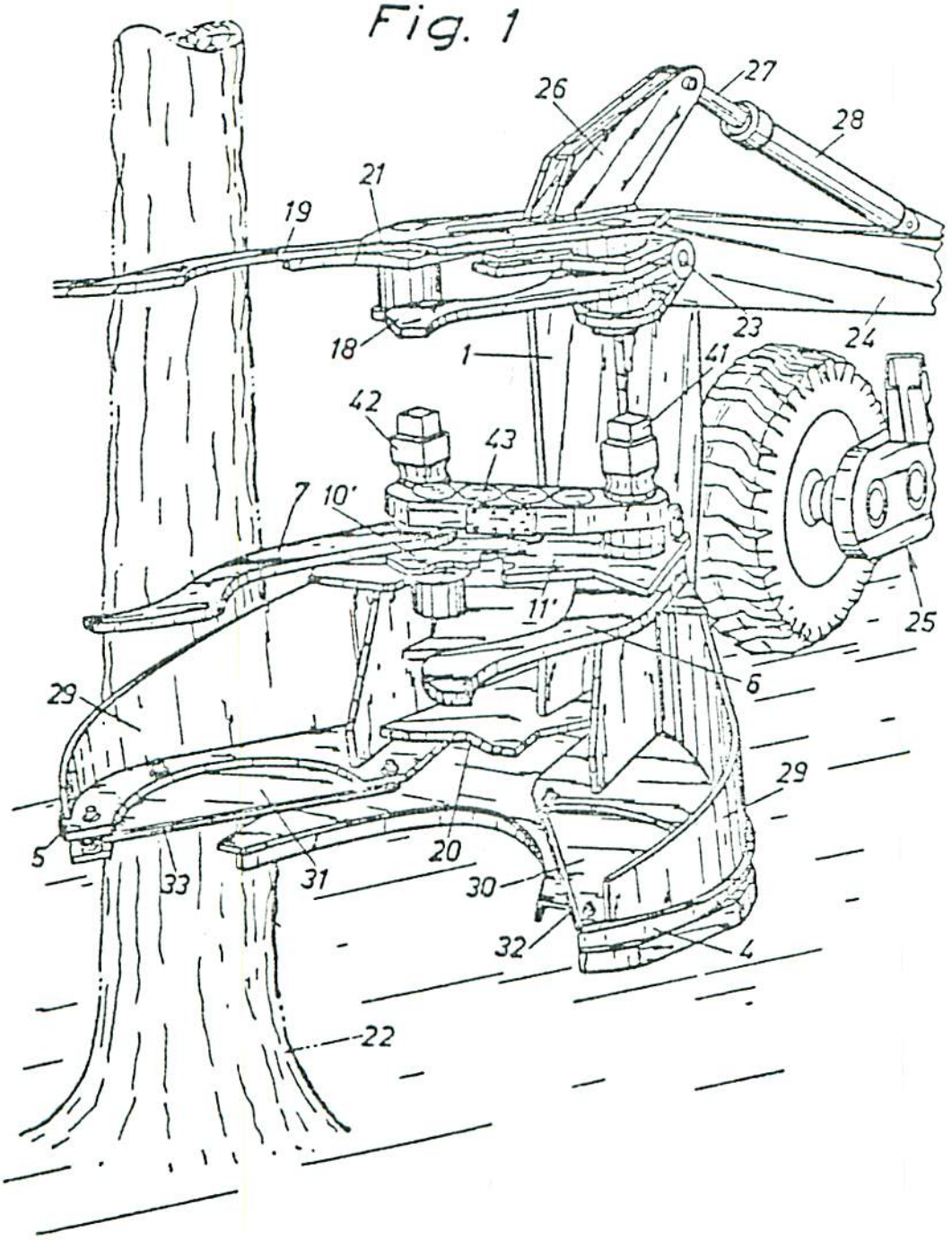
(21) APPLICATION No. 213,286
(22) FILED 741107

(30) PRIORITY DATE Sweden (7315516-0) 731115

No. OF CLAIMS 6

1008340
3-1

Fig. 1



(11) (A) No. 1036048

(45) ISSUED 780808

(52) CLASS 144-27
C.R. CL. 254-156

(51) INT. CL. [2] A01G 23/08

(19) (CA) CANADIAN PATENT (12)

(54) PROCEDURE FOR REDUCING THE GRIPPING FORCE REQUIRED FOR PULLING OUT TREES AND FOR SEPARATION OF ROOTS BY APPLICATION OF A FORCE ACTING ESSENTIALLY IN THE LONGITUDINAL DIRECTION OF THE TREE, AND AN APPARATUS FOR IMPLEMENTATION OF THE PROCEDURE

(70) Widegren, Lars H. and Keskitalo, Tage O.,
Sweden

Granted to Firma Elektro-Diesel,
Sweden

(21) APPLICATION No. 240,403

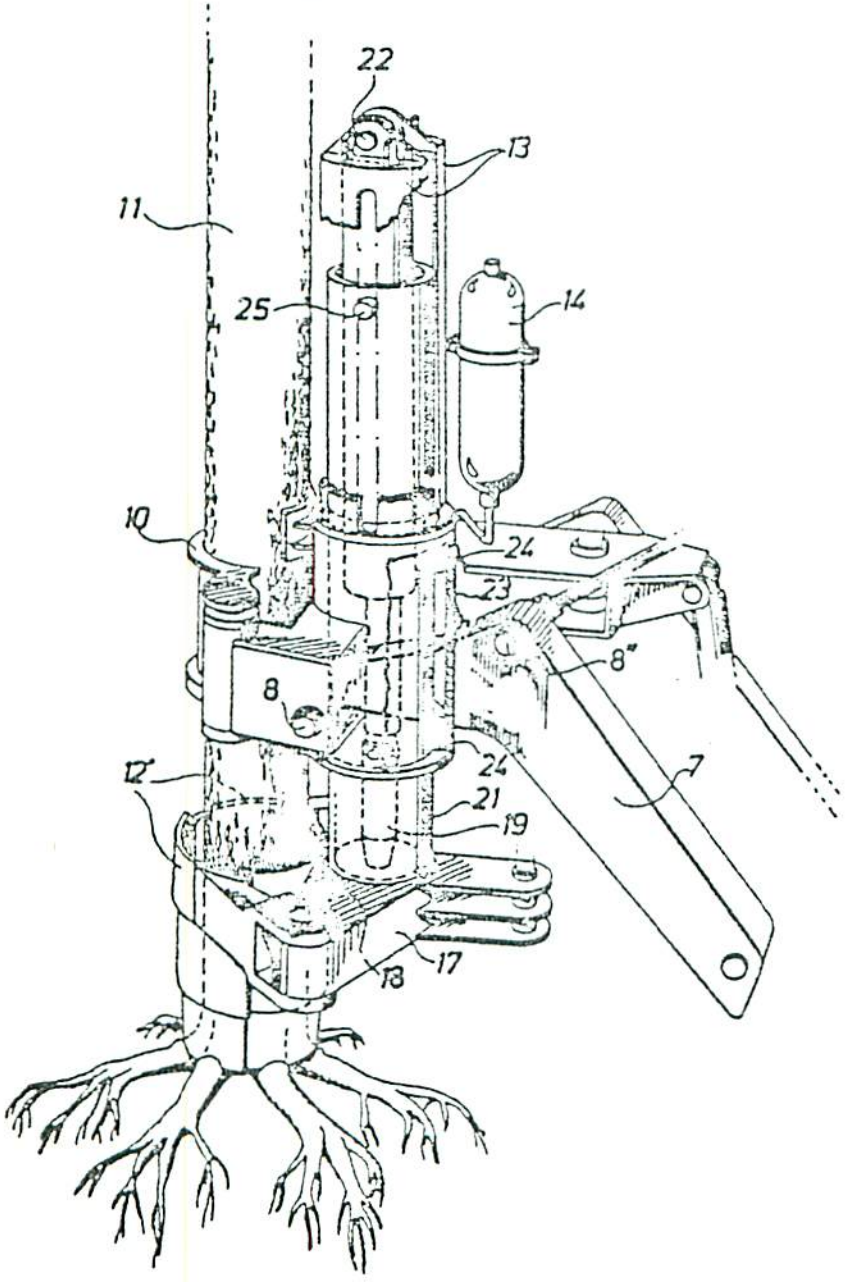
(22) FILED 751125

(30) PRIORITY DATE Sweden (74-14890-9) 741127

No. OF CLAIMS 22

1036048
2-2

Fig.3

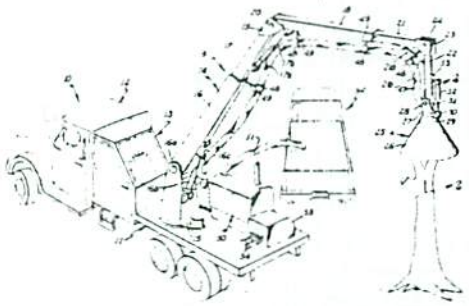


4,121,777

MOBILE TREE REMOVING APPARATUS

Richard M. Kolstad, Rte. 2, and Robert V. Anderson, Box 66, Hwy. 60 East, both of, St. James, Minn. 56081

Filed Sep. 15, 1977, Ser. No. 833,575
Int. Cl.[2] B02C 4/30
U.S. Cl. 241—58
5 Claims



1. A mobile tree removing apparatus comprising: a vehicle,
an elongate extensible and retractable boom structure mounted on said vehicle and including a plurality of elongate boom sections each having an outer end and an inner end, certain sections engaging the next adjacent section in telescoping relation and being longitudinally shiftable relative to each other, other boom sections being pivotally connected to the next adjacent section,
a cutting device including a housing,
means shiftably mounting said housing on the outer end of the outer section to permit shifting movement of the house relative to said outer section,
revolvable cutter members in said housing for engaging and cutting the limbs and trunks of trees into chips,
power means for revolving said cutter members,
means defining an elongate conduit having one end thereof communicating with said housing,
a vacuum pump connected to the other end of said conduit and being operable for removing chips from said housing through the conduit by means of a vacuum.

Swath Clearing

(11) (A) No. 1035673

(45) ISSUED 780801

(52) CLASS 144-33
C.R. CL.

(19) (CA) CANADIAN PATENT (12)

(54) FLAIL DELIMBER

(70) Larson, Robert W.,
Canada

(51) INT. CL. [2] A01G 23/00

(21) APPLICATION No. 237,344

(22) FILED 751009

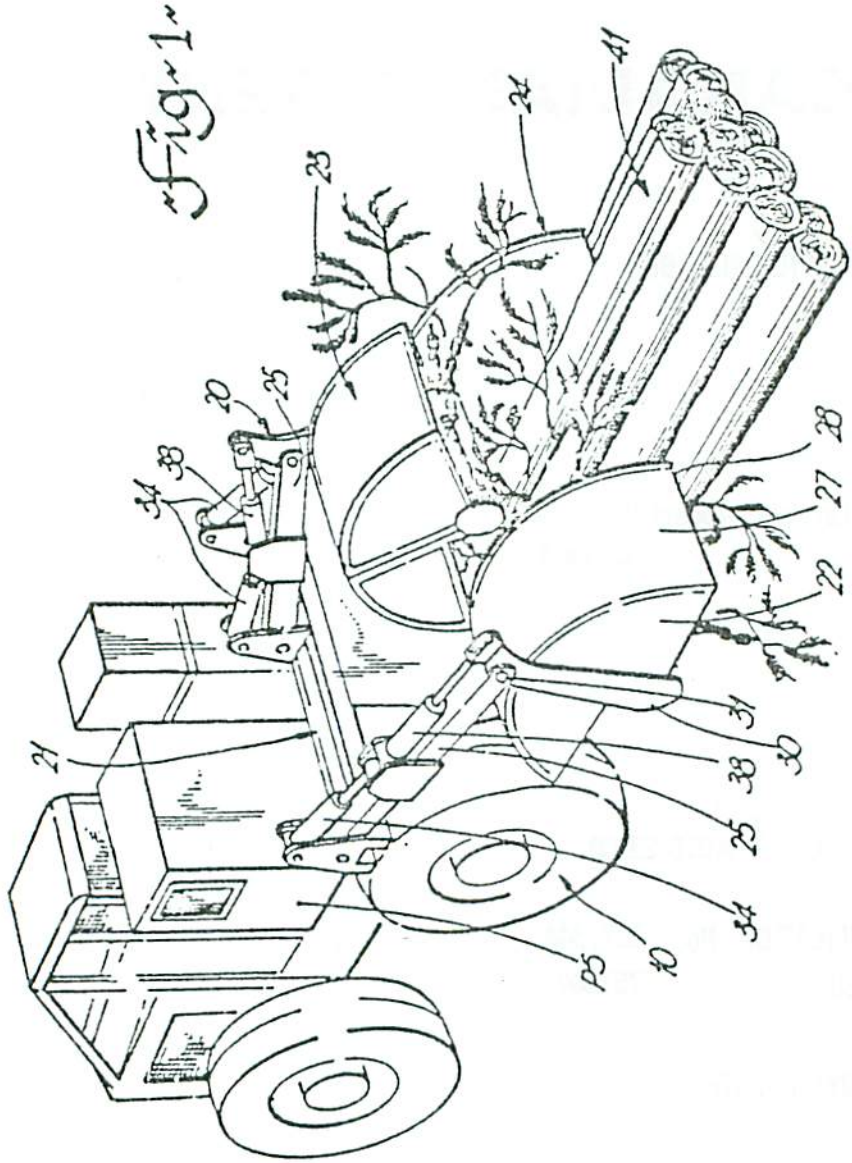
(30) PRIORITY DATE

No. OF CLAIMS 11

1,035673

7-1

Fig. 1



144-208.J

25

M. X. A from 56-26?

March 28, 1950 A. E. YENSEN ET AL 2,501,925

WEED DESTROYER

Filed Nov. 20, 1945 2 Sheets-Sheet 1

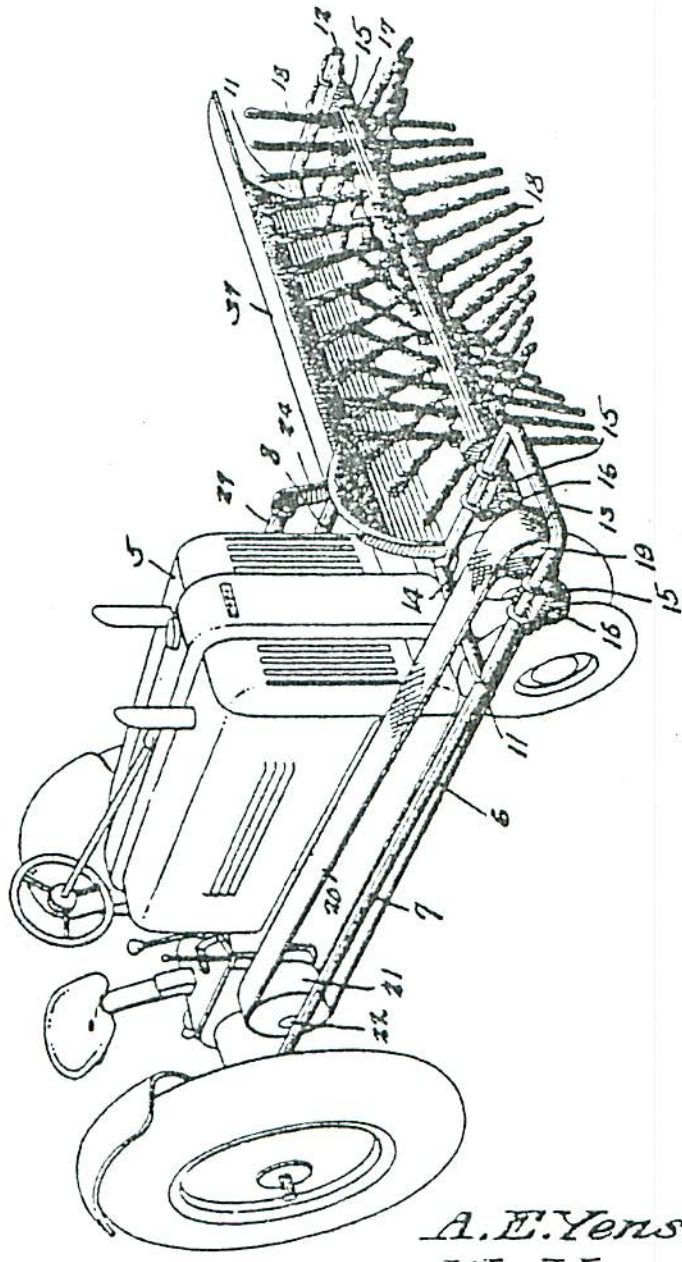


Fig. 1.

A. E. Yensen
W. Yensen
INVENTORS.

Copy in 56-29 M.X.
144-34 M.X.

BY Albert Co.
ATTORNEYS.

Feb. 8, 1944. H. C. SWERTFEGER 2,341,486

MOWING MACHINE

Filed March 19, 1942 2 Sheets-Sheet 2

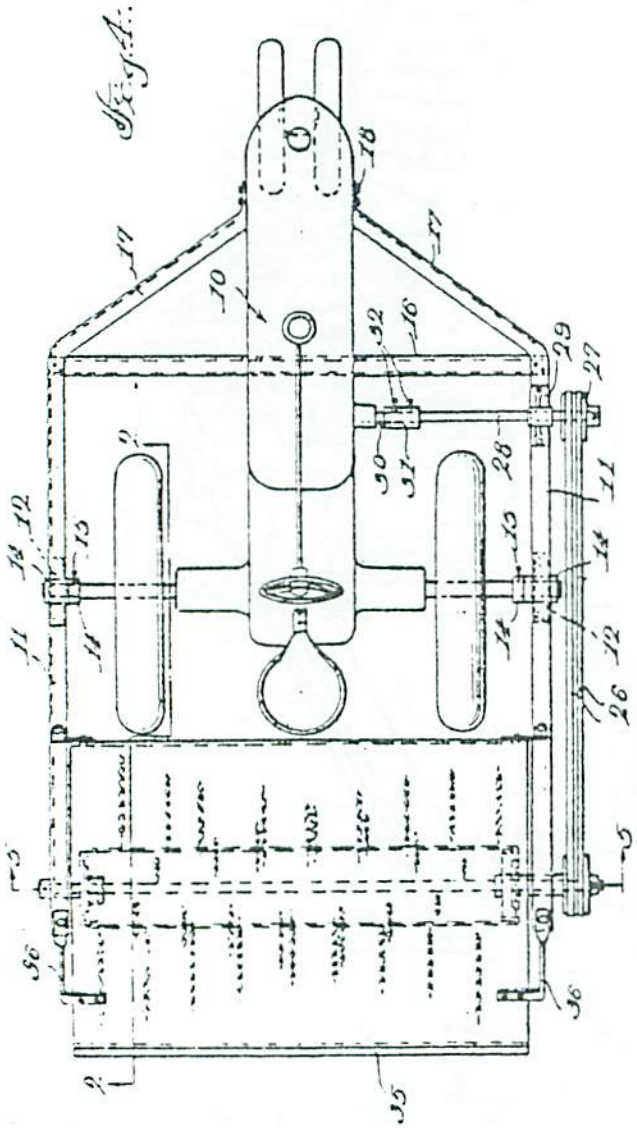


Fig. 4.

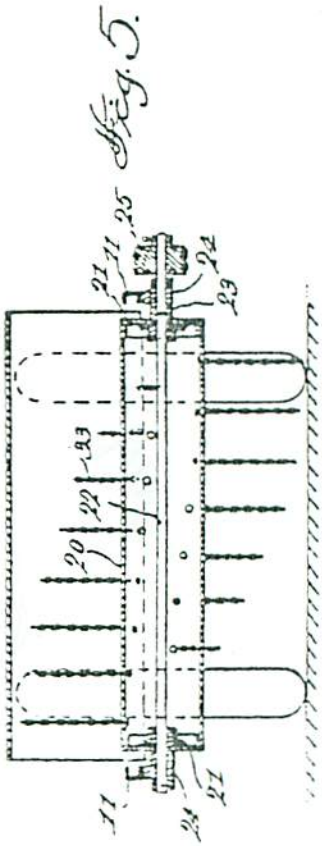


Fig. 5.

INVENTOR.
Harold C. Swertfeger
BY
Victor J. Evans & Co.
ATTORNEYS

United States Patent [19]

Schoonover

[11] 3,818,957

[45] June 25, 1974

[54] LAND CLEARING AND TREE PLANTING SITE PREPARATION APPARATUS

[75] Inventor: Richard H. A. Schoonover, Mercer Island, Wash.

[73] Assignee: Formac International, Inc., Seattle, Wash.

[22] Filed: Apr. 20, 1972

[21] Appl. No.: 245,972

[52] U.S. Cl. ..... 144/34 R

[51] Int. Cl. A01g 23/02

[58] Field of Search ..... 56/255, 256, 295; 144/2 N, 144/34 R, 34 A, 34 B, 309 AC

[56] References Cited

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3,343,575	9/1967	Trout	144/34 R
3,533,458	10/1970	McColl	144/309 AC
3,550,360	12/1970	Van Der Lely	56/295

Primary Examiner—Gerald A. Dost

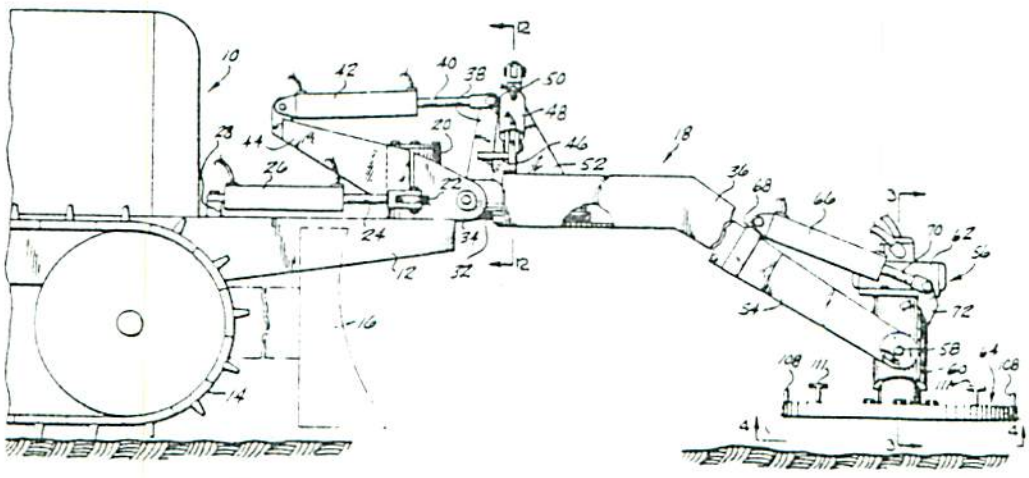
Attorney, Agent, or Firm—Christensen, O'Connor, Garrison & Havelka

[57] ABSTRACT

A brush and tree cutting and pulverizing or comminuting apparatus is mounted on a tracked vehicle. The apparatus includes embodiments for ground preparation for tree planting sites. In general, the apparatus has a cutting head which is mounted for movement on an articulated boom which is in turn mounted on the vehicle. The boom is articulated to manipulate the cutting head for lateral, vertical, pitch and roll movements. The cutter head includes a bearing block having a shaft journaled therein. The shaft is driven by a hydraulic motor. A cutting wheel is affixed to the lower free end of the shaft. Preferably the cutting wheel is a massive disc having a plurality of cutting tooth mounting bars arranged in a predetermined configuration on its bottom surface and on its periphery. Cutting teeth are movably attached to the mounting bars. The cutting wheel further includes a plurality of cutting teeth, preferably of two different types, affixed to the top surface of the cutting wheel. Other embodiments of the clearing apparatus include multiple wheels mounted generally for rotation in a horizontal plane on a boom. These cutting wheels can feed pulverized, cleared material to a conveyor for windrowing. The conveyor is attached to the side of the vehicle on which the boom is mounted. Other embodiments of the land clearing apparatus can include multiple booms mounted on the vehicle, each of which has a cutting wheel mounted for rotation thereon. In addition, the apparatus can include a cutting wheel mounted for rotation in a generally vertical plane positioned at least in part above a horizontally cutting wheel. This embodiment of the apparatus can include feeder teeth for driving brush downwardly toward the horizontal cutting wheels.

In another embodiment of the invention a site preparation wheel is attached to a movable boom in turn mounted on a vehicle. The site preparation wheel can be a massive disc mounted on a hub in turn mounted on a rotatable shaft on the head of the boom. A plurality of massive ground and rock cutting teeth are arranged in a predetermined pattern and affixed to the bottom portion of the disc. The disc can include an auger means mounted coaxially with the hub to initially break ground for the preparation wheel, to guide the ground and rock cutting teeth into appropriate engagement with the site being prepared, and to excavate a planting hole for a tree. The site preparation wheel can also include a plurality of elongate blades mounted on the wheel or hub. The blades have a ground-engaging elongate cutting surface on the bottom thereof. A shroud can be affixed to the outer portion of these elongate blades to retain dirt or earth removed by the blades at the site rather than spewing the loosened dirt aside.

33 Claims, 50 Drawing Figures



4,125,987

ROW CROP HARVESTER

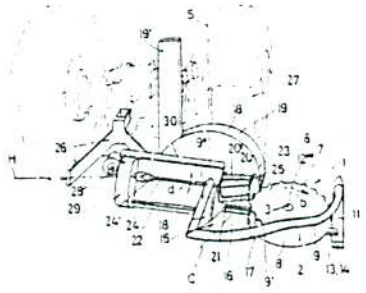
Bernard Krone, Spelle, and Wilhelm Ahler, Stadtlohn, both of Germany, assignors to Maschinenfabriken Bernard Krone GmbH, Spelle, Germany

Filed Oct. 1, 1976, Ser. No. 728,772

Claims priority, application Fed. Rep. of Germany, Oct. 3, 1975, 2544200

Int. Cl.[2] A01D *45/02*

U.S. Cl. 56—13.3 8 Claims



1. A machine for cutting and chopping of crops with stalks which is adapted to be pulled in a direction of travel by a tractor or the like over the ground on which the crop with stalks to be harvested is located, comprising in combination,

a guide casing having vertical wall means;

a cylindrical drum rotatably mounted on the guide casing about a substantially vertical axis, said drum having gripper teeth extending from its periphery; the direction of travel of the drum corresponding to the twelve o'clock position on the drum, a first portion of said vertical wall means extending substantially parallel to the cylindrical surface of the drum at a distance therefrom from its 3-o'clock position to its 8-o'clock position and defining therewith a pulling in passage for the crop to be harvested, a second portion of said vertical wall means merging with said first portion and forming a feed trough which extends substantially tangentially with respect to said drum;

a chaff blower having an inlet is operatively mounted contiguous to said feed trough;

a pair of feed rollers are operatively mounted on said guide casing immediately upstream of said inlet of said chaff blower;

cutting means are connected to said first portion of said vertical wall means and extend into said pulling in passage;

whereby the stalks of the crop are adapted to be seized by the gripper teeth of the drum and transported into said pulling in passage in said cutting means where the stalks are cut off and thereafter the cut stalks are transported to

(11) (5) No. 1024044

(45) ISSUED 780110

(52) CLASS 144-26
C.R. CL.

(19) (CA) # CANADIAN PATENT

(54) CLEARING MACHINE FOR BRUSHWOOD

(72) Pallari, Kyösti,
Finland

(21) APPLICATION No. 236,712
(22) FILED 750930

(30) PRIORITY DATE

No. OF CLAIMS 6

1024044

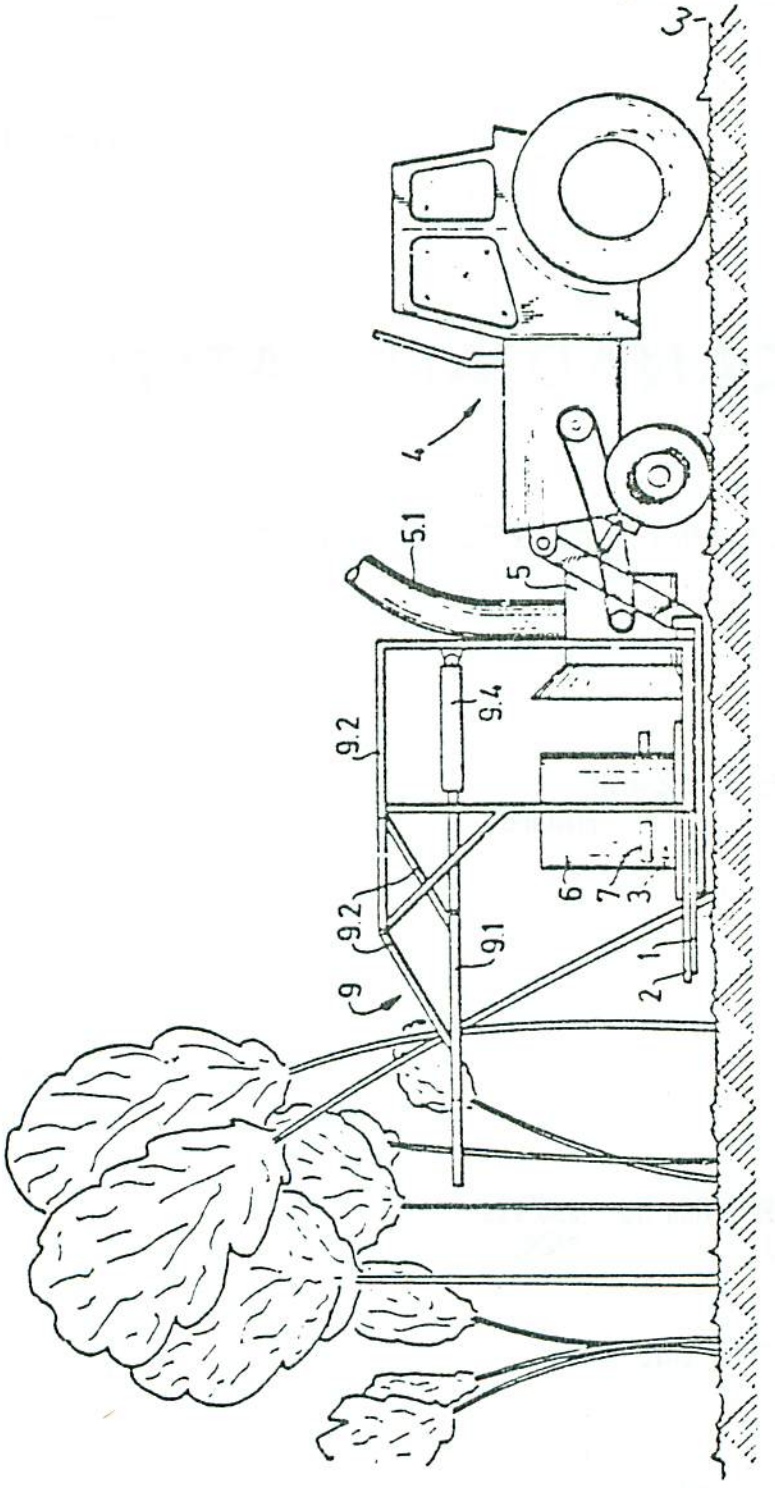


Fig.1

1024044

3-2

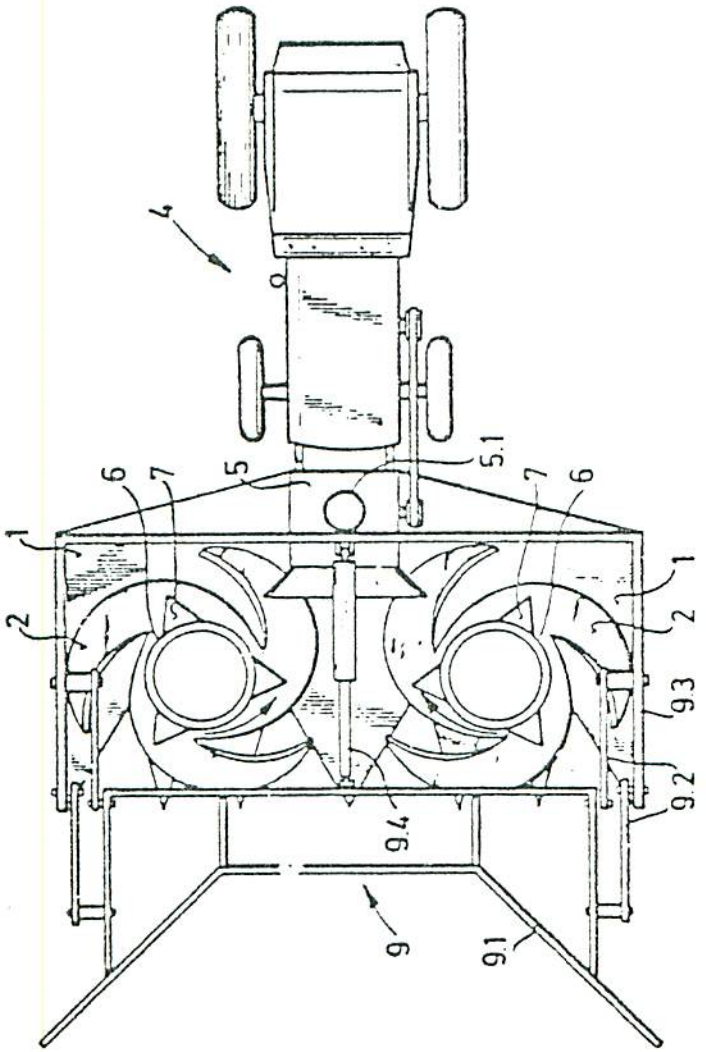


Fig.2

Trash and Vegetation Clearing

(11) (C) No. 1019656

(11) ISSUED 771025

(52) CLASS 144-25
C.R. CL.

(19) (C) CANADIAN PATENT

(54) TREE HARVESTING MACHINE OF A WALKING TYPE

(72) McColl, Bruce J.,
Canada

Granted to Owens-Illinois, Inc.,
U.S.A.

(21) APPLICATION No. 252,856
(22) FILED 760519
DIV'N OF APPL'N No. 197,453 filed 740411

(30) PRIORITY DATE U.S.A. (425,056) 731214

No. OF CLAIMS 16

1019656

12.2

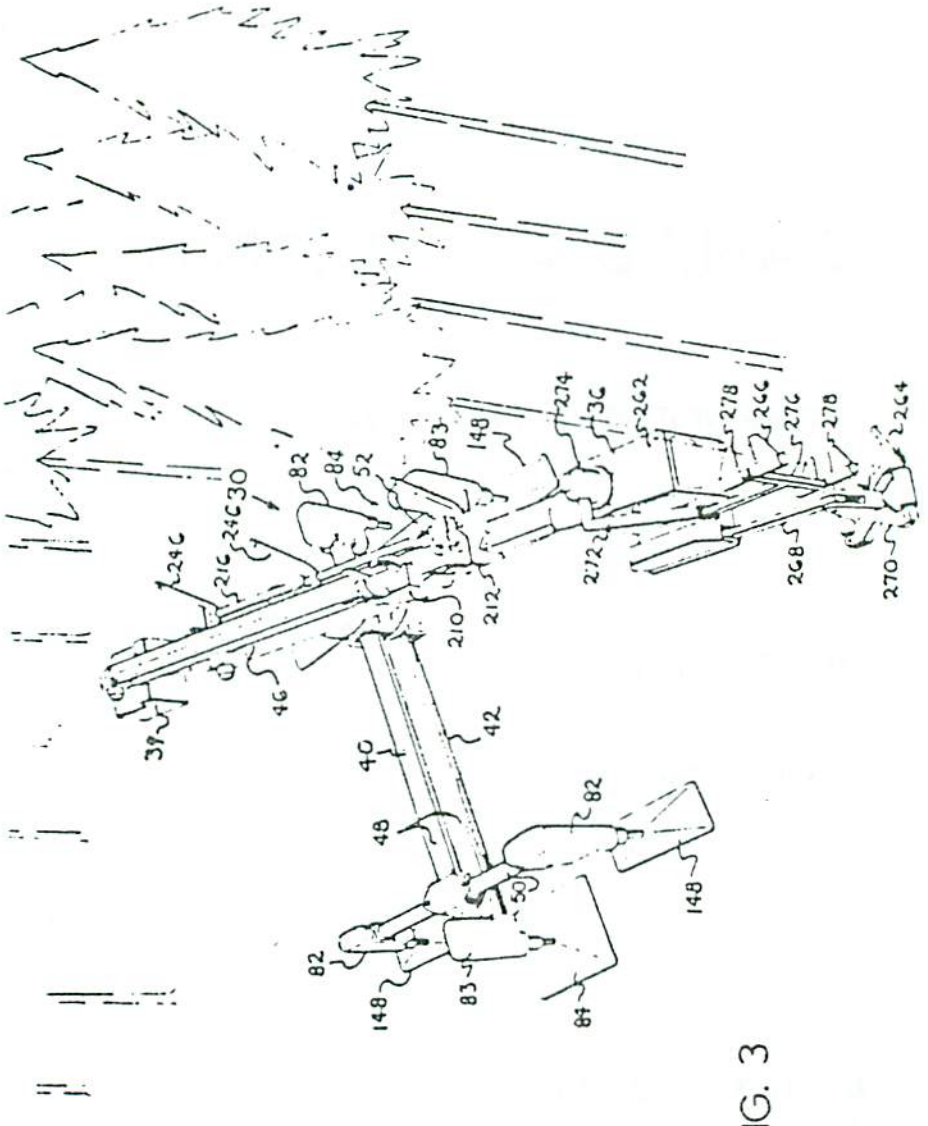


FIG. 3

(11) (A) No. 1004118

(45) ISSUED 770125

(52) CLASS 144-27
C.R. CL.

(19) (A) CANADIAN PATENT

(54) MULTIPLE CUT FELLER

(72) Larson, Robert W.,
Canada

(21) APPLICATION No. 200,151
(22) FILED 740516

(30) PRIORITY DATE

No. OF CLAIMS 24

1004118
8-4

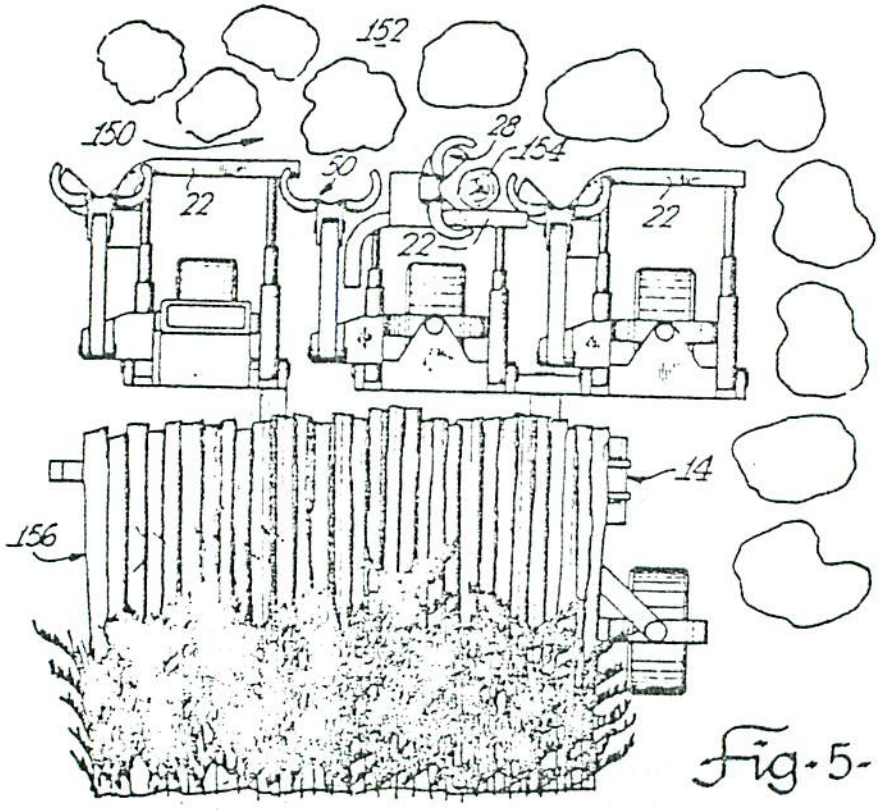


Fig-5-

(11) No 1029283

(45) ISSUED 780411

(52) CLASS 144-27
C.R. CL. 56-42
143-21

(19)(CA) # CANADIAN PATENT

(54) CONTINUOUS FELLING OF TREES

(72) Hyde, Bruce and Tyndall, Wayne,
Canada

Granted to Prince Albert Pulpwood Ltd.,
Canada

(21) APPLICATION No. 248,561
(22) FILED 760323

(30) PRIORITY DATE

No. OF CLAIMS 32

1029283

5-1

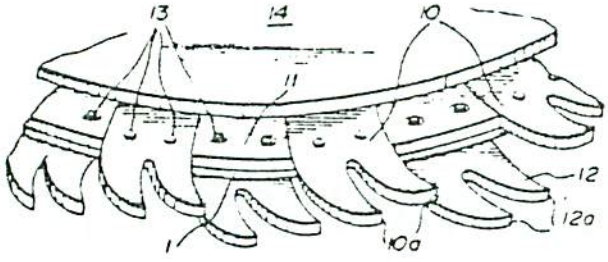


FIG. 5

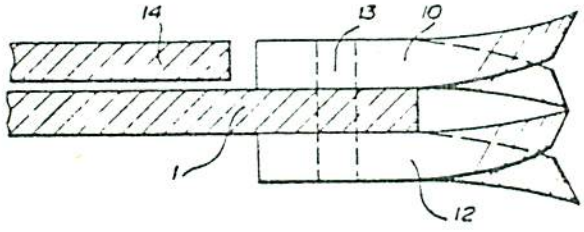


FIG. 6

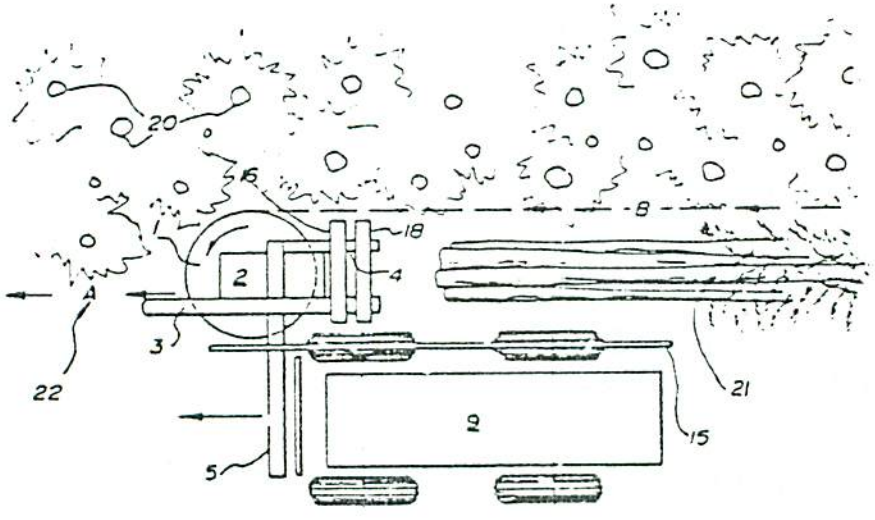


FIG. 7

April 29, 1958 E. W. LAHAR 2,832,382

TRACTOR MOUNTED LAND CLEARING TREE SHAVER

Filed Aug. 3, 1956 2 Sheets-Sheet 1

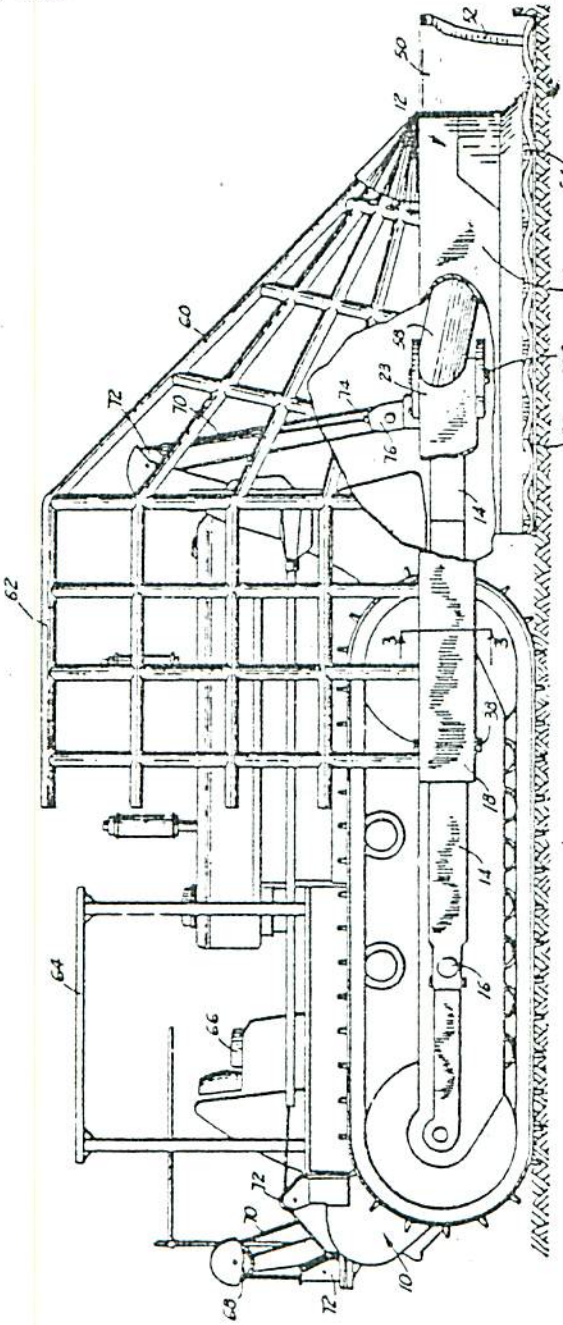


Fig. 1

INVENTOR.
E. W. Lahar

BY

ATTORNEY

Jan. 9, 1951 D. R. GARRETSON 2,537,404

BRUSH CHOPPING MACHINE

Filed Dec. 1, 1945 6 Sheets-Sheet 1

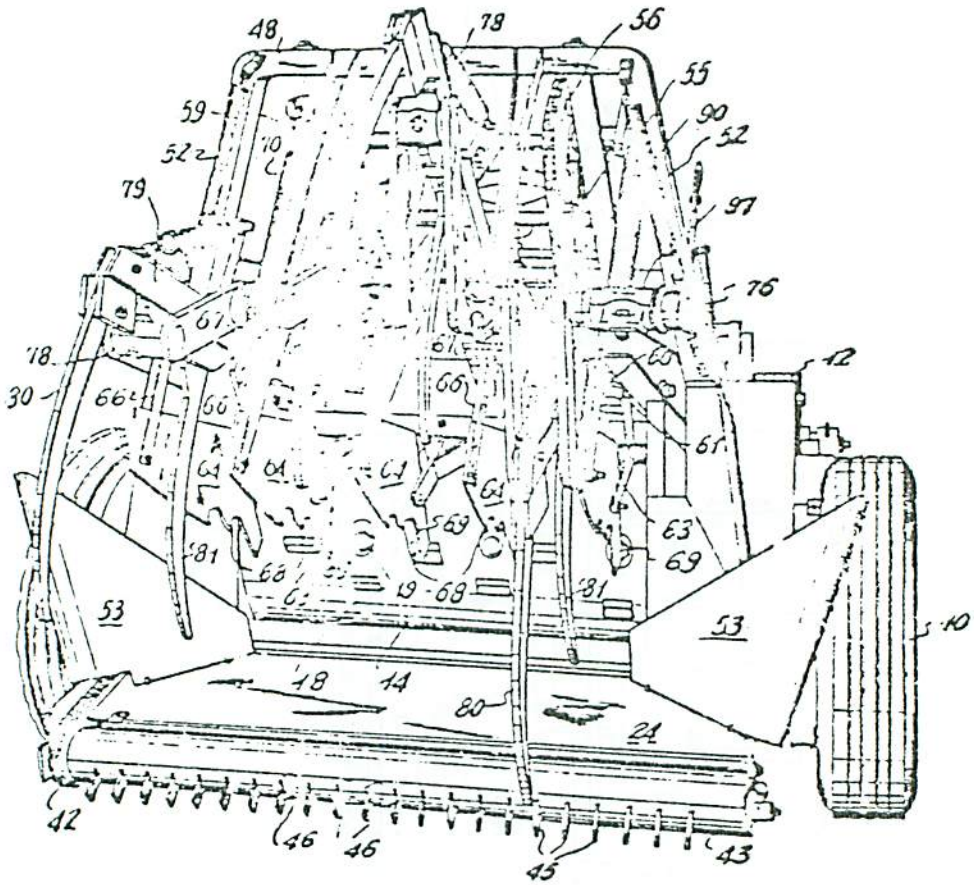


Fig. 1

INVENTOR
DAVIS R. GARRETSON
BY
Hazard & Miller
Attorneys

United States Patent

Scarnato et al.

[15] 3,673,779

[45] July 4, 1972

[54] HARVESTING MACHINE

[72] Inventors: Thomas J. Scarnato, Barrington; Paul C. Grodon, Hinsdale; Stephen R. Hunter, Downers Grove; Paul W. Krage, Elmhurst; Richard A. Zablocki, Chicago, all of Ill.

[73] Assignee: International Harvester Company, Chicago, Ill.

[22] Filed: April 23, 1970

[21] Appl. No.: 31,111

[52] U.S. Cl. 56/503, 56/DIG. 1

[51] Int. Cl. A01d 49/00

[58] Field of Search 56/DIG. 1, 503, 192, 14.5, 56/14.4, 14.1, 14.3, 12.3, 10.2, 11.9

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1,578,285	7/1969	France	56/DIG. 1
1,507,224	12/1969	Germany	56/DIG. 1

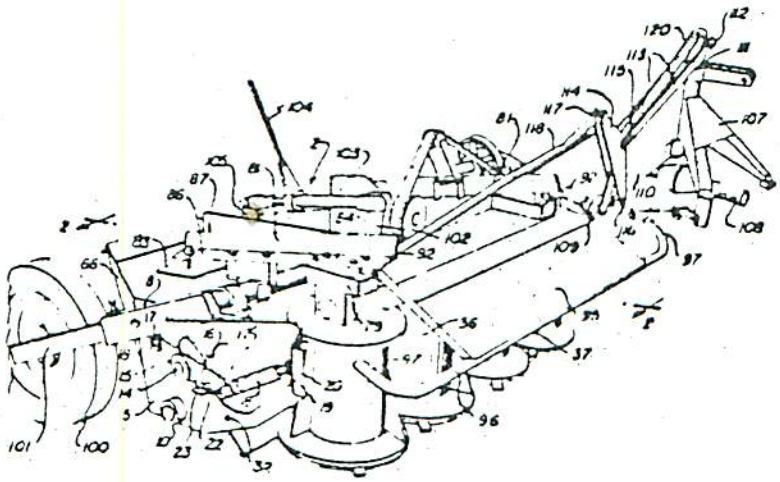
Primary Examiner—Russell R. Kinsey

Attorney—Floyd B. Harman

[57] ABSTRACT

A mower conditioner comprising disk-type mowers ahead of the conditioning rollers functioning to cut and throw the material directly to the conditioning rollers. Another embodiment utilizes disks which provide unobstructed top surfaces which serve to accept the material and to sling the material rearwardly into the conditioning rollers.

19 Claims, 6 Drawing Figures



United States Patent [19]

Koziol

[11] **3,866,397**

[45] **Feb. 18, 1975**

[54] **BRUSH ERADICATOR**

[76] Inventor: **Robert L. Koziol**, 3200 Thomas St., Midland, Tex. 79701

[22] Filed: **Nov. 27, 1972**

[21] Appl. No.: **309,765**

[52] U.S. Cl. **56/16.8**, 56/11.9, 47/1.43, 47/1.7

[51] Int. Cl. **A01d 35/12**

[58] Field of Search ..... 56/1, 16.8, 13.6, 327, 56/11.9; 47/1, 1.5, 1.7; 239/DIG. 6, DIG. 8, 172

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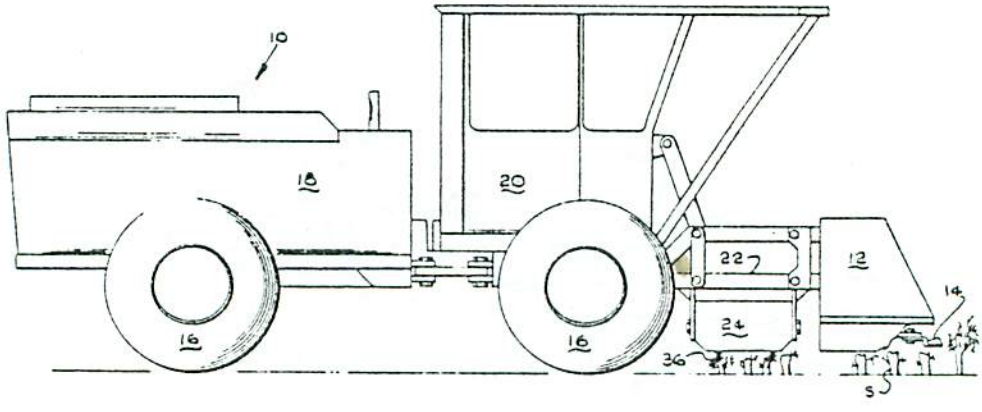
49,831	5/1939	France	47/1.7

Primary Examiner—Russell R. Kinsey
Attorney, Agent, or Firm—Wendell Coffee

[57] **ABSTRACT**

Immediately after unwanted brush is shredded by flails, the exposed stumps are sprayed with herbicide. Flexible flaps or fingers trip on the stumps and activate the herbicide spray; therefore conserving other vegetation and, also, conserving the herbicide.

9 Claims, 4 Drawing Figures



4,110,959

MOWING DEVICE

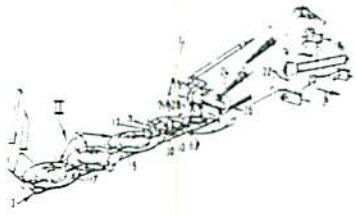
Pieter Adriaan Oosterling, and Hendricus Cornelis van Staveren, both of Nieuw-Vennep, Netherlands, assignors to Multinorm, B.V., Nieuw-Vennep, Netherlands

Filed Nov. 2, 1976, Ser. No. 738,079

Claims priority, application Netherlands, Nov. 28, 1975, 7513926

Int. Cl.[2] A01D *55/18*

U.S. Cl. 56—295 9 Claims



1. A mowing device comprising a housing extending transversely of the direction of movement of said device, a plurality of shafts rotatably journalled in said housing and driving gear means arranged in said housing for driving the shafts each shaft projecting upwardly from said housing to present an exposed upper end, and a cutter member fixed to the upper end of each shaft, each cutting member comprising at least one lower ring of substantially circular, uninterrupted circumference, skimming the top side of the housing, an upper ring covering the lower ring, means securing said upper and lower rings together as a unit and including at least one pin, and at least one cutter fastened at the circumference of the cutting member between the upper and lower rings by said pin and projecting radially beyond said lower ring, the cutters of neighbouring cutting members being relatively off-set in the circumferential direction, each upper ring being of irregular shape in plan view to expose at least that portion of the lower ring of each cutting member which is overlapped by the path of travel of each cutter of a neighbouring cutting member.

4,099,369

MOWING DEVICE

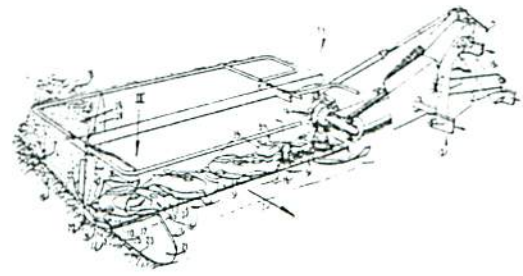
Pieter Adriaan Oosterling, and Hendricus Cornelis van Staveren, both of Nieuw-Vennep, Netherlands, assignors to Multinorm, B.V., Nieuw-Vennep, Netherlands

Filed Oct. 5, 1976, Ser. No. 729,827

Claims priority, application Netherlands, Oct. 10, 1975, 7511970

Int. Cl.[2] A01D *63/00*

U.S. Cl. 56—314 26 Claims



1. A mowing device comprising a housing extending transversely of the direction of travel of the mowing device, a plurality of upright shafts journalled in said housing, driving gear means accommodated in said housing and driving the shafts, a plurality of cutting members, one fixed to the upper end of each shaft, supporting means having a supporting surface bearing on the ground for supporting the mowing device on the field so that the outermost cutting member at one end of the housing is disposed a predetermined distance above the ground to define a cutting level thereat, and at least one screen attached to said one end of the housing and having a front portion extending in front of the outermost cutting member, viewed in the direction of travel and being located just inside the outermost path of said outermost cutting member, but at a higher level than said outermost cutting member, said screen having a lower rim near the outermost cutting member, which extends further outwardly than the front portion and is disposed outside of the outermost cutting member, the lower rim of the screen being located at a higher level than the supporting surface approximately at said predetermined distance above the ground.

4,112,656

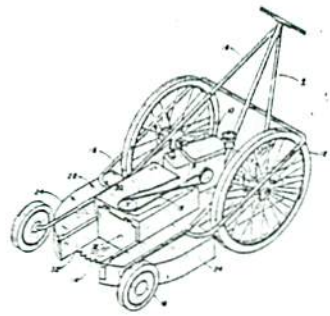
LAWN MOWING BRUSH CUTTER

Jerry Ranko, 504 Reiss St., Meraux, La. 70043, and Frederick E. Ranko, 2709 Barton Dr., Meraux, La. 70075

Continuation-in-part of Ser. No. 645,777, Dec. 31, 1975, abandoned. This application Jan. 19, 1977, Ser. No. 760,596

Int. Cl.[2] A01D *55/18*

U.S. Cl. 56—320.1 3 Claims



1. A lawn mowing brush cutter comprising in combination:

a. a cart having a base with a forward center recess, a pair of small front wheels, a pair of large weight carrying rear wheels, and a rear handle for propelling and guiding said cart by said large wheels;

b. a power supply mounted on said cart between said pair of weight carrying rear wheels and forwardly of said rear handle;

c. dual purpose cutter means horizontally mountable on said cart and in said base and between said front wheels and said power supply for rotation by the power supply to cut swathes of brush and grass defined by the forward center recess in said base;

d. a single purpose mowing means mountable on said dual purpose cutting means in radial extension thereof and in combination therewith for mowing a wider swathe of grass than said dual purpose cutter means; and

e. base adapter means including (1) a removable cover means for covering said forward center recess to make said base continuous and permitting said dual purpose cutter means and said single purpose cutter means to cut grass and (2) a removable recess member positionable with said forward center recess and cooperable with said dual purpose cutter means to establish and mowing swathes.

(11) (A) No. 999803

(45) ISSUED 761116

(52) CLASS 144-87
C.R. CL.

(19)(CA) # CANADIAN PATENT

(54) MACHINE FOR CUTTING WOOD OR OTHER LIGNEOUS MATERIAL INTO SMALL PIECES, AND ALSO FOR FELLING

(72) Heron, Pierre D.,
France

Granted to Centre Technique du Bois,
France

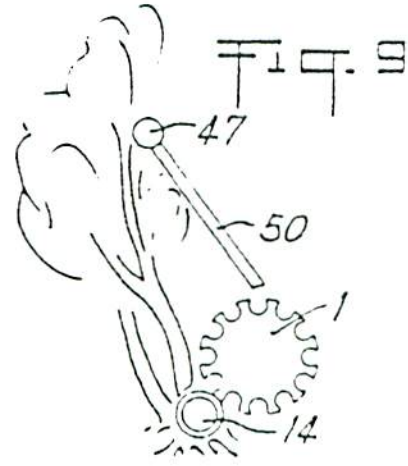


FIG. 9

(21) APPLICATION No. 204,150
(22) FILED 740705

(30) PRIORITY DATE France (73 24 796) 730705

No. OF CLAIMS 17

Stump Removal

United States Patent [19]

Forslund

[11] 4,048,733

[45] Sept. 20, 1977

[54] DEVICE FOR USE IN REMOVAL OF STUMPS

[75] Inventor: Erik Torsten Forslund, Alfta, Sweden

[73] Assignee: Ostbergs Fabriks AB, Alfta, Sweden

[21] Appl. No.: 728,286

[22] Filed: Sept. 30, 1976

[30] Foreign Application Priority Data

Oct. 1, 1975 Sweden 7511007

[51] Int. Cl.² A01B 13/00

[52] U.S. Cl. ..... 37/2 R; 144/34 A

[58] Field of Search ..... 37/2 R, 2 P; 83/658, 83/928; 144/34 A

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304,909	7/1971	U.S.S.R.	37/2 R
282,799	8/1969	U.S.S.R.	37/2 R
324,024	2/1972	U.S.S.R.	37/2 R
247,695	11/1969	U.S.S.R.	37/2 R

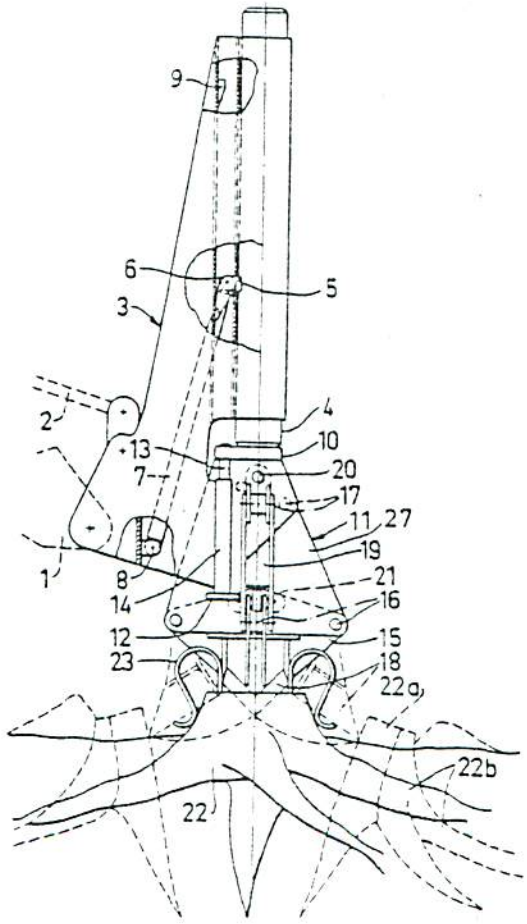
Primary Examiner—E.H. Eickholt

Attorney, Agent, or Firm—Pierce, Scheffler & Parker

[57] ABSTRACT

At the end of a vehicle-carried crane arm a vertically extending frame is supported which at its lower end carries a movable split head with spreadable chopping blades. A ram raisable to the top of the frame drives, when released, by the impact on the split head the blades into the center of a tree stump that is to be extracted from the earth. Then the blades are spread to break the stump into separate portions which are easily individually removable in a direction substantially following the extension of the roots.

7 Claims, 2 Drawing Figures



United States Patent [19]

Shivers, Jr. et al.

[11] 4,074,447

[45] Feb. 21, 1978

[54] STUMP CUTTING AND PRECISION DIGGING APPARATUS

[76] Inventors: Norman E. Shivers, Jr.; David E. Shivers, both of 121 W. El Segundo, Los Angeles, Calif. 90061; Paul N. Shivers, 424 E. Foothill Blvd., Apt. D, Monrovia, Calif. 91610

[21] Appl. No.: 714,568

[22] Filed: Aug. 16, 1976

[51] Int. Cl.² A01G 23/06

[52] U.S. Cl. ..... 37/2 R; 37/94; 144/2 N; 172/512; 241/37.5; 299/39

[58] Field of Search ..... 37/94, 189, 2 R, DIG. 6; 144/2 N, 2 Z, 241, 311, 252 R; 299/39, 89; 172/112, 42, 27, 28, 512; 56/504, 500, 12.7; 83/928; 241/37.5, 101.7

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556,966	2/1957	Italy	280/47.37

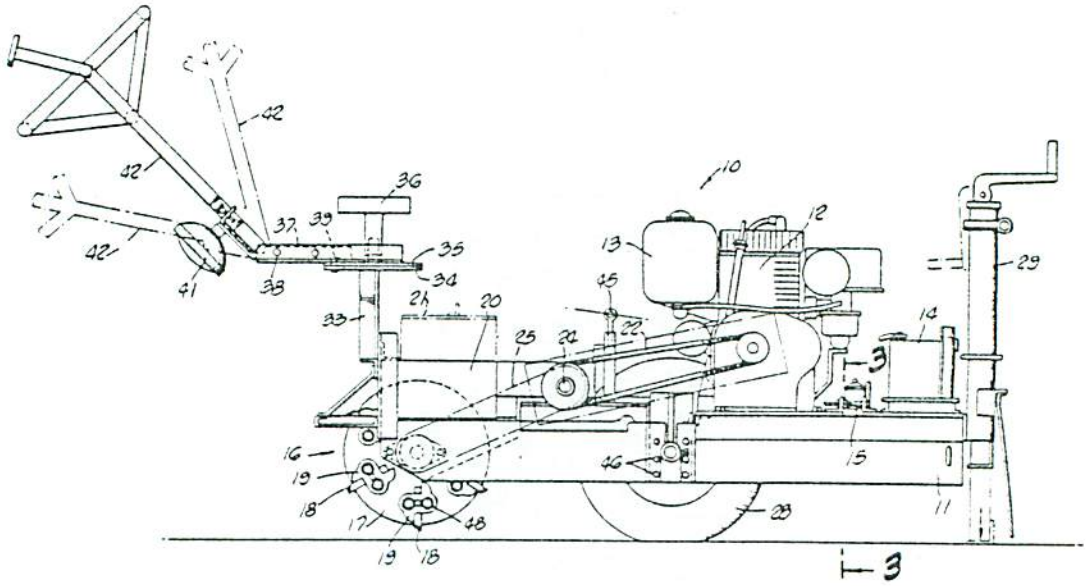
Primary Examiner—Clifford D. Crowder

Attorney, Agent, or Firm—Frank Frisenda, Jr.

[57] ABSTRACT

A stump cutter and earth ripper device having a balanced channel frame chassis, the device including a forward centrally disposed cutting wheel having a plurality of radially extending cutting teeth circumferentially mounted thereon. The frame is supported by a pair of pneumatic tires mounted on individually adjustable and telescopic axles. A unique and rotationally adjustable handle provides accurate control of the device during operation.

18 Claims, 8 Drawing Figures



(11) (C) (CA) No. 924103

(45) ISSUED Apr. 10, 1973

(52) CLASS 37-2
C.R. CL. 262-76
262-78

(10) CANADIAN PATENT

(54) ROTARY CUTTING DEVICE

James F. McCreery, Greensburg, Pennsylvania, U. S. A.

Granted to Kennametal Inc., Latrobe, Pennsylvania, U. S. A.

(21) APPLICATION No. 106,247
(22) FILED Feb. 25, 1971

(30) PRIORITY DATE

No. OF CLAIMS 9

CANADA

924103

3-1

FIG-1

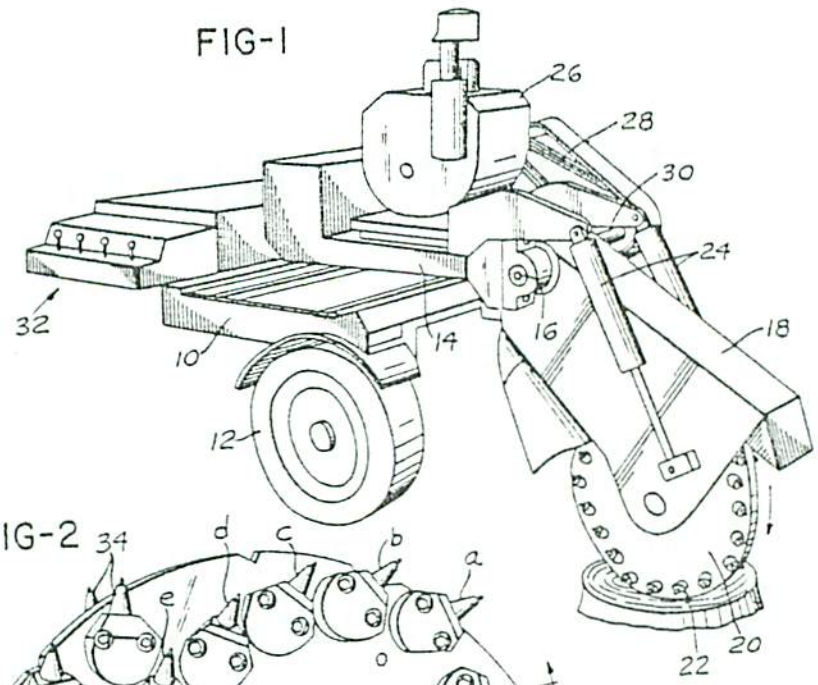
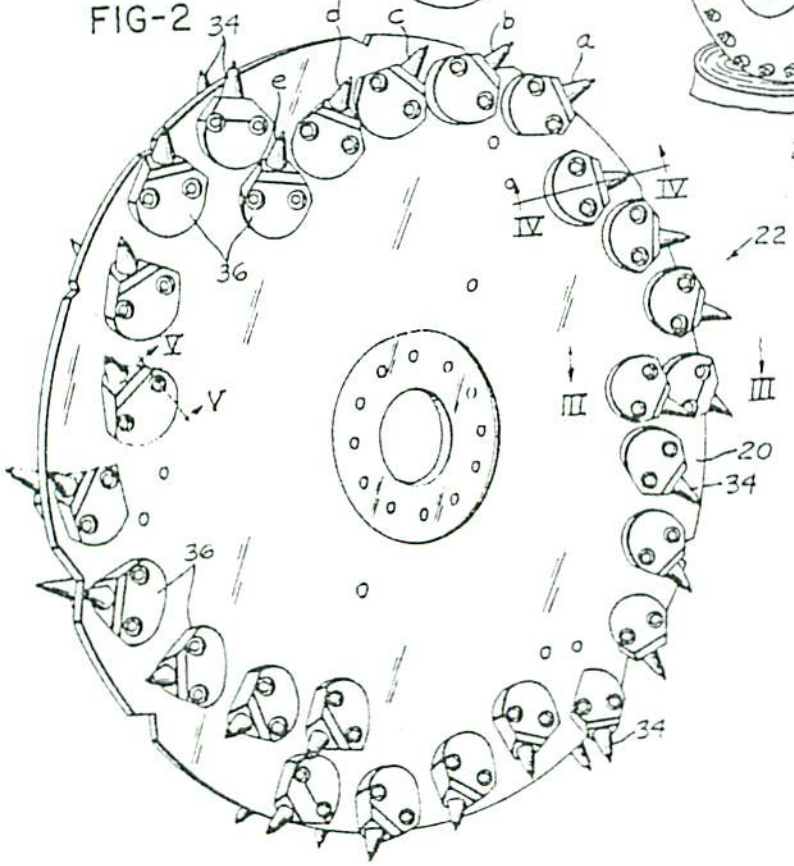


FIG-2



(11) (A) No. 1012039

(45) ISSUED 770614

(52) CLASS 144-24
C.R. CL.

(19) (CA) CANADIAN PATENT

(54) STUMP SPLITTER

(72) Bartlett, Raymond H.,
U.S.A.

(21) APPLICATION No. 212,963
(22) FILED 741104

(30) PRIORITY DATE

No. OF CLAIMS 11

1012039
5.1

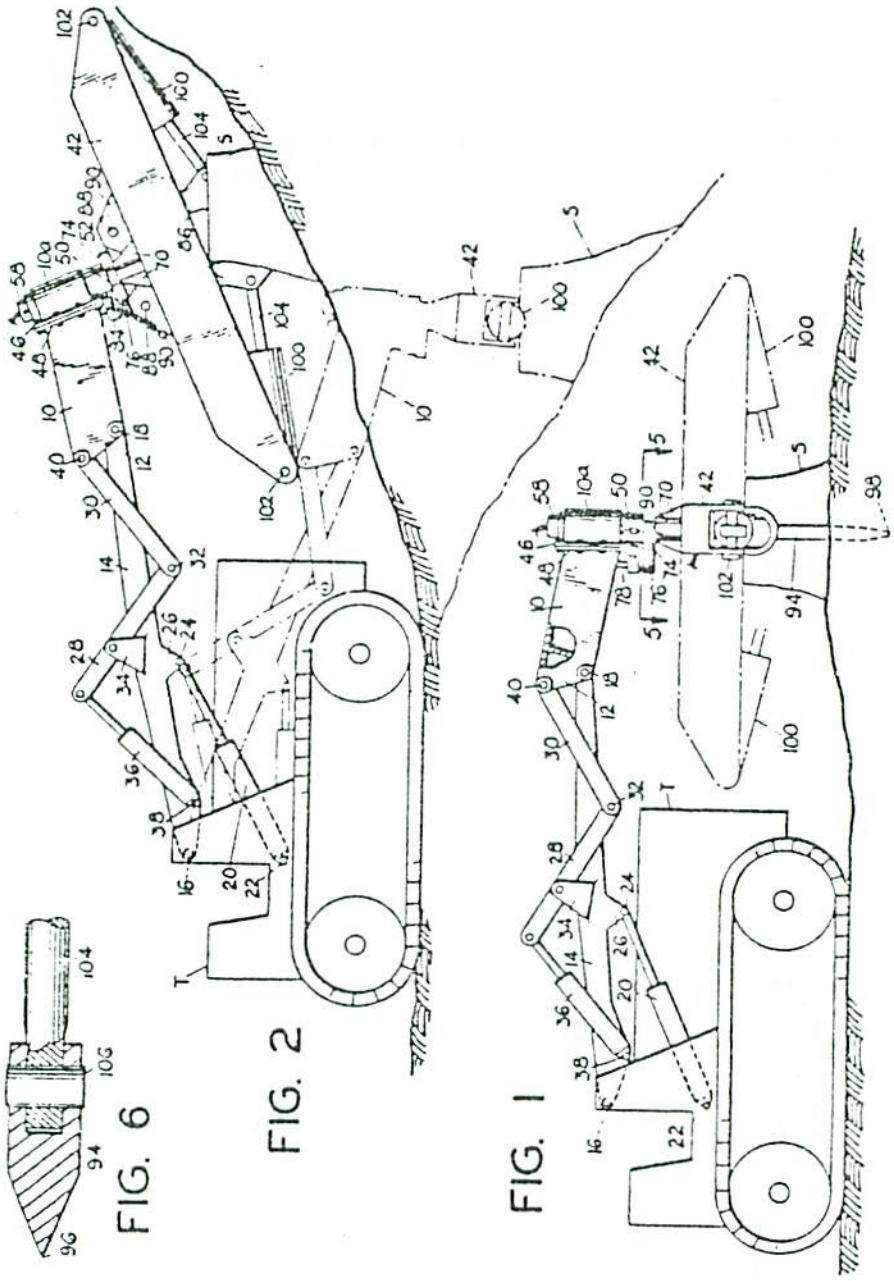


FIG. 6

FIG. 2

FIG. 1

(11) (1) No. 1026652

(45) ISSUED 780221

(52) CLASS 144-24
C.R. CL.

(19)(CA) CANADIAN PATENT

(54) STUMP ERADICATOR

(72) Grover, Ross D.,
U.S.A.

Granted to Ram Industries, Inc.,
U.S.A.

(21) APPLICATION No. 233,200
(22) FILED 750811

(30) PRIORITY DATE U.S.A. (585,459) 750610

No. OF CLAIMS 4

1026652

3-1

FIG 2

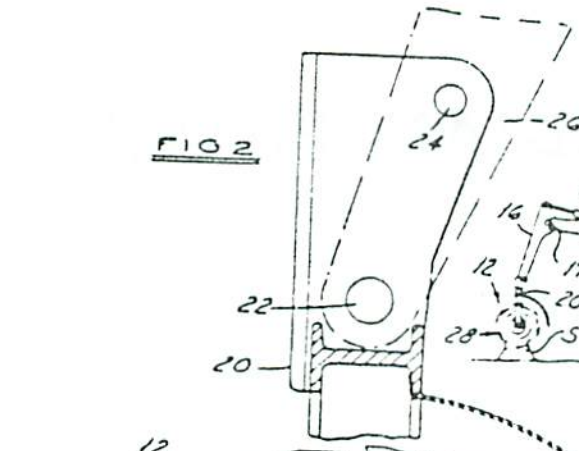
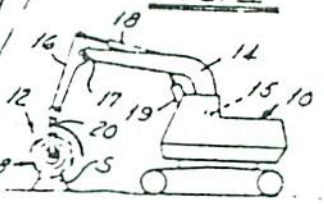
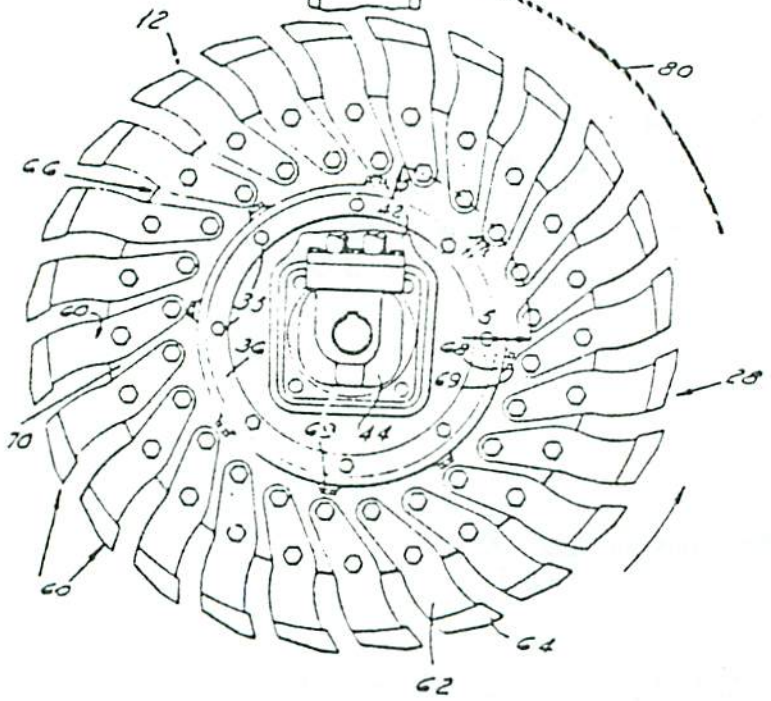


FIG 1





United States Patent

[11] 3,613,799

[72] Inventor Albert G. Bodine
7877 Woodley Ave., Van Nuys, Calif.
91406

[21] Appl. No. 742,933
[22] Filed July 5, 1968
[45] Patented Oct. 19, 1971
Continuation of application Ser. No. 460,628, June 2, 1965, now Patent No. 3,410,351, which is a continuation-in-part of application Ser. No. 326,419, Nov. 27, 1963, now Patent No. 3,269,039, which is a continuation-in-part of application Ser. No. 163,802, Jan. 2, 1962, now abandoned, which is a division of application Ser. No. 839,196, Sept. 10, 1959, now Patent No. 3,030,715.

[54] SONIC SOIL TILLER AND ROCK REDUCER
5 Claims, 2 Drawing Figs.

[52] U.S. Cl. 172/40, 37/DIG. 18, 171/51, 171/71, 241/83, 241/266, 299/14
[51] Int. Cl. A01b 35/00, E21c 37/20
[50] Field of Search ..... 241/84, 94, 95, 101, 264, 266, 206, DIG. 25; 259/DIG. 44; 172/40, 766; 165/345; 51/DIG. 11; 73/67.2, 67.3, 67.4; 209/1, 3; 84/404, 405, 408, 409; 171/51, 83, 77, 71; 37/DIG. 18, 2; 299/14; 241/217, 218, 267, 270, 83, 98; 173/49; 175/55, 56

[56] References Cited

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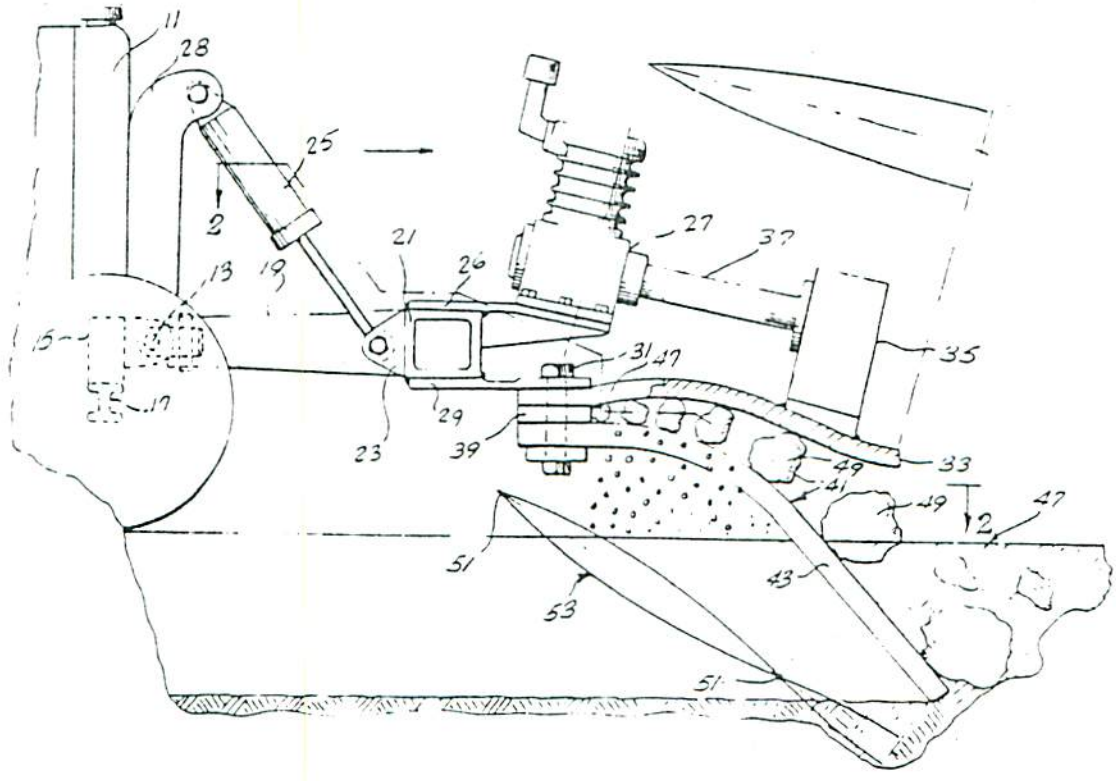
1,693,806	12/1928	Cady	84/409 X
2,247,960	7/1941	Michaels	84/409

FOREIGN PATENTS

99,517	2/1962	Norway	37/2

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Clifford D. Crowder
Attorney—Sokolski & Wohlgemuth

ABSTRACT: A device for cultivating earth and breaking up rocks or field stones for attachment to a tractor and the like comprising a first wide metal plate having an orbiting mass oscillator fixed thereto and a second plate divergent from the first plate having a plurality of metal tines for engagement with the ground. The two plates are coupled together at their base where they converge. A tuning fork effect is achieved through the vibration of the two plates by the oscillator crushing rocks and soil picked up by the tines.

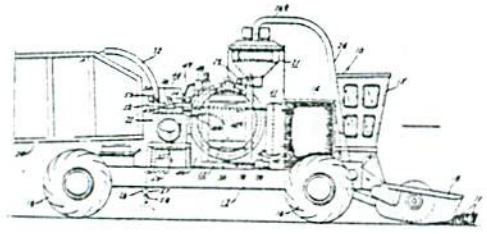


4,109,448

METHOD AND APPARATUS FOR IN-FIELD PROCESSING OF VEGETATION

Donald C. Kline, Allentown, Pa., assignor to Schoeneck Farms, Inc., Nazareth, Pa.

Filed Aug. 11, 1976, Ser. No. 713,349
Int. Cl.[2] A01D 43/00
U.S. Cl. 56—13.5 23 Claims



11. Apparatus for field processing vegetation, comprising:
a vehicle adapted to travel through a field of vegetation,
means carried by said vehicle for harvesting the vegetation as the vehicle advances,
means carried by said vehicle for cooperating with said harvesting means to separate the harvested vegetation into a fibrous fraction and a liquid containing a plant protein composition and other compositions,
means carried by said vehicle for cooperating with said separating means to fractionate said liquid fraction into a first component containing said plant protein composition and a second substantially protein free component containing said other compositions,
means movable with said vehicle for collecting said fibrous fraction and said plant protein composition, and
means carried by said vehicle for applying said other compositions onto the field as the vehicle advances,
whereby the second liquid component is discarded during harvesting and processing of the vegetation.

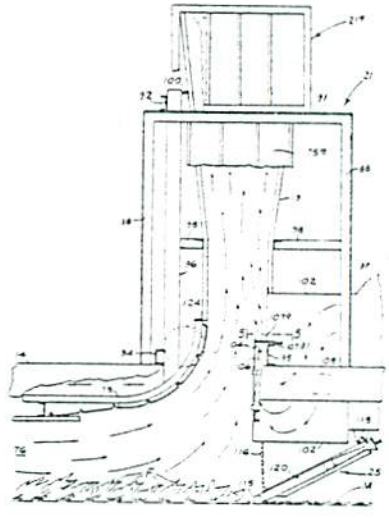
4,088,122

FIELD BURNING APPARATUS

Thomas R. Miles, Portland, Oreg., assignor to State of Oregon, Salem, Oreg.

Filed Aug. 11, 1976, Ser. No. 713,444
Int. Cl.[2] F23C 5/00
U.S. Cl. 126—271.2 R 25 Claims

1. Apparatus for burning combustible material on the ground to thermally cultivate a field comprising:
wheel supported vehicle means having a frame and a frame-connected cover means, said cover means being elevated from the ground and including side portions for defining a burning chamber;
means disposed in said burning chamber operable for initially igniting combustible material on the ground;
draft stack means disposed adjacent to a forward end of said vehicle means, said stack means communicating directly with said burning chamber and extending generally upwardly from said cover means; and
air mover means disposed adjacent to said stack means operable for inducing a draft upwardly through said stack means by delivering ambient air thereinto so that a negative pressure is developed within said burning chamber, air and gaseous products of combustion being drawn from said burning chamber upwardly through said stack means for continuously advancing fire against unburned combustible material in the forward direction of travel of said vehicle means.

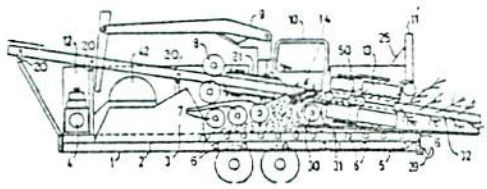


4,098,311

FORESTRY MACHINES

Carl Larsson, Kisa, Sweden, assignor to Kisa Tra AB, Kisa, Sweden

Filed Nov. 26, 1976, Ser. No. 745,298
Int. Cl.[2] A01G *23/08*; B27L *1/00*
U.S. Cl. 144—309 AC
7 Claims



1. A base machine for on-site recovery of felled trees, said trees having an elongate trunk comprising (1) a root end, (2) a top end, and having (3) bark and elongate branches and twigs attached thereto, said machine comprising in combination:

a chassis;

debranching means supported on said chassis for severing said branches and twigs from said trunk close to said bark;

chipping means for chipping said severed branches and twigs;

a first feed means for feeding said tree, root end leading through said debranching means, said first feed means being arranged to press said branches and twigs against said trunk thereby to orient the unattached ends of said branches and twigs towards the top end of said tree and generally parallel to one another in their elongate dimension for severing by said debranching means;

a second feed means for feeding said severed, generally parallel oriented branches and twigs into said chipper wherein said branches and twigs may be cut substantially at right angles to their elongate dimension; and

means for driving said debranching, chipping, and first and second drive means.

United States Patent [19]

Dunn

[11] **3,844,096**

[45] **Oct. 29, 1974**

[54] **BRUSH AND TREE MASTICATOR**

[76] Inventor: **Thomas J. Dunn**, P.O. Box 110, Hackettstown, N.J. 07840

[22] Filed: **Aug. 16, 1973**

[21] Appl. No.: **388,808**

[52] U.S. Cl. **56/504**

[51] Int. Cl. **A01d 49/00**

[58] Field of Search 56/504, 505, 500, 294, 56/12.7, 13.1, 13.2

[56] References Cited

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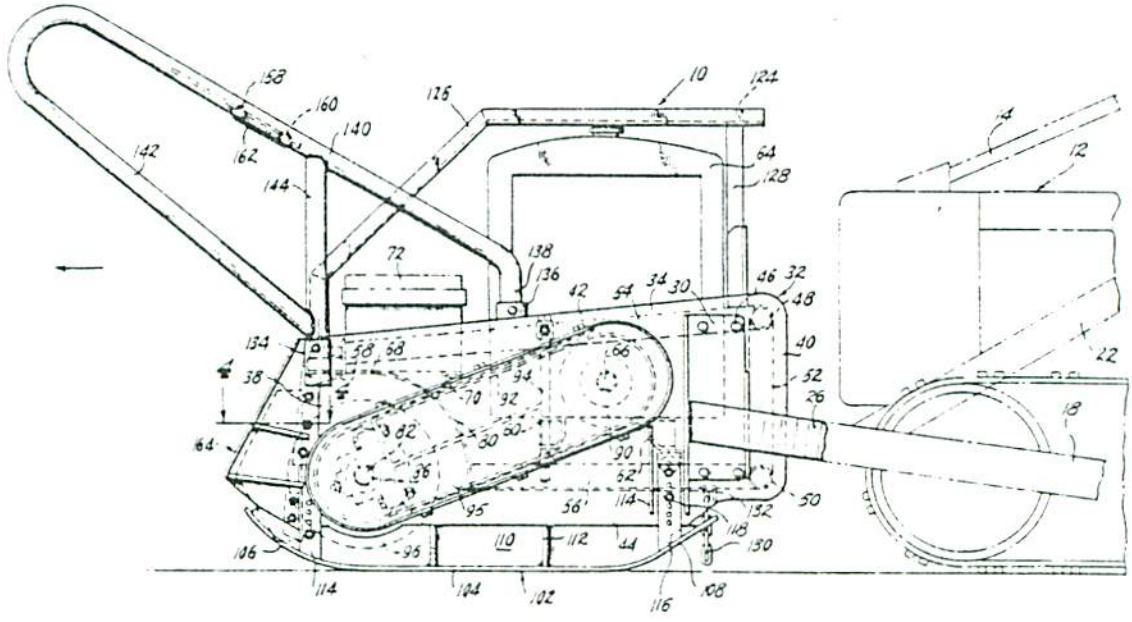
3,574,989	4/1971	Rousseau et al.	56/504

Primary Examiner—Russell R. Kinsey
Attorney, Agent, or Firm—Robert G. McMorrow

[57] ABSTRACT

A unitary shredder for vegetation has a housing with side plates. A motor mounted on the housing is operatively linked to a main axle rotatably secured between the side plates. A series of discs are carried on the axle and have shafts projecting therethrough in outwardly spaced and parallel relation to the axle, said shafts carrying U-form knives. Enlarged arms project from the plates forwardly and outwardly to gather vegetation in the path of travel and direct same to the knives. Deflector plates prevent entry of vegetation between the side plates and the respective adjacent discs.

9 Claims, 9 Drawing Figures



Tree and Slash Disposal

305

(11) No. 1027459

(45) ISSUED 780307

(52) CLASS 144-26
C.R. CL.

(19) CANADIAN PATENT

(54) WHOLE TREE CHIPPER

(72) Gaitten, Walden M.,
U.S.A.

Granted to Kockum Industries, Inc.,
U.S.A.

(21) APPLICATION No. 230,232
(22) FILED 750626

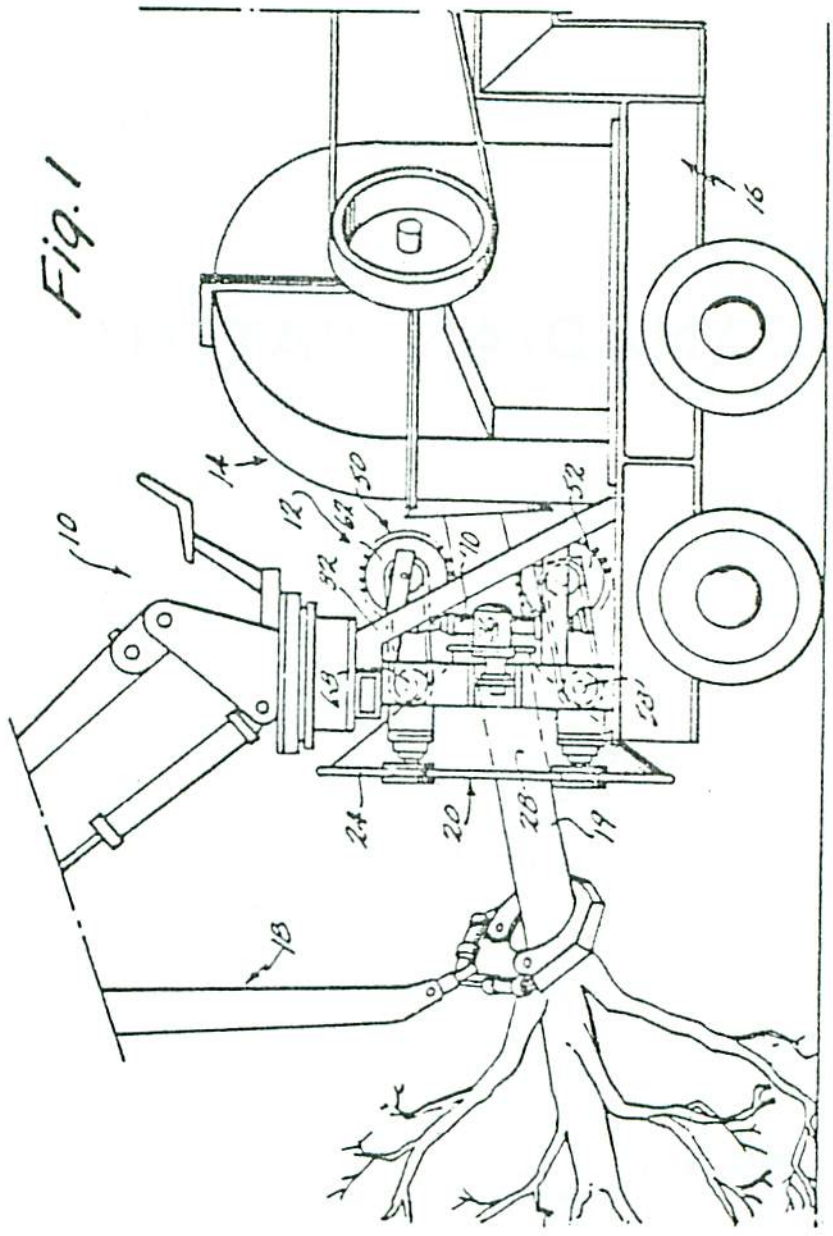
(30) PRIORITY DATE U.S.A. (483 824) 740627

No. OF CLAIMS 25

1027459

7-1

Fig. 1



United States Patent [19]

Szepaniak

[11] 4,062,498

[45] Dec. 13, 1977

[54] MOBILE WOOD CHIPPER UNIT

[76] Inventor: Pertti Leo Juhani Szepaniak, Tolosenmaki, 82500 Kitee, Finland

[21] Appl. No.: 631,569

[22] Filed: Nov. 13, 1975

[30] Foreign Application Priority Data

Nov. 15, 1974 Finland 743318

[51] Int. Cl.[2] B02C 23/00

[52] U.S. Cl. ..... 241/101.7; 144/2 Z

[58] Field of Search ..... 241/92, 101.7; 144/2 Z, 144/3 D, 208 R, 242 R, 309 AC, 311, 312

[56] References Cited

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3,763,905	10/1973	Hamilton et al.	144/2 Z
3,955,765	5/1976	Gaitten	241/101.7

Primary Examiner—Roy Lake
Assistant Examiner—Howard N. Goldberg
Attorney, Agent, or Firm—Ladas, Parry, Von Gehr, Goldsmith & Deschamps

[57] ABSTRACT

A mobile wood chipper unit for chipping preferably thin trees or branches left on the ground when felling trees. The unit comprises a chipper having a feeder which preferably can be directed towards both sides of the chipping unit and is adjustable both in the vertical and the horizontal plane. The chips are then transferred to a container.

6 Claims, 4 Drawing Figures

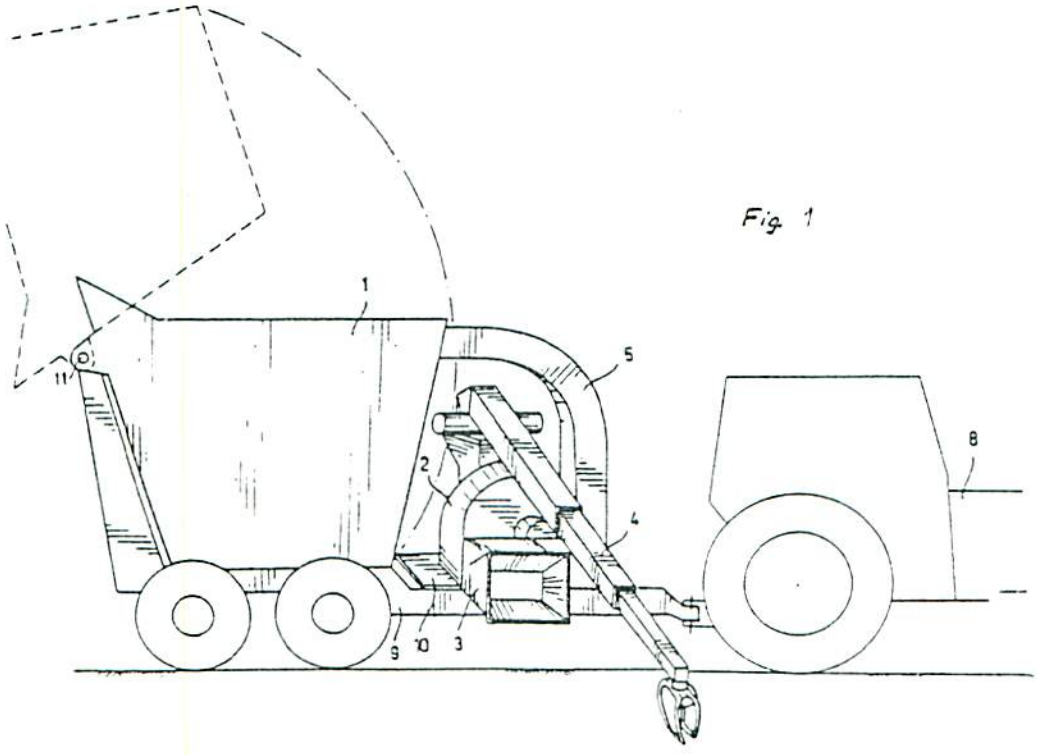

Fig. 1

(11) (A) No. 1011624

(45) ISSUED 770607

(52) CLASS 144-26
C.R. CL. 144-87

(19) (CA) CANADIAN PATENT

(54) BRUSH CHIPPER

(72) Smith, Leward N.,
U. S. A.

Granted to Morbark Industries, Inc.,
U. S. A.

(21) APPLICATION No. 200, 959
(22) FILED 740527

(30) PRIORITY DATE U. S. A. (376, 959) 730706

No. OF CLAIMS 11

1011624
3-1

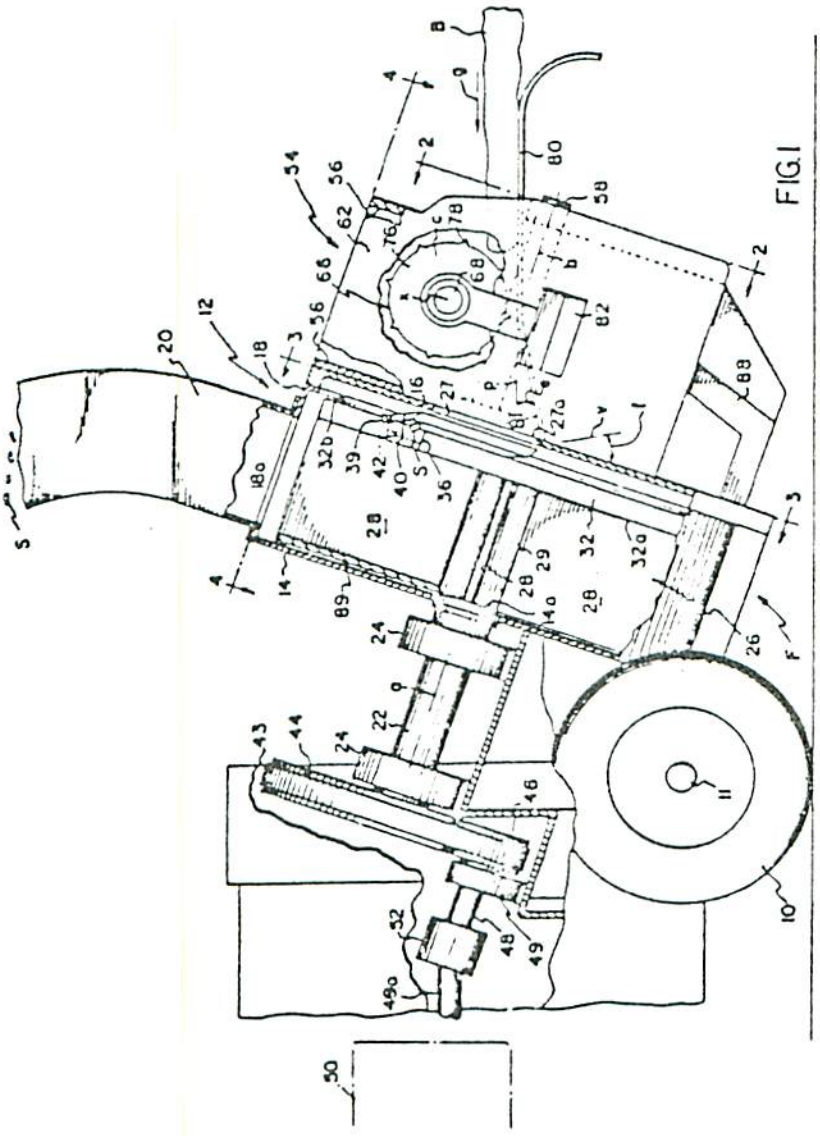

FIG.1

United States Patent [19]

Gunnarsson

[11] **3,881,662**

[45] **May 6, 1975**

[54] **REDUCED NOISE LEVEL BRUSH CHIPPER**

[75] Inventor: **Arne N. Gunnarsson**, Pomona, Calif.

[73] Assignee: **FMC Corporation**, San Jose, Calif.

[22] Filed: **Nov. 21, 1973**

[21] Appl. No.: **418,006**

[52] U.S. Cl. **241/221**; 241/292.1

[51] Int. Cl. **B02c 1/08**

[58] Field of Search ..... 241/221, 222, 220, 198 R, 241/189 R, 186 R, 186.2, 285 R, 291, 292.1

[56] **References Cited**

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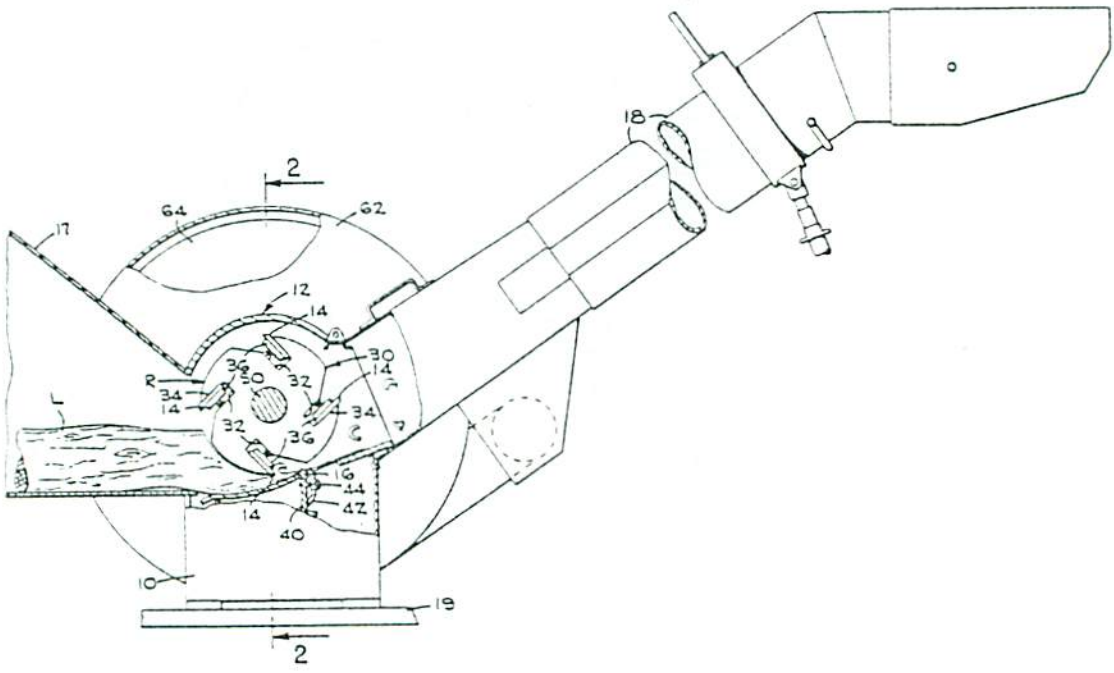
2,679,873	6/1954	Hill	241/186 X
3,270,968	9/1966	Hess et al.	241/221
3,771,733	11/1973	Hadley et al.	241/186 R

Primary Examiner—Roy Lake
Assistant Examiner—DeWalden W. Jones
Attorney, Agent, or Firm—C. E. Tripp

[57] **ABSTRACT**

A quite brush chipper having a bladed cutter head and a flywheel has the moment of the flywheel increased so that the combined kinetic energy of the cutter head and the flywheel at 1,550 RPM is at least equal to the combined kinetic energy of these elements in prior chippers at 3,000 RPM, so that the quiet chipper can be driven at 1,200 – 1,600 RPM for reducing the noise level while providing sufficient stored kinetic energy for effective intermittent chipping.

2 Claims, 5 Drawing Figures



United States Patent [19]

Smith

[11] 4,078,590

[45] Mar. 14, 1978

[54] WHOLE TREE REDUCING APPARATUS

[75] Inventor: Leward N. Smith, Remus, Mich.

[73] Assignee: Morbark Industries, Inc., Winn, Mich.

[21] Appl. No.: 757,695

[22] Filed: Jan. 7, 1977

[51] Int. Cl.² B27L 11/02

[52] U.S. Cl. ..... 144/176; 144/242 R; 144/247; 144/246 F; 241/92; 241/101.7; 241/278 R

[58] Field of Search ..... 144/242 R, 247, 246 F, 144/162 R, 176; 241/92, 101.7, 278 R

[56] References Cited

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3,724,518	4/1973	Zehavi et al.	144/247
3,955,765	5/1976	Gaitten	144/242 R

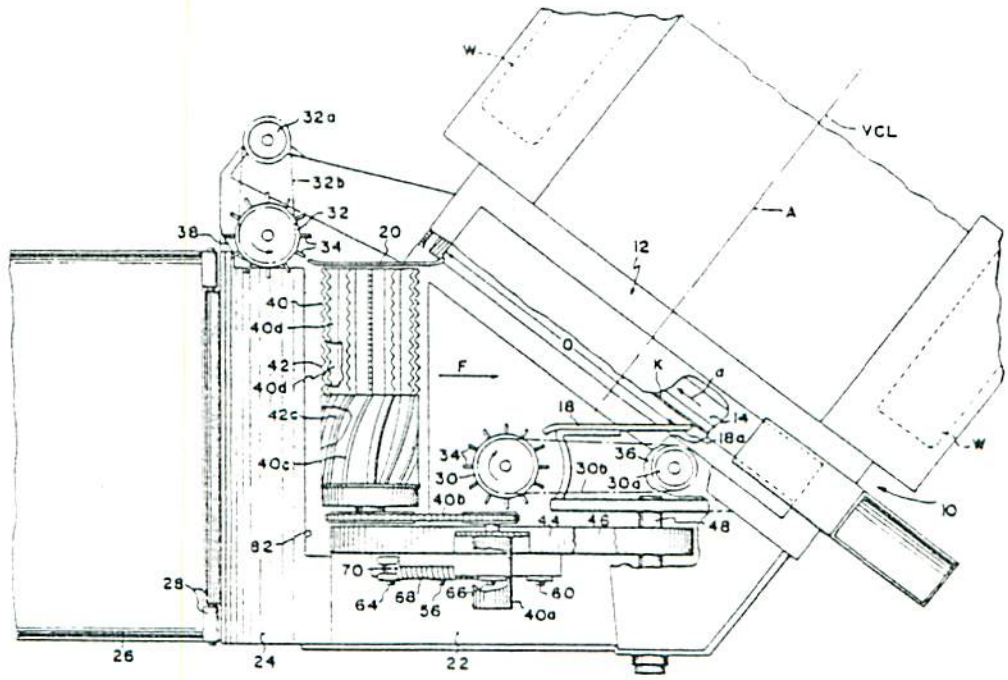
Primary Examiner—Donald R. Schran

Attorney, Agent, or Firm—Learman & McCulloch

[57] ABSTRACT

An apparatus for reducing whole trees having attached limbs and branches to chips wherein a power driven disc chipper is mounted on a frame and a tree or brush feeding and conditioning mechanism is driven at a coordinated feeding speed for feeding trees and tree parts into the chipper while folding projecting limbs and branches inwardly toward the trunk. A pair of power driven feed rolls, mounted for rotation about generally horizontal axes above and below a feed path, are supported for both coordinated generally vertical movement relative to the frame and for relative vertical movement, and power actuated means are provided for selectively varying the vertical spacing between the pair of feed rolls. The power actuated means are so arranged that when a squeezing action is applied, as to crush vertically projecting limbs, the upward force exerted by the lower roll exceeds the downward force exerted by the upper roll to reduce the frictional force exerted by any obstructing tree parts on the support platform.

12 Claims, 3 Drawing Figures



United States Patent [19]

Syrjälä et al.

[11] 4,078,591

[45] Mar. 14, 1978

[54] APPARATUS FOR CHOPPING FOREST AND BOG STUMPS AND SNAGS IN FIELD

[75] Inventors: Urho Syrjälä; Olavi Orasvuo; Erkki Orasvuo, all of Hamina; Reijo Sakki, Summa, all of Finland

[73] Assignee: Kommandiittiyhtio Orasvuon Konepaja, Olavi Orasvuo Ja Kumppanit, Hamina, Finland

[21] Appl. No.: 689,781

[22] Filed: May 25, 1976

[30] Foreign Application Priority Data

May 26, 1975 Finland 751513

[51] Int. Cl.² A47J 49/02; B27L 7/00

[52] U.S. Cl. ..... 144/193 A; 100/98 R; 100/DIG. 5; 144/3 K; 144/193 R; 144/321

[58] Field of Search ..... 144/321, 309 R, 193 R, 144/193 A, 2 R, 3 K; 100/98 R, DIG. 5

[56] References Cited

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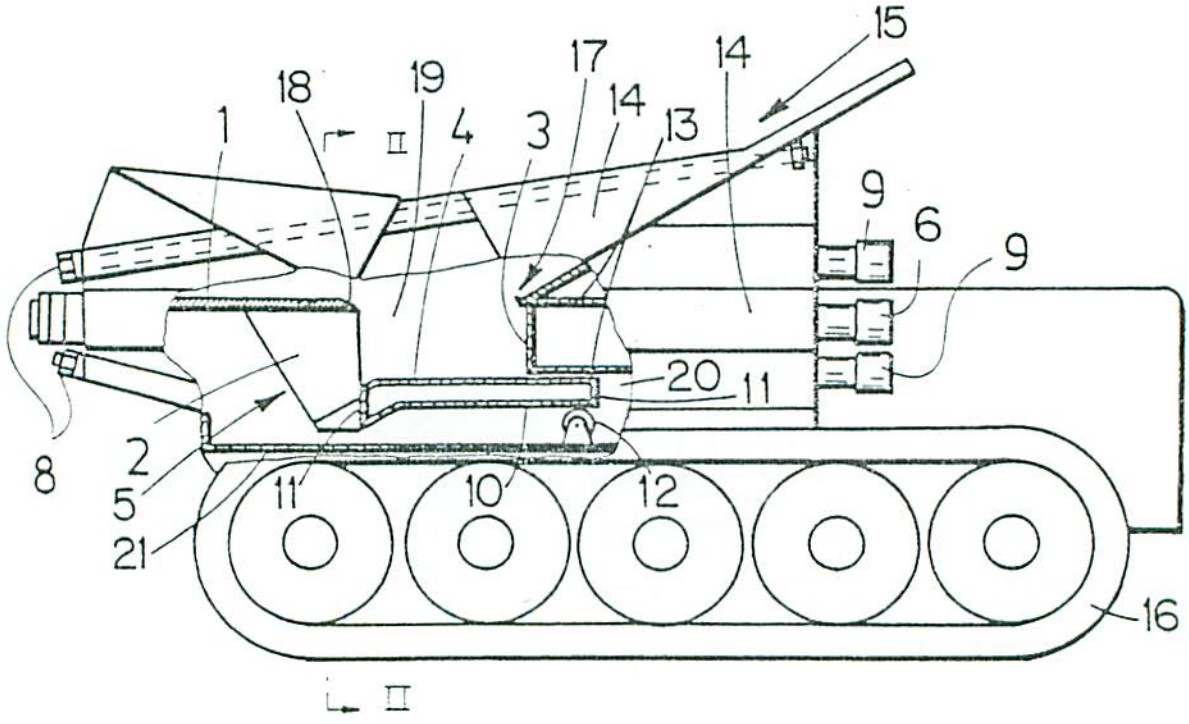
3,872,785	3/1975	Elliott	100/98 R X

Primary Examiner—Othell M. Simpson
Assistant Examiner—W. D. Bray
Attorney, Agent, or Firm—Haseltine, Lake & Waters

[57] ABSTRACT

Apparatus for use in economically profitable chopping of forest and bog stumps and of snags into transportable form in field conditions during all seasons. Chopping is effected by applying pressure which breaks the wood material charge that has been brought in one way or another into the space defined by a main blade and intermediate blades and by a backing plane and bottom. The stumps and snags in arbitrary positions are placed in such position with reference to the blades in connection with the pressing motion that the part of the wood material charge that has been cut off by the blades is able to evade the wedging pressure exerted by the sides of the blades, by sliding into a space which is more free, suffering rupture in the direction of the grain and being urged in chopped condition through the part constituted by the blades into the opening space.

7 Claims, 2 Drawing Figures

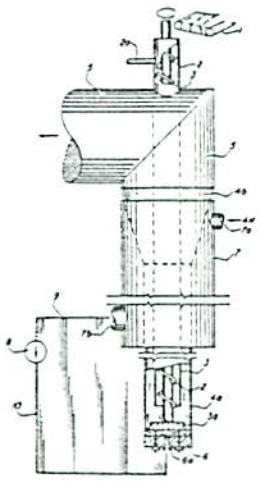


4,105,397

BARK BURNING SYSTEM

Martin T. Jasper, Mississippi State, Miss., and Peter Koch, Alexandria, La., assignors to The United States of America as represented by the Secretary of Agriculture, Washington, D.C.

Filed Jan. 10, 1977, Ser. No. 751,634
Int. Cl.[2] F27B *19/00*
U.S. Cl. 432—90 1 Claim



1. Apparatus for drying and burning particulate bark comprising

(a) an elongated, vertically disposed, downwardly directed feed screw;

(b) means to feed particulate bark to the upper section of said screw;

(c) a vertically-disposed cylindrical housing substantially enclosing said feed screw, said housing terminating above the bottom of said feed screw to provide an egress opening for particulate bark from said screw;

(d) a first wall concentrically disposed around said housing and said egress opening, said wall being cylindrically shaped at it lower section thereof, and being flared outwardly in the form of an inverted cone above said lower section; the annular space between said first wall and said housing defining a combustion chamber;

(e) a second wall concentrically disposed around said first wall to define an annular gas preheating chamber therebetween;

(f) openings in said second wall to permit air to enter and leave said annular preheating chamber;

(g) conduit means connected to one of said openings and to the bottom of said combustion chamber to supply preheated air to the bottom of said combustion chamber; and

(h) air metering means at the bottom of said combustion chamber to permit said preheated air to entrain particulate bark which enters said combustion chamber from said egress opening disposed below the bottom of said cylindrical housing.

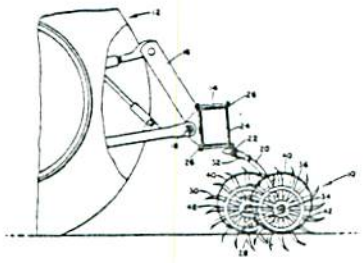
Earth Working

4,100,971

ROTARY HOE STRIPPING MEANS

Darrel Lee Honnold, Winterset, Iowa, assignor to Deere & Company, Moline, Ill.

Filed Aug. 2, 1976, Ser. No. 710,237
Int. Cl.² A01B 23/00
U.S. Cl. 172—547 10 Claims



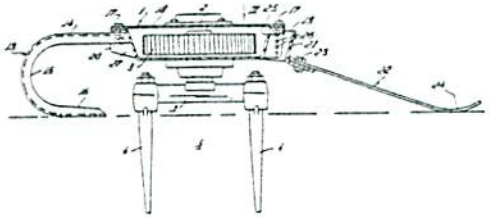
1. A rotary hoe wheel of the type having a central hub member and a plurality of radially extending tine members secured to the hub, the improvement residing in a tine cleaning means comprising: a separate ring member closely adjacent each side of the wheel, the diameter of said ring members being equal to or less than the wheel; and means loosely coupling the ring members together for limited movement relative to one another, for rotation with the wheel and for radial sliding movement along the tine members in substantial unison.

4,088,195

SOIL CULTIVATING IMPLEMENTS

Cornelis van der Lely, 7, Bruschenrain, Zug, Switzerland

Filed Jun. 4, 1976, Ser. No. 692,784
Claims priority, application Netherlands, Jun. 10, 1975, 7506857
Int. Cl.² A01B 33/06
U.S. Cl. 172—59 13 Claims



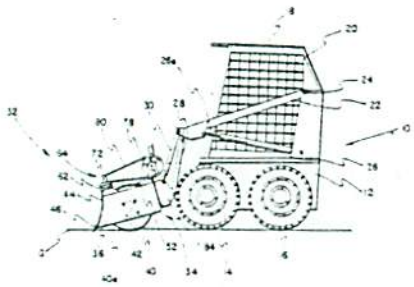
1. A soil cultivating implement comprising a frame and a plurality of soil working members rotatably mounted on upwardly extending axes, said soil working members being positioned in a row that extends transverse to the direction of travel and said members being journalled in an elongated portion of said frame, a plurality of side-by-side, elongated strip-shaped brackets being connected at the front of said frame portion and along the length thereof, said brackets having upper and lower limbs, the upper limb of each bracket being fastened to said frame portion and extending forwardly to a substantially 180° curved base, the lower limbs bearing on the ground and being positioned adjacent one another, whereby said row of soil working members is protected from debris in and on the ground surface during forward travel.

4,098,344

EARTHWORKING IMPLEMENT

Victor Ray Johnson, Box 181, Erwin, N.C. 28339

Filed Oct. 7, 1976, Ser. No. 730,166
Int. Cl.² A01B *35/18*
U.S. Cl. 172—40
8 Claims



1. An earthworking implement comprising:
a. a prime mover;
b. power actuated boom means secured to said prime mover and extending forwardly thereof and movable between a lower position and a raised position;
c. a frame structure secured to said boom means and including a pair of laterally spaced side members and blade means extending forwardly across said side members;
d. an earth tamping roller rotatively mounted rearwardly of said blade means about a transverse axis between said side members of said frame structure;
e. said frame structure further including a rear attaching assembly mounted on the rear portion of said frame structure and including attaching means extending therefrom and connected to said boom means;
f. said frame structure being pivotably mounted about said transverse axis of said earth tamping rollers such that said blade means may be moved from a first lower earth leveling position to an upper inoperative position; and
g. counterweight means rotatively mounted on said frame structure and drive means for driving said counterweight means so as to impart a vibrating like massaging action to said earth tamping roller supported within said frame structure such that said earth tamping roller may be used to compact earth that is passed over thereby, whereby

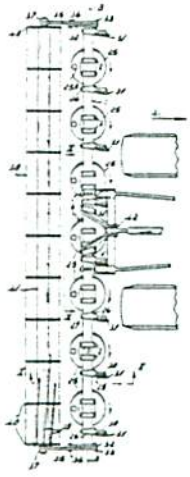
said earthworking implement may perform an earth leveling operation or an earth tamping operation wherein either operation may be performed independently of the other by selectively pivoting said frame structure between said first and second positions about the transverse axis of rotation of said earth tamping roller.

4,088,196

SOIL CULTIVATING IMPLEMENTS

Cornelis van der Lely, 7, Brüschenrain, Zug, Switzerland

Filed Apr. 6, 1976, Ser. No. 674,165
Claims priority, application Netherlands, Apr. 11, 1975, 7504319
Int. Cl.² A01B *21/06*
U.S. Cl. 172—155
4 Claims



1. A soil cultivating implement comprising a frame and a transverse row of soil working members rotatably mounted on respective stub shafts that define upwardly extending axes, each soil working member having downwardly extending tines positioned around its axis of rotation and being freely rotatable about its corresponding axis responsive to the contact of its tines with the ground, said soil working members being releaseably fastened with respective brackets on an elongated beam that extends transverse to the direction of travel, the stub shafts of said soil working members being held in said brackets, said brackets being positioned directly below said beam and being obliquely inclined to the vertical, said shafts being substantially parallel to one another and located in a transverse plane that extends substantially perpendicular to the normal direction of implement travel, each of said brackets being channel shaped with a base positioned between limbs, said limbs having dissimilar vertical lengths and said base being inclined to the horizontal, a respective stub shaft being journalled in said base, said tines each having a substantially straight soil working portion that in the lowest position of the tine, extends obliquely forwardly with respect to the front of the machine, a ground engaging roller being positioned to the rear of said row of soil working members and said roller being connected to the frame and supporting same, said roller extending at least partly across the working width of the implement, the axis of rotation of said roller extending substantially horizontal and parallel to said plane.

PART II Seeding, Planting and Plant Care

This section contains excerpts of patents for equipment for seeding, retrieving, planting, and thinning seedlings, as well as patents for caring for plants and containers for seedlings.

Seeding

United States Patent [19]

Cary et al.

[11] 4,061,094

[45] Dec. 6, 1977

[54] MAGNETIC SEED DELIVERY AUTODIBBLE PLANTER

[75] Inventors: John W. Cary; William H. Heinemann, Jr., both of Kimberly, Idaho

[73] Assignee: The United States of America as represented by the Secretary of Agriculture, Washington, D.C.

[21] Appl. No.: 715,676

[22] Filed: Aug. 19, 1976

[51] Int. Cl.² A01C 5/04

[52] U.S. Cl. 111/89; 111/77; 221/212

[58] Field of Search 111/89-91, 111/77; 221/212

[56] References Cited

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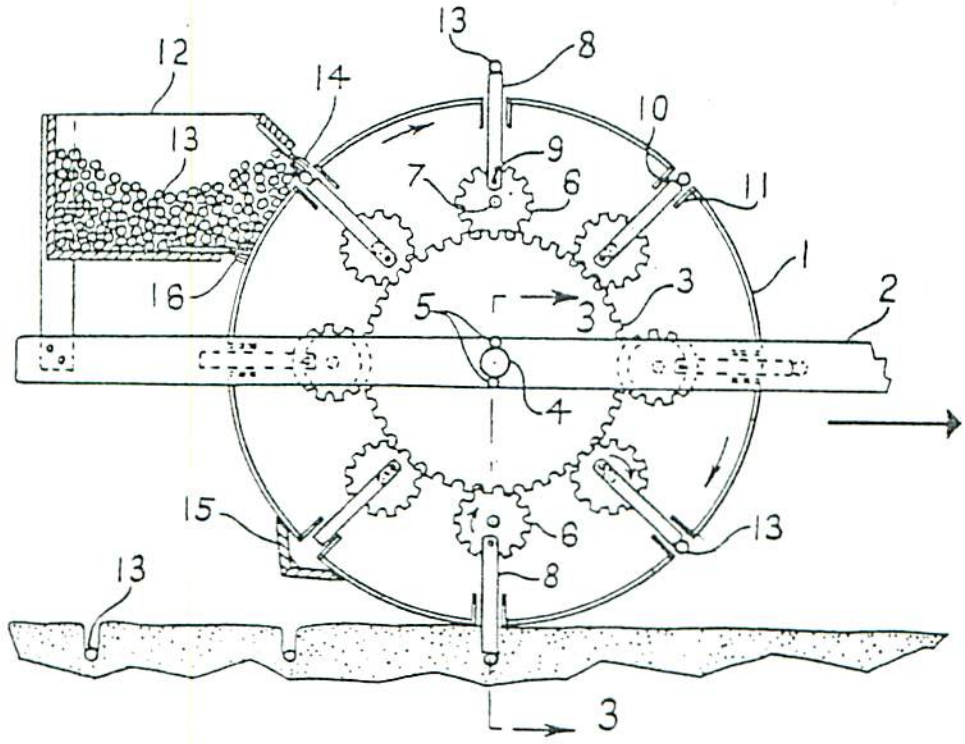
7,912 of	1914	United Kingdom	111/89
264,031	2/1970	U.S.S.R.	111/77

Primary Examiner—Clifford D. Crowder
Assistant Examiner—Steven A. Bratlie
Attorney, Agent, or Firm—M. Howard Silverstein; David G. McConnell; Theodore J. Leitereg

[57] ABSTRACT

Apparatus for punch planting of seeds comprising a slotted-rimmed wheel rotatably mounted on a frame with an axis of rotation passing through the center of a gear fixed to the frame. The wheel is equipped with a plurality of drive gears which communicate with and rotate around the fixed gear. On each drive gear is pivotally mounted a magnetic-tipped punch. The rotation of the wheel causes the punches to move in and out of the slots in the wheel. The action of the punch produces a small hole in the soil and embeds a coated seed therein.

4 Claims, 3 Drawing Figures



(11) No. 978806

(47) ISSUED Dec. 2, 1975

(52) CLASS 111-16
C.R. CL.

(19)(CA)

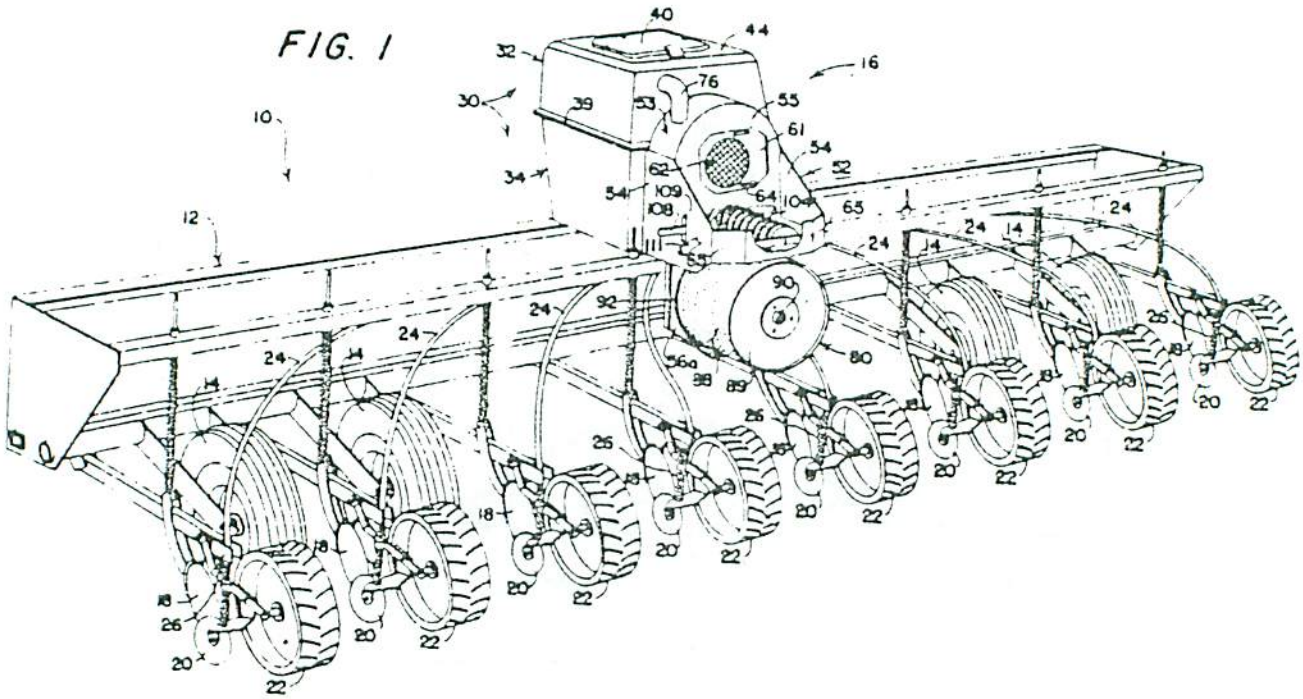
CANADIAN PATENT

(54) SEED DISPENSING MECHANISM

(72) Bauman, Jack L., Naperville, Illinois, U.S.A., and
Lienemann, Darlo E., Darlen, Illinois, U.S.A.

Granted to International Harvester Company, Chicago, Illinois, U.S.A.

FIG. 1



(21) APPLICATION No. 182,201
(22) FILED Sep. 28, 1973

(30) PRIORITY DATE July 9, 1973 (377,478) U.S.A.

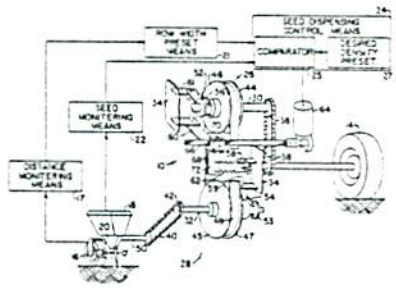
No. OF CLAIMS 15

4,122,974

VARIABLE SPEED PLANTER SEED DRIVE

Jimmy D. Harbert, Coal Valley, and Harold V. Hansen, Cordova, both of Ill., assignors to Deere & Company, Moline, Ill.

Continuation-in-part of Ser. No. 677,811, Apr. 16, 1976, abandoned. This application Aug. 17, 1977, Ser. No. 825,367
Int. Cl.[2] G07F *11/00*
U.S. Cl. 221—13 14 Claims



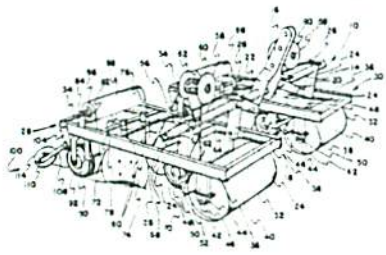
1. In a planter having a main frame and at least two seed dispensing planter units carried thereon, the latter having a planter drive shaft; a ground-engaging distance measuring wheel carried on the frame and having a distance monitoring device associated therewith for producing an electrical signal; a seed monitoring device carried on each planter unit for producing an electrical signal indicative of the rate of seed discharge by the planter unit; a driven drive shaft; a belt drive between the drive shaft and planter shaft including an adjustable variable speed pulley means; a member rotatable in opposite directions and connected to the variable speed pulley means to open and close the latter in accordance with the direction of rotation of the member; a bidirectional electric motor drivingly connected to the rotatable member; a row width preset means for receiving signals from the distance monitoring device and for producing an electrical signal; and a seed dispensing control means for setting the desired seed density for said planter units, said control means including a comparator means for receiving signals from the seed monitoring device and the row width preset means and responsive to said signals to determine seed discharge density and to compare said discharge density to desired seed density to thereby pass an electrical signal to and for driving said electric motor in the direction necessary to make the monitored seed density substantially equal to the desired seed density.

4,092,936

METHOD AND APPARATUS FOR SEED TAPE PLANTING

J. Curtis Griffin, and Clyde C. Griffin, both of Branford, Fla., assignors to Harrington Manufacturing Co., Lewiston, N.C.

Filed Jun. 24, 1976, Ser. No. 699,585
Int. Cl.[2] A01C 7/00; A01G 13/02
U.S. Cl. 111—1 14 Claims



1. An automatic seed tape planter for field planting seed tape, comprising:

A. a mobile frame structure having connecting means associated therewith for connecting the frame structure thereof to a tractor such that said planter can be pulled through a field by said tractor during the planting operation;

B. means mounted about the front of said frame structure for forming a seed bed about a top portion of the soil within the field being traversed by said planter, said seed bed forming means including:

B1. roller means rotatively mounted forwardly within said frame structure about a transverse axis;

B2. said roller means including an outer cylindrical surface for engaging the underlying soil as said planter is pulled through the field by said tractor such that the engagement of said outer cylindrical surface with the underlying soil results in the formation of said seed bed; and

B3. cleaning blade means associated with said seed bed forming means and normally maintained in engagement with the outer cylindrical surface of said roller means for continuously cleaning said cylindrical surface during the planting operation;

C. means for dispensing seed tape from said planter to said formed seed bed where said seed tape is appropriately disposed generally on the surface of said seed bed or embedded within the seed bed in accordance with accepted planting practices for the particular type of seeds within said seed tape, said seed tape dispensing means including:

C1. means for supporting a spool having said seed tape wound therearound;

C2. guide means disposed generally below said spool having said seed tape wound therearound, said guide means being spaced vertically above said formed seed bed and having said seed tape threaded therethrough such that as the seed tape is dispensed in the planting operation the seed tape moves through said guide means; and

C3. wherein there is provided wheel means supported by said frame structure rearwardly of said guide means for passing over said seed tape once the same is engaged with the underlying soil and applying a downward force to generally hold the seed tape about the formed seed bed so as to allow the seed tape to freely unwind from the spool thereof as said planter moves through the field during the planting operation; and

D. means for laying a covering material over said formed seed bed and the dispensed seed tape for protecting the seeds and resulting seedlings for a time period after planting said seed tape, said means for laying said covering material including:

D1. means associated with said frame structure for supporting a spool of covering material about a transverse axis rearwardly of said seed tape dispensing means;

D2. means for engaging said covering material and pressing the same against the underlying soil during the seed tape planting operation so as to generally hold the covering material about said formed seed bed so as to allow the covering material to properly unwind from the spool thereof during the planting operation;

D3. furrow opening disc means supported by said planter frame structure forwardly of the area where said covering material is laid, for opening a furrow on each side of said formed seed bed;

D4. said means for engaging said covering material including a pair of laterally spaced wheels supported by said frame structure and particularly spaced to run in the furrows formed by said furrow opening disc means, said wheels operative to engage side portions of said covering material dispensed from said spool and to press the same into said furrows; and

D5. back filling means carried by said planter frame structure generally rearwardly of said pair of wheels for back filling portions of the soil displaced from said furrows back into said furrows and over the side portions of said covering material such that the back filled soil tends to hold down said covering material about said seed belt, said back filling means comprising a pair of laterally spaced floating disc assemblies carried by said frame structure about the rear thereof, each floating disc assembly engagable with a mound of dirt displaced from a respective furrow and disposed adjacent thereto so as to urge a portion of the displaced soil back into said furrow, each of said floating disc assemblies including:

1. pivot plate means rotatably mounted about a transverse axis to said frame structure;

2. arm means secured to said pivot plate means and extending generally rearwardly therefrom; and

3. disc means secured to a remote end of said arm means opposite the end thereof which is connected to said pivot plate means, said disc means being angled so as to engage and urge soil disposed adjacent a respective furrow back into said furrow and generally over a respective side portion of said covering material disposed within said furrow.

Growing Plants

4,118,891

SYSTEM FOR GROWING PLANTS

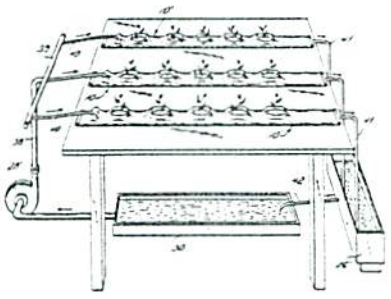
Donald K. Kehl, 2915 Kings Dr., and Eugene A. Crist, 2338 Pretty Bayou Island Dr., both of Panama City, Fla. 32401

Continuation-in-part of Ser. No. 618,816, Oct. 2, 1975. This application Sep. 28, 1976, Ser. No. 727,577

Int. Cl.[2] A01G *31/00*

U.S. Cl. 47—59 12 Claims

1. A conduit for use with a recirculating water-nutrient solution plant supply system of a type for growing a plurality of plants with respective roots of each plant supported in a respective plant medium located in a conduit, said conduit placed on a sloped surface so that gravity carries the water-nutrient solution to the plants in the conduit from one end to the other and a pump to recirculate the unused water-nutrient solution to the upper end of the conduit, the conduit comprising a continuous plant tube constituted of a thin, pliant plastic foil, the tube having the property of collapsing when empty, slotted openings formed in the top of the tube, said slotted openings being formed at intervals in said tube, each of said slotted openings being of a size sufficient to receive said plant medium, said tube portion forming said slotted openings being spread apart to open said slotted openings permitting said plant medium to be inserted in said tube, said tube comprising said



upper end with means provided between said upper end and the first slotted opening for introduction of said solution and an open end through which the unused portion of the solution drains from said tube, the bottom portion of said tube being closed between said ends to comprise a continuous impervious channel unobstructed except by said plant medium for said water-nutrient solution to flow between said ends with all of said unused solution leaving said tube exiting at said open end, said plants being in fluid communication with each other, the tube generally conforming to the shape defined by said plant and plant medium by draping on said medium to form said channel.

Plant Harvesters

United States Patent [19]

Cox

[11] 3,893,633

[45] July 8, 1975

[54] TREE THINNING AND REDUCING MACHINE

[76] Inventor: Ernest P. Cox, P.O. Box 154, Lolo, Mont. 59847

[22] Filed: Aug. 15, 1974

[21] Appl. No.: 497,668

[52] U.S. Cl. 241/101.7; 241/190; 241/236

[51] Int. Cl.[2] B02C 13/09; B02C 21/02

[58] Field of Search ..... 241/101.7, 235, 236, 190; 144/2 R, 162 A, 212, 312

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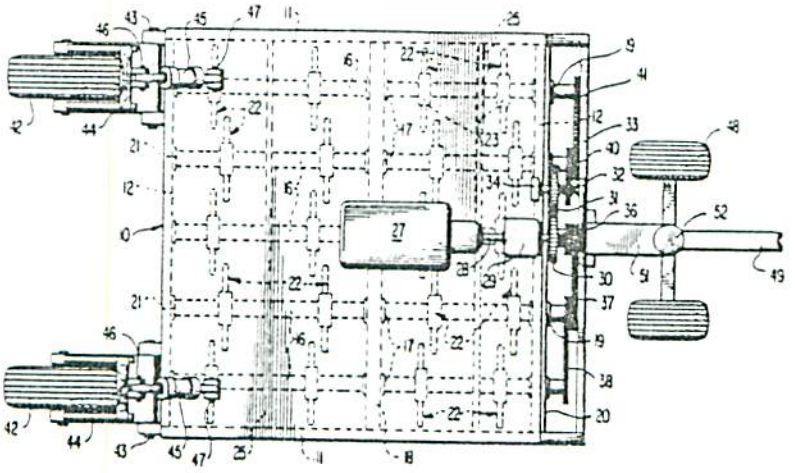
Primary Examiner—Granville Y. Custer, Jr.
Assistant Examiner—E. F. Desmond
Attorney, Agent, or Firm—Lawrence L. Colbert

[57] ABSTRACT

A tractor-drawn multiple rotor machine employs on each rotor shaft plural wood breaking teeth units which coact with plural transverse breaker bars carried by the massive frame of the machine. Second growth timber is overrun by the machine and forced downwardly into near parallelism with the rotor shafts of the machine, where the breaking teeth engage the timber and force it upwardly against the breaker bars and reduce it into relatively short lengths. The machine includes its own power plant and gearing to drive the rotor shafts.

10 Claims, 5 Drawing Figures



Plant Extractors

4,135,580

PLANT EXTRACTOR

Aries Bouwman, Wageningen, Netherlands, assignor to Drost Machines B.V., Rhenen, Netherlands

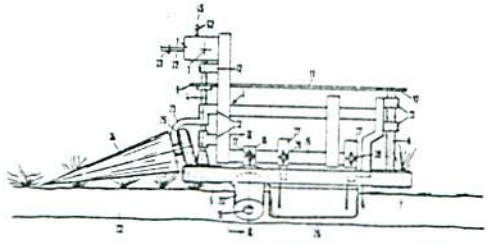
Filed Oct. 29, 1976, Ser. No. 736,848

Claims priority, application Netherlands, Oct. 29, 1975, 7512656

Int. Cl.[2] A01D *25/00*

U.S. Cl. 171—61

20 Claims



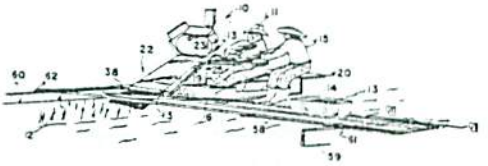
1. A machine adapted to be moved in a given direction for pulling off green plants from tuberous crops which remain in the ground during the operation of the machine, in particular the plants of seed potatoes, said machine comprising: a frame; at least two plant extracting members comprised of endless belts supported by said frame in such manner that longitudinally-extending first portions of the belts face each other and longitudinally-extending second portions of the belts face away from each other, said endless belts being driveable in opposite directions in an endless substantially horizontal orbit and having a confluent path in which said first portions cooperate with each other for clamping plants therebetween, said plant extracting members, in their confluent path, being movable entirely or substantially entirely in a horizontal direction opposite to the direction of travel of the machine and at a speed higher than the speed of travel of the machine; means supported by said frame and having portions spaced from the second portions of said plant extracting members for compressing the ground on opposite sides of said confluent path; and means supported by said frame and positioned, in the direction of travel, in front of said first portions of the belts for moving tops of plants into an upright position in the region of said confluent path so that the plant tops are engageable by the plant extracting members.

4,113,022

PLANT PULLER

Joe Balinte, and Michael Verhaeghe, both of P.O. Box 273, Courtland, Ontario, Canada

Filed Oct. 20, 1976, Ser. No. 734,091
Int. Cl.[2] A01D 25/04
U.S. Cl. 171—61
30 Claims



1. A plant puller for pulling growing plants from a bed comprising:

(a) a frame mounted for travel over the bed;

(b) a conveyor mounted on the frame at an inclined position relative to the bed, including at least one pair of juxtaposed loop belts of resilient material, each having idler and drive wheels, the pair of belts being jointly disposed to have corresponding lower ends in close proximity to the ground to form an input terminus to the conveyor and having corresponding upper ends forming an upper terminus, and means attached to the frame for holding the adjacent segments of the loop belts in substantially juxtaposed relation between their respective wheels so that each belt has a proximate surface adjacent to that of the other belt from the lower terminus continuously to the upper terminus;

(c) means carried by the frame for counter-rotating each belt and their wheels and each belt so that the proximate surfaces of the two adjacent belts travel in the same direction from the lower terminus to the upper terminus;

(d) a collection receptacle, carried by said frame, and mounted below the upper terminus of the conveyor onto which the pulled plants fall;

(e) a track rigidly positioned at a predetermined distance above the bed;

(f) means for advancing the frame over the track and hence over the bed whereby the cooperative travel of the frame over the bed and of the conveyor belts causes the belts at the lower terminus to encompass the upper portion of the stalk of a plant and to pull the plant out of the bed whereby the plant is conveyed by the conveyor up and along the conveyor to be discharged from the upper terminus thereof and to fall onto the collection receptacle; and

(g) means mounted in the frame for locating the lower terminus of the conveyor at a specific predetermined distance from the bed for pulling larger plants above a predetermined height by the plant puller, whereas smaller plants below the predetermined height are left in the bed, during the travel of the plant puller over the bed.

Plant Transplanters

(11) (CA) No. 880069

(45) ISSUED Sep. 7, 1971

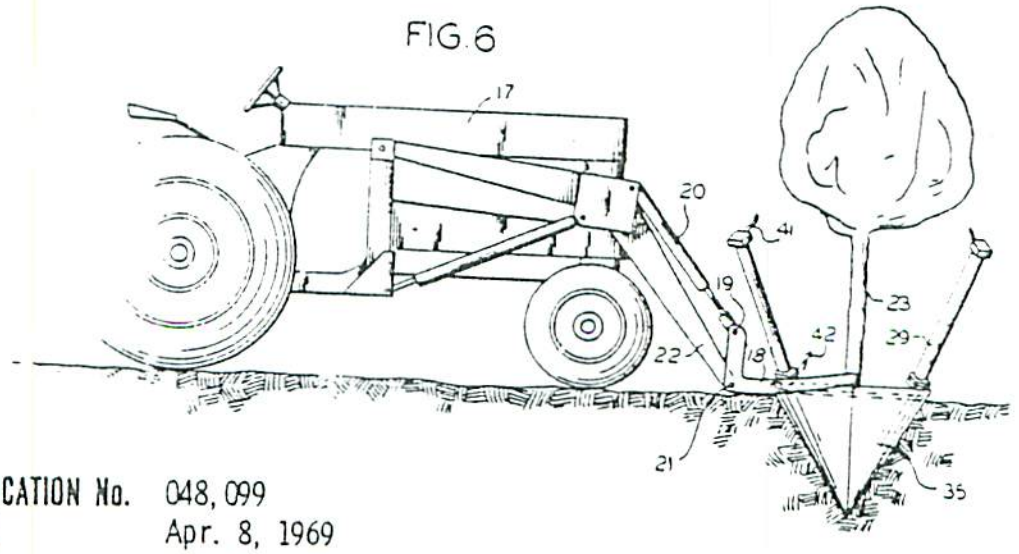
(52) CLASS 111-3
C.R. CL.

(10) CANADIAN PATENT

(54) TRANSPLANTER

Russell C. Grover and Phillip C. Grover, Lakewood, Ohio, U. S. A.

FIG. 6



(21) APPLICATION No. 048,099
(22) FILED Apr. 8, 1969

(30) PRIORITY DATE

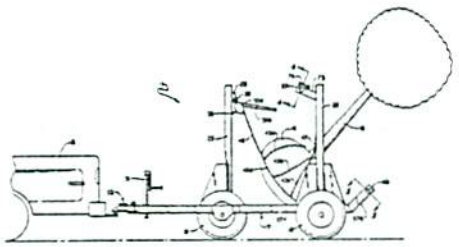
No. OF CLAIMS 9

4,114,766

TREE CADDY

Bernard J. Decker, 3415 E. Livingston, Columbus, Ohio 43227, and Frederick J. Schmitt, 5184 Blair Ave., Canal Winchester, Ohio 43110

Filed Feb. 17, 1977, Ser. No. 769,381
Int. Cl.[2] A01G *23/04*
U.S. Cl. 214—3
9 Claims



1. A machine for use in transplanting trees comprising:

(1) means, including a frame having a plurality of upright members secured to said machine for lifting a tree, after the tree has been severed from the earth, the roots of the tree and the soil embracing said roots has been balled and encircled with a tensile constituent;

(2) means of transporting said tree to any selected site where a hole has been made for receipt of said tree; and

(3) means of lowering the tree so that the tree and balled roots thereof are positioned correctly in said hole, wherein there is provided an undercarriage having a plurality of wheels by which the machine is supported; the frame consisting of a plurality of normally substantially horizontal members secured to and supported by said wheels; three upright members secured to the horizontal members and extending substantially vertically upwards and substantially parallel with each other and wherein a pair of said upright members are laterally spaced opposite to each other and wherein the third upright member is displaced longitudinally forward of said pair of laterally spaced upright members and is positioned laterally between said pair of upright members;

hangers supported by the upper ends of each of the upright members;

winches secured to each of the hangers;

a plurality of tensile components capable of being secured to the tensile constituent of the balled roots and operably assembled with said winches so that the operation of each of the winches will increase or decrease the effective length of the associated tensile component to raise said tree while in an upright attitude, then to tilt, transport, and lower said tree.

Plant Transporters

United States Patent

Arnold et al.

[15] 3,693,721

[45] Sept. 26, 1972

[54] APPARATUS AND TECHNIQUE FOR HARVESTING PLANTS ROOTED IN THE GROUND

[72] Inventors: Eugene W. Arnold; Earl D. Hasenwinkle, both of Longview, Wash.

[73] Assignee: Weyerhaeuser Company, Tacoma, Wash.

[22] Filed: Sept. 24, 1970

[21] Appl. No.: 75,219

[52] U.S. Cl. 171/61, 47/1

[51] Int. Cl. A01d 25/04

[58] Field of Search 171/61, 62, 21, 32, 101, 103, 171/104

[56] References Cited

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1,060,968	5/1913	Bocker	171/101
2,902,997	9/1959	Hawkins et al.	171/61
2,833,358	5/1958	Lust	171/61

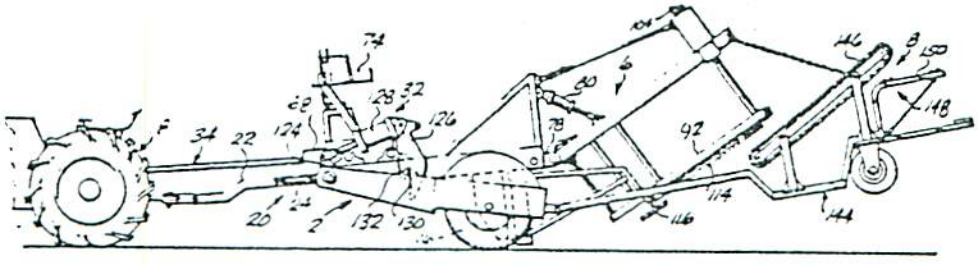
Primary Examiner—Antonio F. Guida

Attorney—Christensen, Sanborn & Matthews

[57] ABSTRACT

The apparatus includes means for severing the body of earth contiguous to the roots of the plants from the surrounding ground; and means for relatively removing the plants from the body of root-contiguous earth, including means for lifting the plants in relation to the ground, and means for agitating the body of root-contiguous earth when it is severed from the ground, so as to loosen the earth and reduce its cohesion with respect to the roots, before the plants are lifted in relation to the ground. The apparatus is thus able to harvest the plants without undue damage to the roots. In addition, damage to the stems is minimized through the use of a special elastomer-faced belt lift mechanism as part of the lift means; and a rapid harvesting rate is maintained through the use of a special apparatus and technique for collecting and discharging the plants from the lift mechanism in a containerized condition.

18 Claims, 14 Drawing Figures



United States Patent [19]

Mayo et al.

[11] **3,743,024**

[45] **July 3, 1973**

[54] **PLANT HARVESTING MACHINE**

[75] Inventors: **William Harold Mayo**, Cairo, Ga.; **Arthur Burnett Winters**, Narberth, Pa.; **James Bradley Davis, Jr.**, Cairo, Ga.; **Harrison Edenfield**, Cairo, Ga.; **Aubrey Cornelius Gainous**, Cairo, Ga.

[73] Assignee: **Campbell Soup Company**, Camden, N.J.

[22] Filed: **Mar. 19, 1971**

[21] Appl. No.: **125,945**

[52] U.S. Cl. **171/61**

[51] Int. Cl. **A01d 19/12**

[58] Field of Search 161/61, 62

[56] **References Cited**

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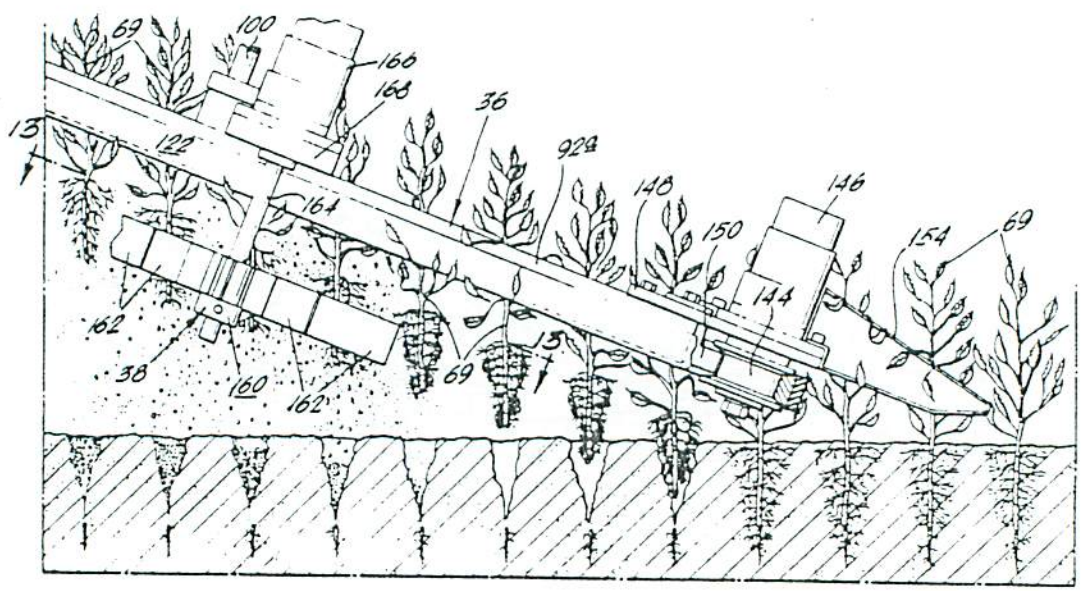
3,543,493	4/1967	Duda	171/61
3,578,088	5/1971	Raath	171/62
2,902,997	9/1959	Hawkins et al.	171/61

Primary Examiner—Antonio F. Guida
Attorney—John W. Logan

[57] **ABSTRACT**

A harvesting machine for the automatic harvesting of seedling plants. The machine includes means for loosening the soil adjacent the plant roots and for cutting the roots at a predetermined depth. Conveyors aligned with each row of plants and driven at a speed commensurate with the forward speed of the machine lift the plants from the loosened soil. Rotary beaters having resilient vanes engage the roots of the plants as they pass along the conveyors to remove any soil clinging to the roots. The machine includes means for advancing the plants directly into shipping cartons from the conveyors.

23 Claims, 14 Drawing Figures



United States Patent [19]

Storms

[11] 3,964,550

[45] June 22, 1976

[54] TREE SEEDLING HARVESTER

[75] Inventor: James G. Storms, Garfield, Wash.

[73] Assignee: J. E. Love Company, Garfield, Wash.

[22] Filed: Sept. 16, 1974

[21] Appl. No.: 506,292

[52] U.S. Cl. 171/61; 171/114

[51] Int. Cl.[2] A01D 25/00

[58] Field of Search 171/58, 61, 71, 83, 171/99, 111, 114, 115

[56] References Cited

UNITED STATES PATENTS

2,907,393	10/1959	Hawkins	171/61
3,693,721	9/1972	Arnold et al.	171/61
3,743,024	7/1973	Mayo et al.	171/61

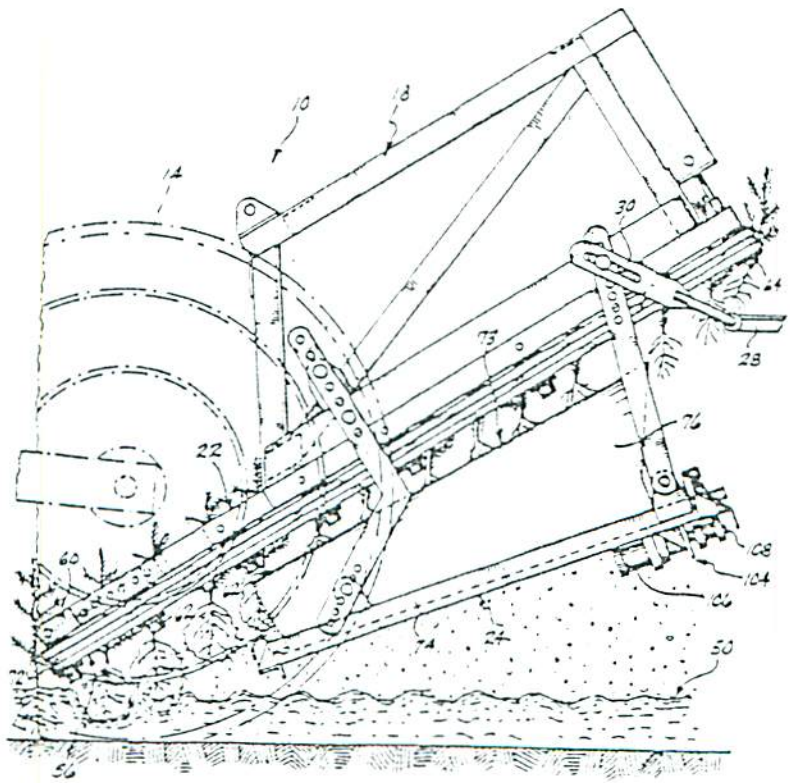
Primary Examiner—Russell R. Kinsey

Attorney, Agent, or Firm—Graybeal, Barnard, Uhlir & Hughes

[57] ABSTRACT

A mobile device for harvesting tree seedlings includes means for subsurface cutting to separate and loosen from the surrounding ground the body of earth adjoining the roots of the tree seedlings. The movement and relative position of the earth separating means enables it to efficiently sever the roots of the tree seedlings from the surrounding ground while allowing only a minimum amount of earth to adhere to the roots of the seedlings as they are removed. A plurality of paired gripper belts remove the loosened seedlings by lifting them upwardly and rearwardly relative to the ground, each pair of gripper belts having male-female intercoupled gripping surfaces which minimize damage to the stems of the seedlings. Disposed below the gripper belts are a plurality of elongated root beater means adapted to move in a transverse oscillatory manner to agitate the roots and remove the earth adhering thereto without damaging the seedlings. A drive linkage mechanism controls the movement of the root beater means and balances the forces resulting therefrom to substantially reduce vibration in the harvester. Finally, an improved sheave structure for the gripper belt drive mechanism enables worn-out bearings to be readily replaced without replacing the entire sheave structure.

15 Claims, 12 Drawing Figures



United States Patent [19]

Storms

[11] 3,993,142

[45] Nov. 23, 1976

[54] TREE SEEDLING HARVESTER

[75] Inventor: James G. Storms, Garfield, Wash.

[73] Assignee: J. E. Love Company, Garfield, Wash.

[22] Filed: Aug. 8, 1975

[21] Appl. No.: 603,042

Related U.S. Application Data

[62] Division of Ser. No. 506,292, Sept. 16, 1974, Pat. No. 3,964,550.

[52] U.S. Cl. 171/101

[51] Int. Cl.[2] A01D 33/00

[58] Field of Search 171/61, 62, 101, 124, 171/134

[56] References Cited

UNITED STATES PATENTS

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3,616,861	11/1971	Bettencourt	171/101
3,693,721	9/1972	Arnold et al.	171/61

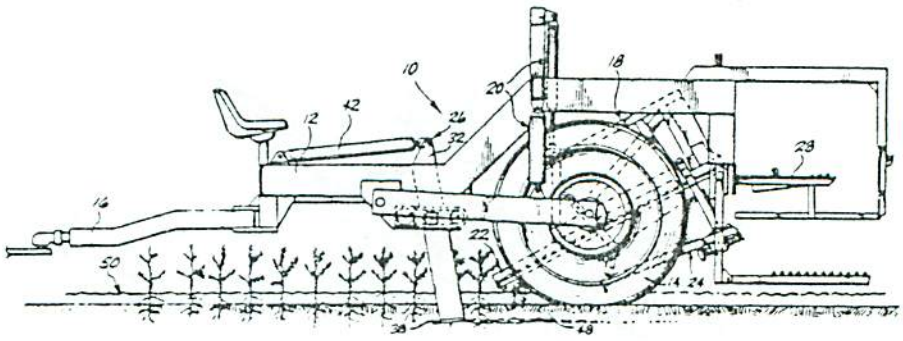
Primary Examiner—Russell R. Kinsey

Attorney, Agent, or Firm—Graybeal, Barnard & Uhlir

[57] ABSTRACT

A mobile device for harvesting tree seedlings includes means for subsurface cutting to separate and loosen from the surrounding ground the body of earth adjoining the roots of the tree seedlings. The movement and relative position of the earth separating means enables it to efficiently sever the roots of the tree seedlings from the surrounding ground while allowing only a minimum amount of earth to adhere to the roots of the seedlings as they are removed. A plurality of paired gripper belts remove the loosened seedlings by lifting them upwardly and rearwardly relative to the ground, each pair of gripper belts having male-female intercoupled gripping surfaces which minimize damage to the stems of the seedlings. Disposed below the gripper belts are a plurality of elongated root beater means adapted to move in a transverse oscillatory manner to agitate the roots and remove the earth adhering thereto without damaging the seedlings. A drive linkage mechanism controls the movement of the root beater means and balances the forces resulting therefrom to substantially reduce vibration in the harvester. Finally, an improved sheave structure for the gripper belt drive mechanism enables worn-out bearings to be readily replaced without replacing the entire sheave structure.

3 Claims, 12 Drawing Figures



United States Patent [19]

Stewart

[11] 3,977,099

[45] Aug. 31, 1976

[54] NURSERY STOCKS DIGGING MACHINE

[75] Inventor: John E. Stewart, Gresham, Oreg.

[73] Assignee: Nursery Implements, Inc., Gresham, Oreg.

[22] Filed: Dec. 16, 1974

[21] Appl. No.: 532,835

[52] U.S. Cl. ..... 37/2 R

[51] Int. Cl.[2] A01G 23/04

[58] Field of Search ..... 37/2 R; 144/2 N

[56] References Cited

UNITED STATES PATENTS

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2,990,630	7/1961	Granford	37/2 R
3,045,368	7/1962	Whitcomb	37/2 R
3,078,602	2/1963	Holopainen	37/2 R
3,163,944	1/1965	Whitcomb	37/2 R
3,713,234	1/1973	Grover et al.	37/2 R
3,739,823	6/1973	Bartell	37/2 R X

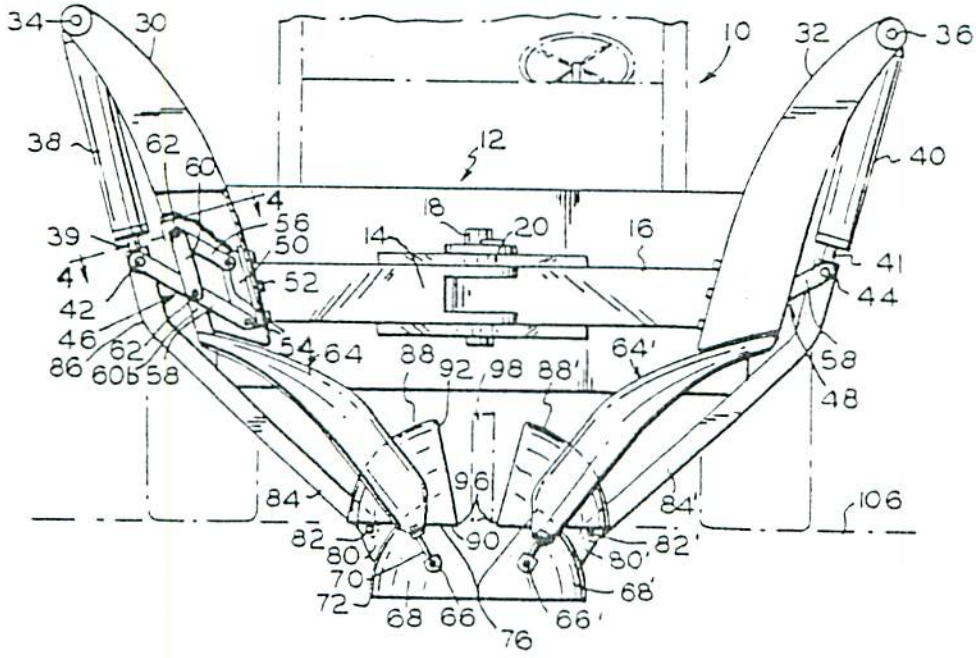
Primary Examiner—Stephen C. Pellegrino

Attorney, Agent, or Firm—Klarquist, Sparkman, Campbell, Leigh, Hall & Whinston

[57] ABSTRACT

The digging machine according to the present invention includes pairs of spherical blades which are rotated beneath a plant for forming a root ball and removing the plant. By operation of a pair of parallelogram linkages, the spherical blades are rotated beneath the surface of the ground, and spherical blade covers are moved downwardly to encompass the upper part of a root ball for convenient removal thereof.

11 Claims, 7 Drawing Figures



4,095,357

TREE DIGGER

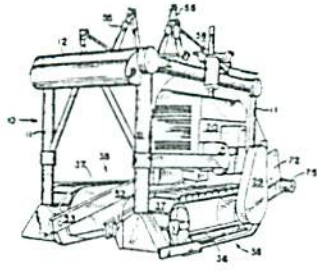
Wendell E. Daniel, Topeka, Kans., assignor to International Harvester Company, Chicago, Ill.

Continuation of Ser. No. 652,006, Jan. 26, 1976, abandoned, which is a continuation of Ser. No. 313,215, Dec. 8, 1975, abandoned, which is a continuation of Ser. No. 94,890, Dec. 3, 1970, abandoned. This application Apr. 28, 1977, Ser. No. 791,670

Int. Cl.[2] A01B *13/00*; A01G *23/00*

U.S. Cl. 37—2 R

1 Claim



1. A plant digging machine having forward and rearward ends comprising:

a frame including an elevated portion and downward extending supports;

a pair of laterally spaced track assemblies connected to said supports;

a pair of engines, each engine affixed to said frame and positioned above one of said pair of track assemblies;

an independent, variable speed drive train extending between each engine and its underlying track assembly;

each drive train including:

hydrostatic transmission having a variable volume pump driven by the engine and a hydraulic motor driven by the pump;

a drive sprocket driven by the motor;

a driven sprocket drivingly connected to one of said track assemblies; and

a driven chain extending between and drivingly connecting said drive and driven sprockets;

said supports, said engines, said driven trains and said track assemblies defining an open space therebetween to permit the plants to be straddled thereby as the machine is driven forward;

bell crank means rotatably supported on said elevated portion of the frame;

a pair of lift arms pivotally connected to said bell crank means and extending downward on each side of said open space;

a blade connected to the lift arms and positioned between said track assemblies and centrally of their length;

brace means extending between said blade and frame;

hydraulic ram means connected to said bell crank means for vertically adjusting said blade; and

an operator's station including a seat located on said frame above said elevated portion and toward the rear of the machine to permit ready observation of said blade and plants to be dug thereby within said open space.

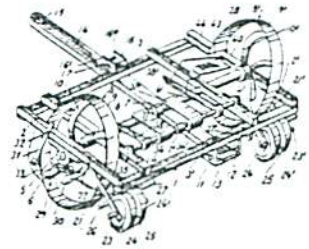
Planting Machines

4,091,751

PLANTING MACHINE

Alfredo Félix Dri, and Jorge César Miranda, both of Paso de los Libres, Montevideo 893, Prov. Corrientes, Ark.

Filed Mar. 15, 1977, Ser. No. 777,734
Claims priority, application Argentina, Mar. 17, 1976, 262598
Int. Cl.[2] A01C *11/00, 23/02*
U.S. Cl. 111—2
11 Claims



1. Automatic planting machine for planting in rows, small trees and the like into the bottom of a furrow opened in the soil, said furrow may be opened by the same machine, said machine comprising a chassis having at least a pair of sides, a main wheel at each side of the chassis, independent axles for each main wheel and rotatably supported by said chassis, each main wheel having a rim, at least one through aperture in each rim, a planter having a planting tube slidably mounted in each of said through apertures and timed with the rotation of the corresponding main wheel to project to the outside of said through opening and rim upon said through opening facing the bottom of said furrow, each planting tube having an input end, and means capable of feeding plants, one at a time, into the input end of each planting tube to enable planting of said plant into the bottom of said furrow upon said through opening facing the bottom of said furrow.

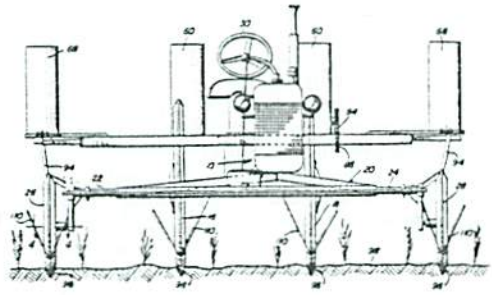
4,100,862

4-ROW TRAC PLANTER

Robert P. Mowen, and Jacob D. Gettings, both of R.R. #4, Jerseyville, Ill. 62052

Filed Mar. 21, 1977, Ser. No. 779,737
Int. Cl.[2] A01C 5/00
U.S. Cl. 111—52 3 Claims

1. A trac planter comprising a frame including journalled narrow front and rear pairs of opposite side wheels, a prime mover mounted on said frame and drivingly connected to at least one pair of said wheels, said frame defining a longitudinal center line, said wheels being disposed in four vertical planes paralleling said center line and spaced equally apart transversely of said frame, said wheels including narrow outer peripheral portions adapted, due to the gross weight of said planter, to form narrow depressed tracks in cultivated ground over which said planter travels, and seed planting means supported from said frame and including narrow depending seed discharging means disposed immediately rearwardly of each of said wheels, in the corresponding vertical plane, and operative to discharge seeds into the depressed ground tracks formed by said wheels, the outer peripheral portions of said wheels being generally V-shaped in cross-sectional shape with their apex portions facing generally radially outwardly of the corresponding axes of rotation of said wheels, each of said wheels having a rearwardly and upwardly opening and inclined generally V-shaped standing crop divider operatively supported



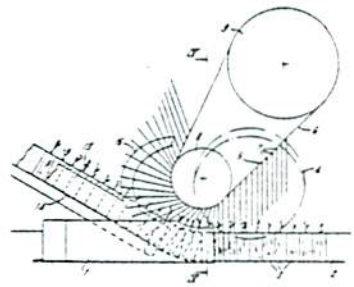
from said frame immediately ahead of the lower forward quadrant of the corresponding wheel, said frame, other than said depending seed discharging means and said standing crop dividers being devoid of portions thereof projecting more than slightly below the axes of rotation of said wheels, the lower portions of said wheels, below elevations thereon spaced only slightly below said axes of rotation thereof, being of axial thicknesses no greater than the width of said outer peripheral portions, said wheels being supported from said frame with their axes of rotation spaced below said frame.

4,106,415

PLANT-SETTING MACHINE

Reijo Sakari Häkli, Iso-Vimma, Finland, assignor to Lannen Tehtaat OY, Iso-Vimma, Finland

Filed Oct. 7, 1976, Ser. No. 730,687
Claims priority, application Finland, Apr. 30, 1976, 761221
Int. Cl.[2] A01C *11/02*
U.S. Cl. 111—3 7 Claims



1. A plant setting machine comprising a plowshare for the formation of a furrow, a feeding apparatus mounted behind said plowshare for feeding and guiding plants into said furrow, means mounted behind said feeding apparatus for compressing the soil on both sides of the furrow after the plants have been set therein, and an operating device for holding said plants in an upright position in said furrow until the compressing is completed, said operating device comprising a first pair of laterally spaced pulleys mounted on said machine above and on opposite sides of said furrow and substantially above the point of deposit of said plants in said furrow, a second pair of spaced pulleys mounted on said machine spaced from and parallel to said first pair of pulleys and adapted to be driven in the direction of movement of said plowshare, a pair of endless means interconnecting the corresponding pulleys of said two pairs, and a plurality of flexible members attached to each of said endless means at relatively short intervals whereby said flexible members on each such endless means form a pair of walls on opposite sides of the deposited plants, moving in a direction opposite to that of the movement of said plowshare whereby said walls laterally support said plants and maintain their position until said compressing means compacts the sides of the furrow to fix the position of said plants.

4,111,135

PLANTING MACHINE

Leonard Charles Braun, Bartlett, and Edward Leonard Benno, Grayslake, both of Ill., assignors to Illinois Tool Works Inc., Chicago, Ill.

Filed Jun. 28, 1976, Ser. No. 700,270
Int. Cl.[2] A01C *11/00, 5/02*
U.S. Cl. 111—2 1 Claim

1. In a planting machine, means for moving said machine along the ground, a mechanism for inserting an elongated container with a plant growing therein in a vertical direction a substantial depth into the ground and substantially absent any horizontal movement of the container and plant relative to the ground while said container and plant are held by said mechanism for inserting and the machine is moving along the ground, said mechanism comprising an elongated tubular plant holder formed to encircle and frictionally engage said elongated container to be inserted in the ground, rotatable members mounted in said machine for rotation about an axis substantially perpendicular to the direction of movement of the machine, movable means carrying said elongated tubular plant holder in a substantially vertical orientation on said rotatable members, said rotatable members inserting said container frictionally held therein into the ground in a substantially vertical direction and to a substantial depth responsive to the rotation of said rotatable members while the machine is moving along the ground, a ground drive wheel rotating responsive to movement of said

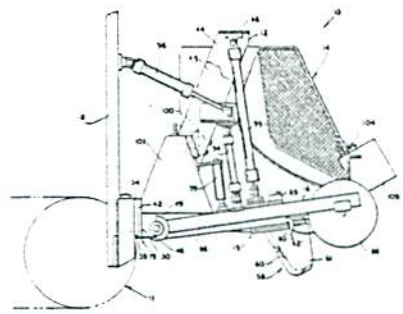
machine along the ground, driving means connected between said ground drive wheel and said rotatable members for rotating said rotatable members responsive to rotation of said ground drive wheel, and said movable means normally carrying said plant holder on and with said rotatable members but permitting movement of said plant holder on and relative to said rotatable members in both directions along a line longitudinally of said machine and in the direction said machine moves along the ground when said plant holder engages the ground, said movable means being a resiliently biased roller carriage, said movable means preventing said rotatable means from moving said movable means relative to the ground along a line longitudinally of said machine while said rotatable members are inserting said tubular plant holder with said container and plant therein into the ground in a substantially vertical direction and to a substantial depth and while retracting said tubular plant holder out of the ground.

4,112,857

SPOT PLANTER

Edmund G. Bradley, Lithia Springs, Ga., assignor to Marden Manufacturing Company, Inc., Auburndale, Fla.

Filed Oct. 21, 1976, Ser. No. 734,547
Int. Cl.[2] A01C *11/00*
U.S. Cl. 111—3 5 Claims



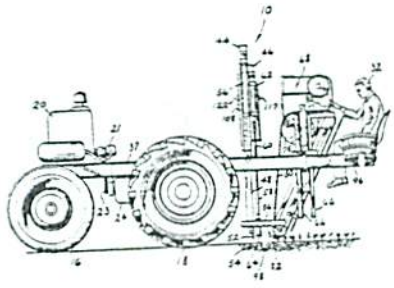
1. A spot planter comprising a frame movable forwardly over the ground behind a towing vehicle, a passenger compartment supported by said frame and including means for supporting a passenger facing opposite to the forward direction of movement of said frame, dibble means mounted on said frame and movable up and down adjacent said passenger compartment to cut planting pockets along a path in the ground, seedling ejector means movable up and down with said dibble means for inserting seedlings into the planting pockets, packing means mounted on said frame and movable up and down beside and behind said dibble means to close the planting pockets, said packing means comprising a wheel including an annular ground engaging surface with one side portion of the annular ground engaging surface being of larger diameter than the other side portion thereof and with the larger diameter portion of said wheel being positioned away from the path of the planting pockets and the smaller diameter portion of said wheel being positioned adjacent the path of the planting pockets, said wheel being rotatable about an axis inclined upwardly from the position of the wheel toward the planting pockets and angled forwardly from the position of the wheel toward the line of the pockets whereby when the wheel engages the ground adjacent a planting pocket it tends to sweep the soil toward the planting pocket and to press the soil at a downward inclined angle toward the lower portion of the planting pocket substantially without reducing the height of the soil adjacent the seedling.

4,116,137

PLANTER FOR TREES, HERBS, SHRUBS AND SIMILAR PLANTS

Henry Westerhoven, 2030 S. Bainbridge Ctr. Rd., Benton Harbor, Mich. 49022

Filed May 25, 1977, Ser. No. 800,409
Int. Cl.[2] A01C *11/00*
U.S. Cl. 111—2
7 Claims



1. A planter for trees, shrubs, herbs and similar plants comprising a chassis, wheel means supporting said chassis for movement over the ground in a selected direction of travel, a blade carried by said chassis and extending transversely to said direction of chassis travel, said blade being shiftable relative to said chassis along said direction of chassis travel between fore and aft positions, said blade being further shiftable relative to said chassis between a lower ground engaging position and an upper position spaced from said ground, a conveyor carried by said chassis and including means for releasably supporting a plurality of plants in a row extending transversely to the direction of said chassis travel, means for shifting said blade from its said upper and fore positions into its said lower and aft positions for forming a trough in said ground transversely relative to the direction of chassis travel, said conveyor having one end located rearwardly of and extending to adjacent said blade in its lower and aft positions, means for rotating said conveyor to position said plant supporting means at said trough with the plants extending into the trough, said blade shifting means for shifting said blade from its lower and aft trough forming positions into its upper and fore positions and thereafter again into its lower and aft positions adjacently forwardly of said trough to cover said trough and the plants where they extend therein and simultaneously form another trough paralleling and located forwardly of said first mentioned trough, and means for

rotating said wheel means to move said chassis forwardly to position said conveyor one end adjacent said other trough whereby said conveyor may be rotated to position said plant supporting means at said other trough with additional plants being carried thereby extending into said other trough.

United States Patent

Owens et al.

[15] 3,643,611

[45] Feb. 22, 1972

[54] PLANTING APPARATUS

[72] Inventors: Edwin G. Owens; Joseph J. Wiley, Jr., both of Summerville, S.C.

[73] Assignee: Westvaco Corporation, New York, N.Y.

[22] Filed: Nov. 13, 1969

[21] Appl. No.: 876,491

[52] U.S. Cl. 111/2, 172/166, 172/491

[51] Int. Cl. A01c 11/02

[58] Field of Search 111/2, 3; 172/491, 166

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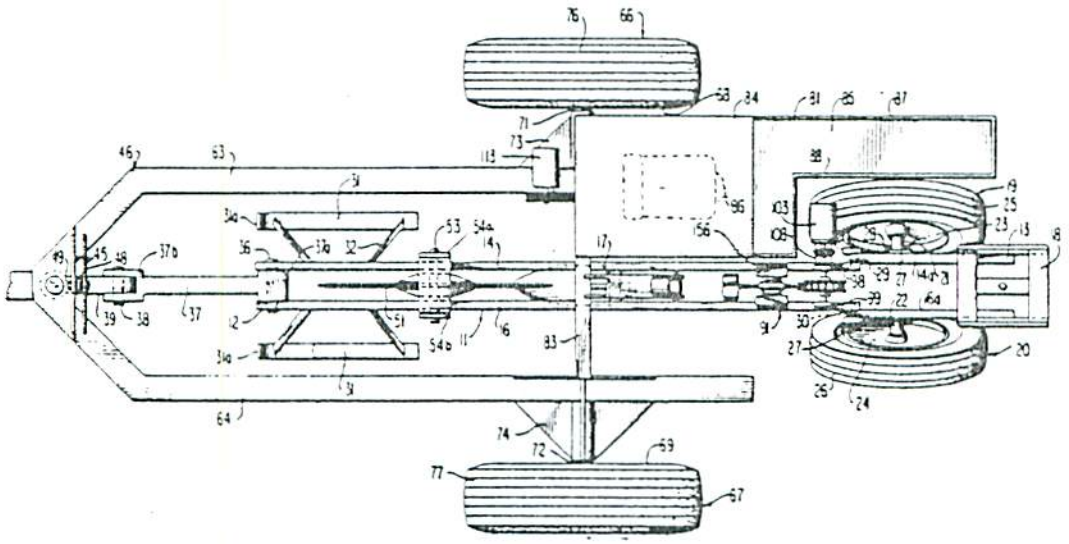
3,125,044	3/1964	Kolk	111/2
3,379,147	4/1968	Cochran	111/2
3,508,411	4/1970	Rogers	172/491 X

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—R. T. Rader
Attorney—Ernest B. Lipscomb, Robert S. Grimshaw and T. Russell Foster

[57] ABSTRACT

Apparatus for setting plants such as tree seedlings into the ground including a planter frame having a front end arranged to be attached to a tractor for freely pivotal movement in a vertical plane by means including a support frame and having a rear end supported on earth compacting means in front of which are supported on the planter frame, furrow-forming means and a plant-setting device, the planter frame being arranged to follow the contour of the ground during its forward movement independently of the support frame on which an operator is supported for manually feeding plants to the plant-setting device.

11 Claims, 8 Drawing Figures



United States Patent [19]

Grundström et al.

[11] 3,972,294

[45] Aug. 3, 1976

[54] PLANTING MACHINE

[76] Inventors: Erik Hilding Grundström; Göte Einar Grundström; Ivar Waleij, all of 8 Sockenvagen, Dorotea, Sweden, 91070

[22] Filed: Oct. 21, 1974

[21] Appl. No.: 516,762

[30] Foreign Application Priority Data

Oct. 31, 1973 Sweden 7314795

[52] U.S. Cl. 111/3; 111/91

[51] Int. Cl.² A01C 11/00

[58] Field of Search 111/3, 2, 91

[56] References Cited

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2,776,633	1/1957	Bible	111/3
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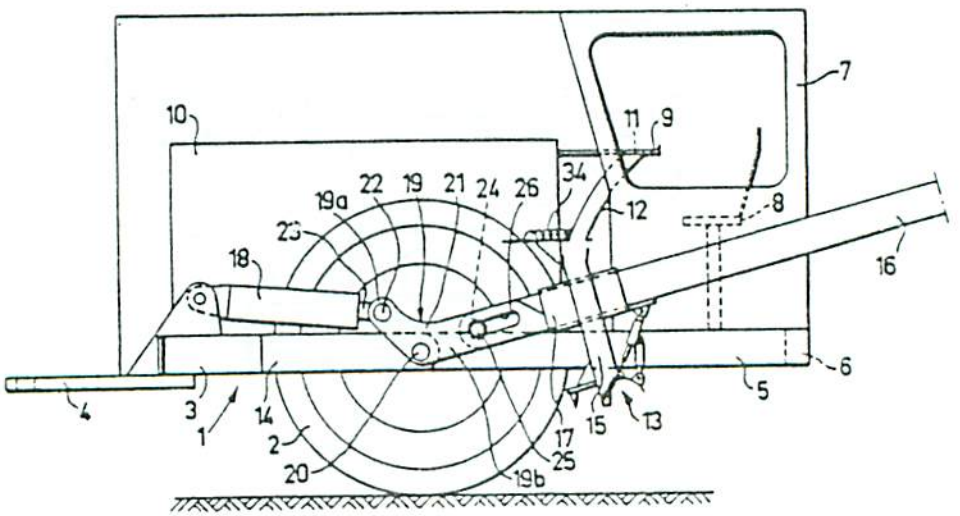
Primary Examiner—Stephen C. Pellegrino

Attorney, Agent, or Firm—Pierce, Scheffler & Parker

[57] ABSTRACT

The improved planting machine of the invention, which prepares a hole in the soil for a plant to be inserted therein, and thereupon places the plant in said hole and firms the soil about it, is characterized in that the machine has a planting member so actuated that during the act of planting the plant said member temporarily stands still in relation to the soil whilst the planting machine as a whole advances at its normal rate.

21 Claims, 4 Drawing Figures



(11) (CA) No. 908,507

(45) ISSUED Aug. 29, 1972

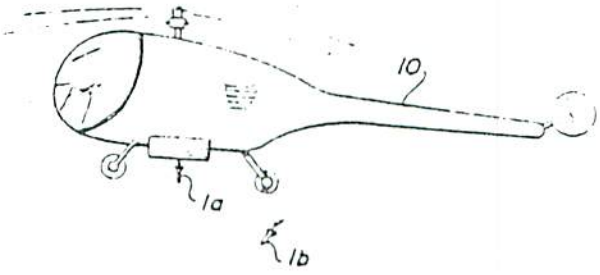
(52) CLASS 111-1
C.R. CL.

(10) CANADIAN PATENT

(54) AERIAL PLANTING METHOD AND APPARATUS

John Walters and Ian S. Gartshore, Maple Ridge,
British Columbia, Canada

Granted to Canadian Patents and Development Limited,
Ottawa, Ontario, Canada



(21) APPLICATION No. 093,968
(22) FILED Sep. 24, 1970

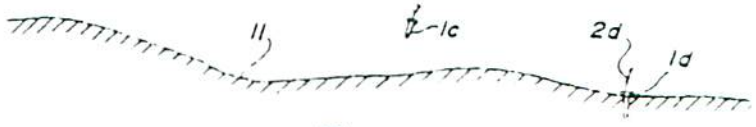


FIG. 1.

(30) PRIORITY DATE

No. OF CLAIMS 8

Hand Tools

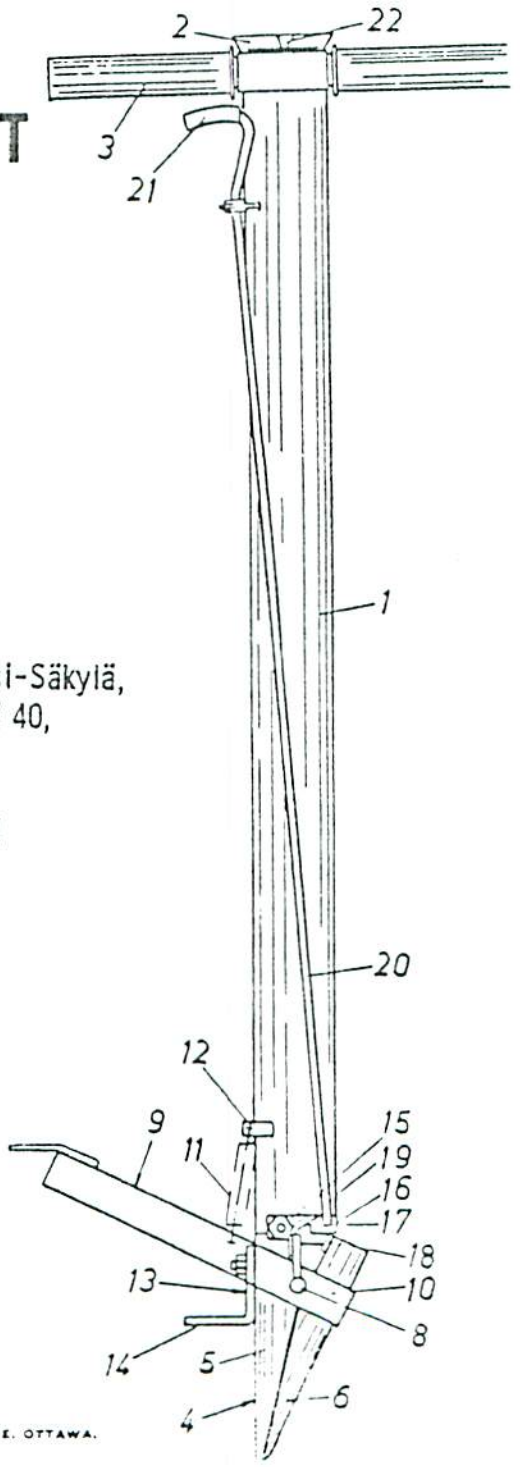
(11) (A) No. 957567

(45) ISSUED Nov. 12, 1974

(52) CLASS 111-33
C.R. CL.

(19) (CA) # CANADIAN PATENT

(54) PLANTING TOOL FOR SEEDLINGS



(70) Bergius, Mikko H. T. and Keskilohko, Altti K., Länsi-Säkylä, Finland, and Saarenketo, Tapio H., 96400 Rovaniemi 40, Finland

Granted to Lännen Sokeri Oy, Länsi-Säkylä, Finland

(21) APPLICATION No. 136,409
(22) FILED Mar. 7, 1972

(30) PRIORITY DATE Mar. 11, 1971 (706/71) Finland

No. OF CLAIMS 3

(11) (A) No. 957207

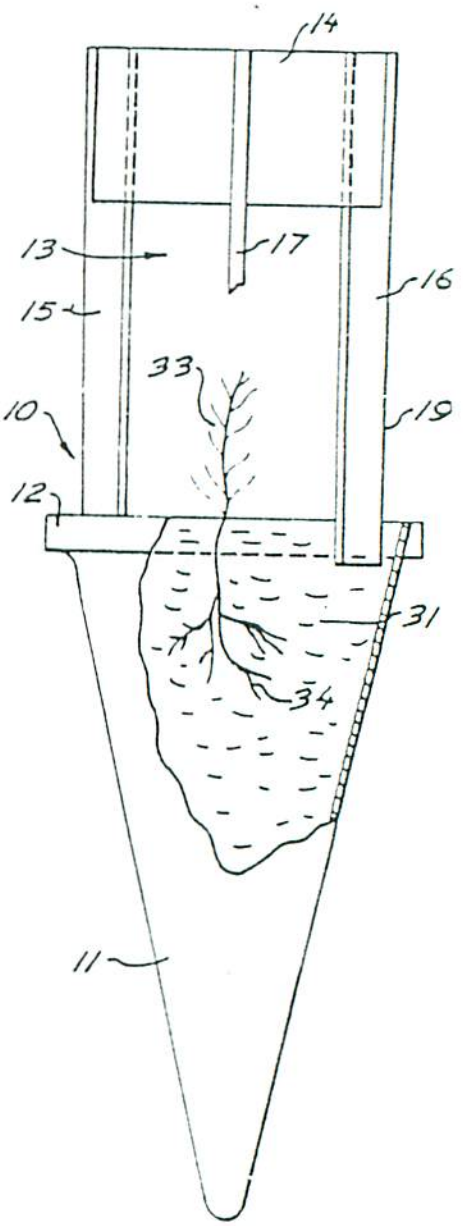
(45) ISSUED Nov. 5, 1974

(52) CLASS 111-1
C.R. CL.

(19) (CA)

CANADIAN PATENT

(54) PLANTING METHOD AND DEVICE



(72) Race, William F., Lions Bay, British Columbia, Canada

(21) APPLICATION No. 121,505
(22) FILED Aug. 27, 1971

(30) PRIORITY DATE

No. OF CLAIMS 14

Plant Containers

(11) (A) No. 991408

(45) ISSUED 760622

(52) CLASS 47-18
C.R. CL.

(19) (CA) # CANADIAN PATENT

(54) PLANTING CONTAINERS

(72) Walters, John,
Canada

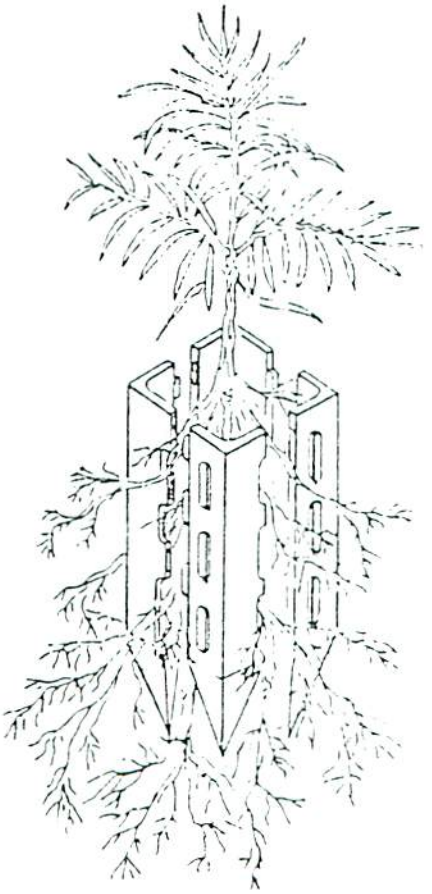


FIG. 8

(21) APPLICATION No. 196,996
(22) FILED 740408

(30) PRIORITY DATE

No. OF CLAIMS 15

United States Patent [19]

Walters

[11] 3,962,822

[45] June 15, 1976

[54] PLANTING CONTAINERS

[75] Inventor: John Walters, Whonnock, Canada

[73] Assignee: Canadian Patents and Development Limited, Ottawa, Canada

[22] Filed: Mar. 31, 1975

[21] Appl. No.: 563,854

[30] Foreign Application Priority Data

Apr. 8, 1974 Canada 196996

[52] U.S. Cl. 47/34.11; 47/34.13; 47/37; 47/58

[51] Int. Cl.² A01G 23/00

[58] Field of Search ..... 47/34–38.1, 47/1, 48.5, 58, DIG. 4; 71/64; 206/243; 111/2, 4, DIG. 1; 220/23.4–23.6

[56] References Cited

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3,800,974	4/1974	Mogel et al.	220/234
3,844,987	10/1974	Clendinning et al.	47/37

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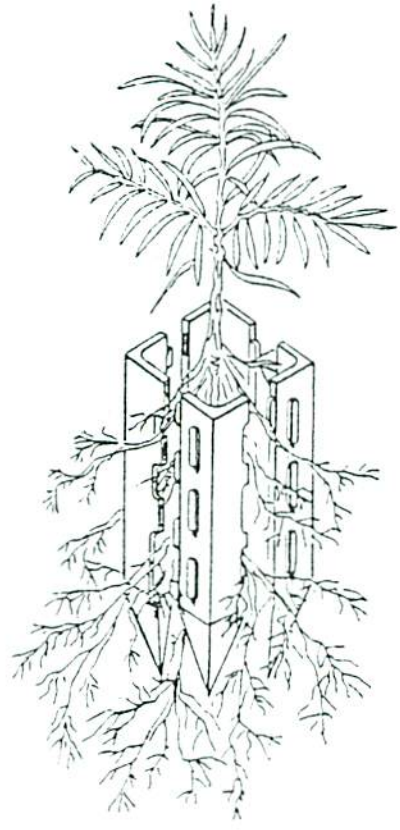
24,354	10/1897	United Kingdom	47/37

Primary Examiner—Edgar S. Burr
Assistant Examiner—James R. Feyrer
Attorney, Agent, or Firm—Ronald G. Bitner

[57] ABSTRACT

This invention relates to planting containers which facilitate the mechanized planting of seedlings in large numbers. The containers comprise a square cross-sectioned tubular portion and an earth penetrating nose portion. For immediate root egress the containers have apertures which are offset to one side in order that they are blocked by the wall of another similar container when placed contiguous therewith. The containers are adapted to be grouped into bundles which facilitate the nursery, transporting and planting operations. The containers may be formed of a biodegradable material or may comprise separating sections to allow unimpeded root development.

13 Claims, 9 Drawing Figures



United States Patent [19]

Bergeron et al.

[11] 3,889,416

[45] June 17, 1975

[54] SEEDLING TREE GROWING APPARATUS

[76] Inventors: **Duncan G. Bergeron**, Rt. 2, Box 706, Beaverton, Oreg. 97005; **Ray E. Leach**, Rt. 2, Box 20, Aurora, Oreg. 97002

[22] Filed: **Dec. 10, 1973**

[21] Appl. No.: **423,386**

[52] U.S. Cl. **47/34.13**; 211/74; 47/39

[51] Int. Cl. **A01g 9/02**; A47b 71/00

[58] Field of Search ..... 211/71–74; 47/34, 34.13, 37, 1.2, 1.1, 38–39; 224/48 A–48 C

[56] References Cited

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FOREIGN PATENTS OR APPLICATIONS

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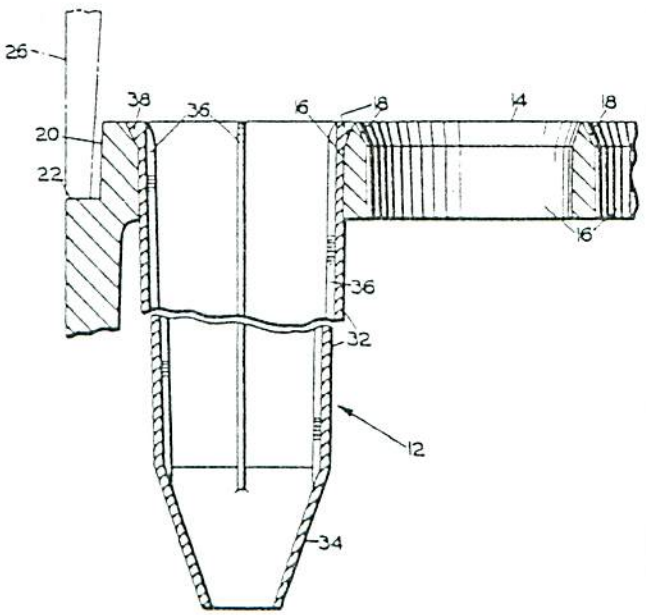
Primary Examiner—Robert E. Bagwill

Attorney, Agent, or Firm—Eugene D. Farley

[57] ABSTRACT

Seedling tree growing apparatus for use particularly in growing seedling reforestation trees comprises in combination a support tray and a plurality of tubes adapted to be supported vertically in the tray. The tubes are open at both ends and provided with inwardly extending longitudinal ribs which guide the roots of the seedling trees contained therein out the open, lower end of the tubes for air pruning.

4 Claims, 7 Drawing Figures



(11) (A) No. 989614

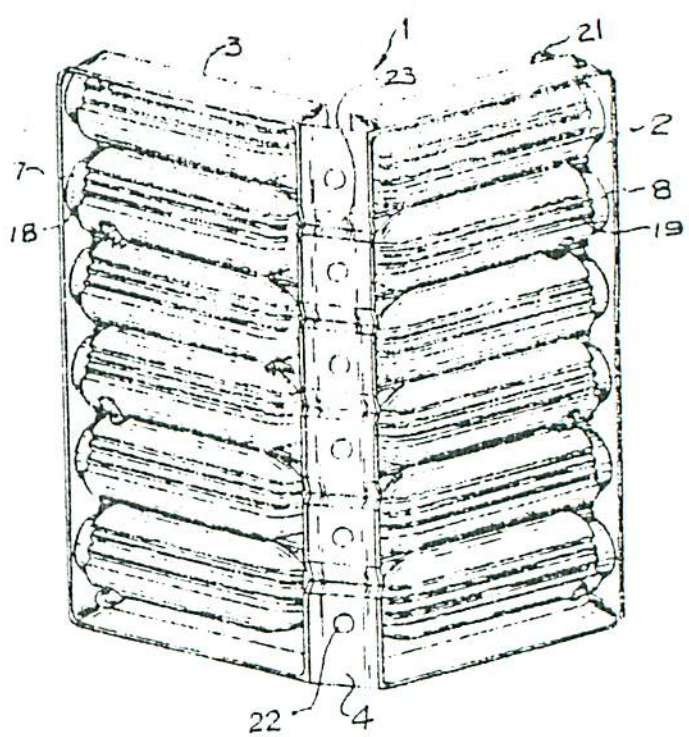
(45) ISSUED 760525

(52) CLASS 47-20
C.R. CL. 217-108

(19) (CA) # CANADIAN PATENT

(54) CONTAINER FOR SEEDLINGS

(72) Spencer, Henry A., Canada



(21) APPLICATION No. 178,232
(22) FILED 730807

(30) PRIORITY DATE

No. OF CLAIMS 9

(11) (CA) No. 855929

(45) ISSUED Nov. 17, 1970

(52) CLASS 47-20
C.R. CL. 47-21

(10) CANADIAN PATENT

(54) CONTAINERIZED TREE SEEDLING UNITS AND METHOD OF MAKING THESE UNITS

Norman R. Pelton, Haney, British Columbia, Canada

(21) APPLICATION No. 002,018
(22) FILED Oct. 10, 1967

(30) PRIORITY DATE

No. OF CLAIMS 12

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CCA-274

855929
8-2

Fig. 5.

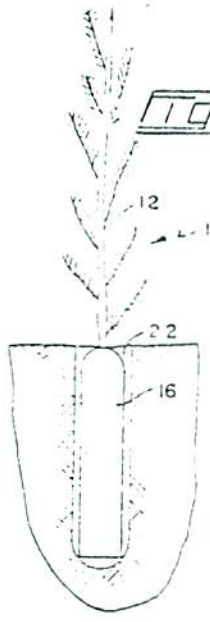


Fig. 14.

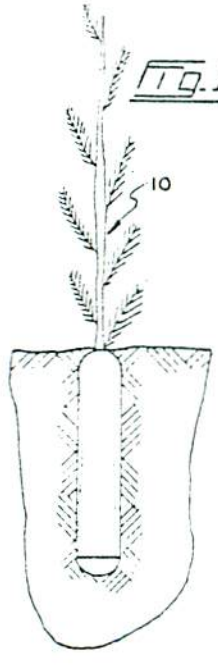
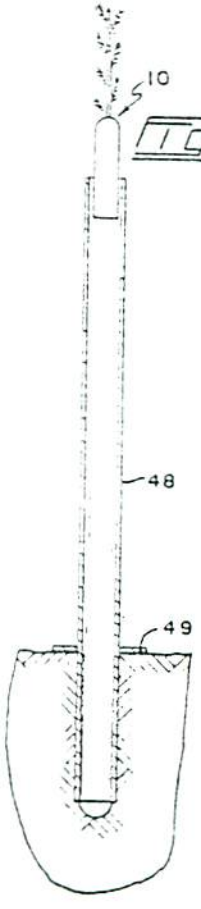


Fig. 12.

Fig. 13.



Vegetation Control

4,092,800

VEGETATION CONTROL

James Robert Wayland, Jr.; Frank S. Davis, and Morris Guy Merkle, all of College Station, Tex., assignors to Phytox Corporation, College Station, Tex.

Continuation of Ser. No. 400,139, Sep. 24, 1973, abandoned, which is a continuation of Ser. No. 225,109, Feb. 10, 1972, abandoned. This application Nov. 2, 1976, Ser. No. 737,909

Int. Cl.[2] A01G *1/00*

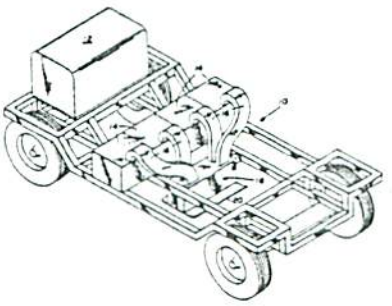
U.S. Cl. 47—1.3 7 Claims

1. A method of vegetation control, comprising the steps of:

generating an electromagnetic wave having a frequency in the range of from 300 MHz to 300 GHz for emission from an energy radiator;

subjecting an area within which vegetation is to be controlled to the electromagnetic wave emission from the energy radiator; and

reflecting the wave emission after it has passed through the area back into the area of vegetation control to achieve an energy density from approximately 150 Joules/cm^2 to approximately 300 Joules/cm^2 sufficient to cause the death or debilitation of the vegetation without raising the temperature of the area sufficiently to cause death or debilitation solely by thermal effects.

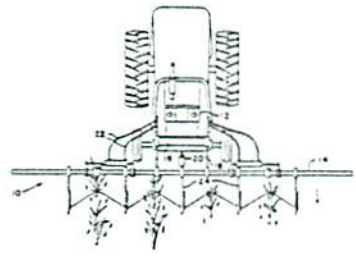


4,094,095

METHOD AND APPARATUS FOR USING ELECTRICAL CURRENT TO DESTROY WEEDS IN AND AROUND CROP ROWS

Willis G. Dykes, Vicksburg, Miss., assignor to Lasco, Inc., Vicksburg, Miss.

Filed May 9, 1977, Ser. No. 795,087
Int. Cl.[2] A01M *21/00*
U.S. Cl. 47—1.3 14 Claims



4. A machine for destroying weeds growing in and around crop rows without destruction of crops growing therein, comprising;

(a) a vehicle adapted to travel in a given direction,

(b) a source of high-voltage electricity mounted on and movable with said vehicle,

(c) means for connecting said high-voltage source of electricity to ground,

(d) a plurality of conductive spring members,

(e) means for mounting said conductive spring members so that they are disposed in generally horizontal planes, and

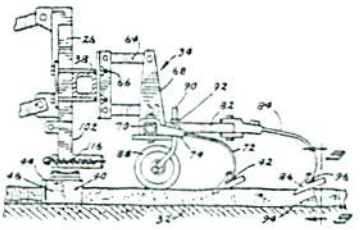
(f) means for providing a larger dwell time of contact between said spring members and relatively flexible weeds than the dwell time of contact between said spring members and relatively stiff crop plants, so that weeds contacted by said spring members generally receive sufficient electrical energy to result in destruction thereof while crop plants do not receive sufficient electrical energy to result in destruction thereof, said means comprising a first portion of each spring member having an end connected to said mounting means and making a first angle α with respect to a line along said direction of travel of said vehicle, and a second portion of each spring member having a free end and making a second angle $\ominus$ with respect to a line along said direction of travel of said vehicle, said second angle β being substantially greater than said angle α, and said connected end adapted to be disposed between rows of crops as said vehicle travels in said given direction; and wherein the length of said first portion of each spring member is significantly greater than the length of said second portion of each spring member; and wherein each spring member has a spring constant such that relatively stiff crop plants will deflect said spring member while relatively flexible weeds will not deflect said spring member.

4,117,889

APPARATUS FOR GUIDING ROW CROP PROCESSING IMPLEMENTS

John C. Larson, Clements, Minn. 56224

Filed Jan. 21, 1977, Ser. No. 761,373
Int. Cl.[2] A01B 59/00
U.S. Cl. 172—26
4 Claims



2. In combination with laterally movable implements for moving over the ground to establish the location of crop rows in a field and for processing crops in those rows, apparatus for establishing a guide trench in precise parallel relation to such crop rows and for guiding said row crop processing implements using said trenches, said apparatus including:

A. a plurality of vertical guide block support bars fixedly positioned with respect to each of said implements in spaced relation to each other in direction transverse to the moving direction of the implement to which they are fixedly positioned;

B. a plurality of vertical guide blocks, each firmly mounted with respect to a lower end of one of said support bars to have position beneath the surface of the ground on which the implement to which it is mounted is supported and to lie in a vertical plane in parallel relation to the direction of travel of that implement as it moves over the field;

C. each such block including a relatively short wedge-shaped leading edge portion and an elongated flat plate-like trailing portion; and

D. wherein said means for firmly mounting each guide block with respect to a lower end of one of said support bars includes:

(1) a guide block pivot plate pivotally mounted with respect to a lower end portion of said support bar;

(2) means for attaching said guide block to said guide block pivot plate, said means including a guide block attachment plate integral with a lower end of said pivot plate, a guide block plate integral with an upper edge of said guide block and removable fastening means to connect said guide block plate and said guide block attachment plate;

(3) resilient means for urging said pivot plate and said guide block to move forwardly in the direction of motion of said implement; and

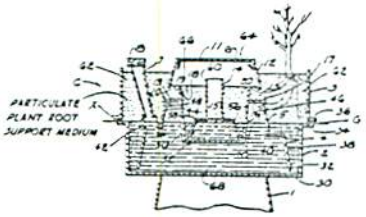
(4) stop means fixed with respect to said support bar and said pivot plate for limiting the forward motion of said guide block to position whereby said wedge-shaped leading edge portion of said block is in substantially perpendicular relationship with respect to the ground on which the implement is supported.

4,133,141

APPARATUS AND METHOD FOR GROWING PLANTS

Choong W. Lee, No. 1 Pesiaran Stonor, Kuala Lumpur 04-08, Malaysia

Filed Dec. 16, 1977, Ser. No. 861,366
Int. Cl.² A01G *9/02, 31/02*
U.S. Cl. 47—79 17 Claims



1. A plant-growing device, comprising:

an upwardly open receptacle, having a floor and an upstanding outer peripheral wall;

wall means separating the interior of the receptacle into three regions: a plant-growing region adapted to contain a body of particulate, plant root-support medium in which plants may be rooted, a water compartment and a nutrient container;

said wall means providing a first interface with a first path of physical communication between the plant-growing region and the water compartment and a second interface with a second path of physical communication between the plant-growing region and the nutrient container;

wall means dividing the nutrient container into a first chamber for containing a bulk supply of plant nutrients in concentrated form, a second chamber for receiving a capillary medium in contact with said second path, and a third path of physical communication between the first and second chambers distally of said third path, so that plant nutrients, to reach the plant-growing region from said bulk supply, must traverse from said third path to said second path, across said capillary medium, at least largely by capillary action;

and basin means for catching a limited quantity of water in the vicinity of said second path, and in communication therewith, for providing at least some of the moisture necessary for retarding said capillary action.

4,117,685

METHOD AND MEANS FOR IRRIGATING SOIL AND GROWING PLANTS HAVING VARYING WATER REQUIREMENTS

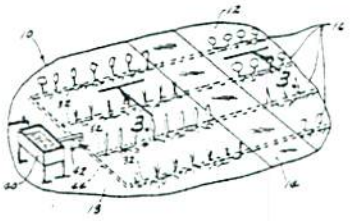
William Skaife, Dubuque, Iowa, assignor to Margaret R. Skaife, Dubuque, Iowa

Filed Jul. 5, 1977, Ser. No. 812,793
Int. Cl.² A01G *27/00;* E02B *13/00*
U.S. Cl. 405—36 8 Claims

1. A method of irrigating soil and growing plants having varying water requirements including the steps of,

providing a growing medium having top and bottom layers with the top layer being soil and the bottom layer being a material having substantially greater water holding and retention characteristics than said top layer of soil thereby substantially restricting the transmission of water from said bottom layer to said top layer by capillary action,

insulating the bottom layer from soil to the sides and therebelow, and



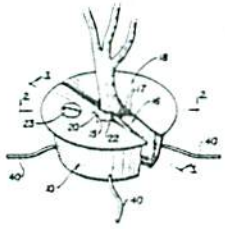
supplying water to the bottom layer of growing medium to maintain it substantially saturated whereby plant roots may grow downwardly toward and into said lowermost layer to the level suitable for their water requirements.

4,087,938

TREE WATERING DEVICE

James Preston Koch, Rte. 8, Box 268-A, Yakima, Wash. 98908

Filed Mar. 21, 1977, Ser. No. 779,898
Int. Cl.[2] A01G *29/00*
U.S. Cl. 47—48.5 6 Claims



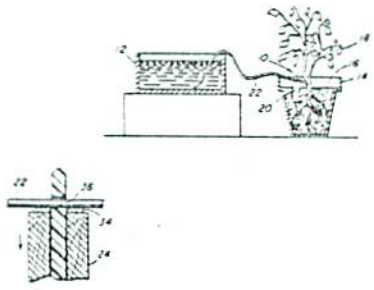
1. A tree watering device comprising a watering tub of substantially annular form adapted to rest on the ground at the base of a tree in surrounding relationship to the tree trunk, said tub having a generally radial slot extending from top to bottom thereof by means of which said tub may be placed around a tree trunk, adjustable water metering valve means on said tub near its bottom by means of which water can be delivered at a controlled rate to selected tree root areas, said tub having a bottom wall and an upwardly flaring side wall and a center upstanding sleeve rising from the bottom wall of the annular tub, a pair of radial substantially vertical walls joining the tub side wall with said center sleeve and defining therewith a generally radial slot, a concave lid resting on the open top of said tub and having a center opening adapted to fit over and surround said sleeve and a radial slot adapted to register with the tub radial slot, said tub being colored black to absorb heat and said lid and upstanding sleeve being white and reflective.

4,121,608

LIQUID METERING DEVICE

Edward MacLeod, 143 Park Dr., Apt. 26, Boston, Mass. 02215

Filed Feb. 14, 1977, Ser. No. 768,401
Int. Cl.[2] A01G *27/00*
U.S. Cl. 137—78 5 Claims



1. A device for delivering a liquid such as water from a source to a site such as a potted plant, comprising

(a) a valve adapted to be positioned at said site and responsive to the moisture level thereof,

(b) said valve including a first member formed of a material having a relatively high coefficient of expansion in the presence of moisture and a second member formed of a material that is essentially stable in the presence of moisture,

(c) said members being operatively connected to one another and defining a nipping joint therebetween subject to the relative movement between said members according to the moisture level at said site, and

(d) an elongated flexible tube passing through said joint and adapted to be extended between said site and said source.

(e) said first member being an elongated tubular sleeve and said second member being an elongated core restrained at one end to one end of said sleeve and said other end being formed with a transverse opening adjacent the other end of said sleeve, said tube passing through said opening.

PART III Patent Office Classification

Canadian Patent Office Classification

Amended: 21 Apr 76

CLASS 97

EARTH WORKING: AGRICULTURAL

Section: M-1

Revised: August 10, 1967
J.R. Chiarelli

3 EARTH PERFORATOR AND LAWN AERATOR
5 SOIL ELEVATORS AND TREATERS
6 With Heat Treatment
7 With Rotating Beaters, Cutters or Crushers
7.5 ROW CROP THINNERS
7.6 Electronically Operated Or Controlled
8 HILLERS, RIDGERS AND FURROWERS
9 PACKERS AND ROLLERS (INCLUDES LAWN ROLLERS)
10 Combined With Cultivator or Harrow
11 Multiple Wheel Type
12 PLOWS
13 Reversible
14 Disc Type
15 Plural Alternately Used
16 Direction of Motion Reversing
17 Turnover Type
18 Semi Tractor Mounted
19 Tractor Mounted
20 Motorized (i.e., self propelled)
21 Hand Manipulated by Walking Attendant
22 Shares or Discs on Moving Endless Chain
23 With Combination Tool (e.g., disc and moldboard, rolling moldboard, etc.)
24 Disc Type
25 Sulky or Rider
26 Side Tractor Mounted
27 Rear Tractor Mounted
28 With Power Lift
29 Fluid Operator
30 Disc Gang (e.g. "one way disc")
31 Multiple Gang
32 Gang (e.g. "one way disc")
33 Driven Gang
34 Multiple Gang
35 Tandem
36 Tandem Pairs
PLOWS
37 Tractor Mounted
38 Semi Tractor Mounted
39 Tractor Drawn
40 Multiple Plows or Gangs Individually Mounted
41 With Power Lift(s)
42 With Power Lift
43 Fluid Operator
44 Lifts Per Se
45 Rear Furrow Wheels and Wheel Mounts Per Se
46 Sulky or Rider Type
47 Interconnected Steerable Front and Rear Wheels
48 Cultivating, Mulch and Trash Handling Attachments
49 Coulters and Coulter Mounts Per Se
50 Rolling Type
51 Cleaners for Shares, Discs and Coulters
52 CULTIVATORS AND HARROWS
53 Hand Manipulated by Walking Attendant
54 Propelled by Attendant
55 With Variable Frame Width
56 Horizontal Transverse Axis Rotary Tool
57 Horizontal Transverse Axis Rotary Tool
58 With One or More Other Type Tools
59 Rotating Rod (e.g. rodweeders)
60 With Circumferentially Spaced Rods or Cutter Bars
61 With Teeth or Tines
62 Retractable, Pivoted or Sprung
63 Power Driven Tool
64 Tractor Power
65 Multiple Tools in Tandem
66 Helical Auger Type Tool
67 Transverse Axis Orbital Type
68 Endless Chain Type With Transverse Axes
69 Vertical Axis Rotary Tools
70 Toothed Harrows
70.1 Longitudinal Axis Rotary Tools
70.2 Laterally Reciprocating Tools

Amended: 10 Mar 72

Class 97 (Cont'd.)

- CULTIVATORS AND HARROWS
  - Laterally Reciprocating Tools
    - 70.3 Intermittent Reciprocation For Row Crops
  - 70.4 Tractor Mounted
    - 70.5 Combined Forward And Rear Mounted
    - 70.6 Rear Mounted
  - 70.7 Straddle Row Type
  - 70.8 With Subsurface Weeding Tools
  - 70.9 With Subsoil Loosening Tools
  - 71 Spring Tooth (e.g. Covers)
  - 71.1 Toothed Drag Harrows (Except Rotary)
    - 71.2 With Clearing Or Clearing Devices
    - 71.3 Wheeled Or Sulky (Includes Harrow Sulkies per se)
    - 71.4 With Reversible Teeth, Adjustable Tooth Angle And Adjustable Depth
    - 71.5 Flexible Net, Or Link And Chain, Or Drag Bar Harrows
  - 71.6 Wheeled Frame Type
    - 71.7 With Power Lift
    - 71.8 With Suspended And/Or Towed Tool Frame Or Bar
- 72 POWER IMPLEMENT LIFTS PER SE
- 75 TOOLS AND CONNECTIONS
  - 76 Overload Release (e.g., Spring Biased Connections)
  - 77 Rolling And Rotary
    - 78 Disc Structure, Connections And Specific Attachments
  - 81 Plow Bottom Type
    - 81.5 Mouldboards
    - 82 Points And Shares
  - 83 Tooth Type
    - 84 Spring Or Resilient Toothed
- 88 FRAME ELEMENTS AND ATTACHMENTS
  - 89 Beams
  - 90 Wheels And Runners
  - 91 Fenders
- 95 HAND HELD TOOLS (E.G., GARDEN TOOLS)
  - 95.5 Picks
  - 96 Combined Or Convertible
    - 97 Pivotal Or Adjustable Head
    - 98 Pivitol Or Adjustable Head
  - 99 Forks Or Shovels
  - 100 Bladed Hoes And Weeders
  - 101 Rakes
  - 102 Forks Or Shovels
    - 103 Fulcrumed
    - 104 Apertured
    - 105 Tined Or Harpooned
    - 106 Scoop Type
  - 107 Bladed Hoes And Weeders
    - 108 Compound
    - 109 Horizontal
    - 110 Toothed
  - 111 Rakes
    - 112 Broom Type Lawn Rakes
    - 113 With Cleaner Attachment
  - 114 Handles And Connections
    - 115 With Auxiliary Handle
    - 116 D-Tops Per Se
- 117 HITCHES AND RELATED DEVICES
  - 117.1 Drawbars (Rolling Or Drag)
    - 117.2 Folding And/Or Articulated
  - 118 Vertically Load Supporting
    - 119 Draft Compensating And Control (e.g., Three Point Hitches)
  - 120 Linkages And Stabilizers
    - 121 Coupling Means
      - 121.1 Laterally And/Or Vertically Adjustable
      - 121.2 Couplings And Clevises
      - 121.3 With Overload Release
      - 121.4 With Remote Release
- 122 FOLDING IMPLEMENT FRAME AND/OR SWIVELLING WHEELS FOR TRANSPORTING

Amended: 20 Mar 73

CLASS 37

LAND SURFACE MATERIAL PUSHING

Section: M-9

Revised: 31 Aug 1967
G.G. Phillips

1 MATERIAL LOOSENERS
2 | Stumpers, Grubbers And Root Cutters
2.5 | Surfacing From Roofs, Decks And Floors
3 | Vibrators Or Vibration Assisted
4 | Flails And Rolling Cutters
5 | Rakes, Rippers And Scarifiers
6 | | Combined With Pusher Blade
7 | | With Separate Pusher Blade
8 | Reciprocating Impact
9 | | Picks and Cutters
10 MATERIAL PUSHERS (E.G., DOZER OR GRADER)
11 | Combined Machines (E.g., Blade and Roller or Transport)
12 | Automatic Tool Positioning Control (E.g., Pendulum, Electronic, Light Beam)
13 | Sub Aquatic
15 | Rink Ice and Ski Slope Resurfacing and Conditioning
16 | Conveyor and Combination Blades
17 | Manual
18 | Ditchers, Dammers and Pit Plows (E.g., For Drainage and Irrigation)
19 | Convertible Blade (E.g., V-To-Diagonal)
20 | Front Mounted (E.g., Dozer)
21 | | V-Blade
22 | | With Wings
23 | | Transverse Blade
24 | | | Center Pivot Mount
25 | | | Two Point Mount
26 | | | For Automotive Vehicle Or Farm Tractor
27 | | With Wings
28 | Side Mounted (Wing-Type)
29 | Underslung Blade (E.g., Grader)
30 | | Long Wheel-Base Levellers
31 | | Wheel Or Runner Adjustable For Depth Control
32 | | Laterally Tilting Wheel Or Frame
33 | | With Wings
34 | | Adjustable In Both Horizontal and Vertical Planes
35 | | With Ring Mount
36 | | Multiple Blade Or Drag-Type
37 | Rear Mounted Blade
38 | Towed Blade Or Drag Type
39 | | With Adjustable Wheel Or Runner
40 | Elements
41 | | Blades
42 | | | Sprung Or Releasably Mounted
43 | | | Cutting Edges
44 | | | Extensions And Gates

Amended: 23 Jul 68

CLASS 47

PLANT HUSBANDRY

Section: M-7

Revised: 29 Feb. 1968.
F.J. Lalande

1 HYDROPONIC CULTURE
2 |Seed Germinators
4 PROPAGATION
5 AMBIENT ATMOSPHERE CONDITIONING
6 GREENHOUSES AND HOTBEDS
7 PLANT TREATMENTS
8 |Mulching
9 |Weed Destroying
10 |Root Feeding (e.g. Fertilizing or Watering)
11 | Plant Receptacles
12 |Injection
13 |Tree Surgery
14 PROTECTING AND/OR SUPPORTING
15 |Trunk or Stem Guards
16 |Plant Covers
17 | With Transparent Walls
18 PLANT RECEPTACLES
19 |Seed Tapes And/Or Packages
20 |Transplanting
21 MISCELLANEOUS

CLASS 56

HARVESTERS

Section: M-1 Revised: May 13, 1968.
G.G. Phillips

TRANSPORTING
HITCHES (DRAFT ONLY)
DETACHABLE AND INTERCHANGEABLE HEADERS (E.G., FOR COMBINE)
CROP CONDITIONERS (E.G., CRUSHING TO PROMOTE DRYING)
 Rolls Per Se
HARVESTERS - SPECIAL
 Subaquatic
 Cotton
 Tobacco
 Tree Sap (Includes Buckets and Spouts Per Se)
  Collecting Systems
 Edible Plant (Cabbage, Celery, Asparagus, Brussel Sprouts)
 Fruits - Vine (Tomatoes, Cucumbers, Grapes)
 Fruits - Tree And Bush
  Pneumatic - Suction And Blowing
  Vibrating
  Hand Or Hand Operated - Single Fruit
  Collecting Chutes
 Corn And Cane
  With Corn Ear Stripping
   With Snapping Rolls
    With Husking
   With Husking
  With Comminuting
  Attachments For Other Grain Handling Machines
 Plant Pulling (e.g., Flax, Weeds)
  With Clamping
   Coacting Rolls
   Coacting Belts Or Conveyors
 Seed Or Leaf Stripping (e.g. Rice, Hops, Peas, Leaves From Brussel Sprouts. Note: Plant is not cut.)
  Rotating Fingered Reel, Beater Or Brush
 Suction Recovery Of Fallen Seed
HARVESTERS - GENERAL
 Speed Controlled By Feed Rate
 Cutting
  Lawn Edge Trimmers
  Rotary Cutters
   Hedge Trimmer
   Vertical Axis
    Disc Type (Single And Multiple)
     Toothed Edge
    Radial Blade(s) (Includes Flails)
     With Coacting Cutter Bar (Stationary Or Counter Rotating)
     Tractor Drawn Or Mounted
      With Recovery - Forage Harvester
      Multiple Blade
     Garden Or Lawn Type
      With Rider Facility
       Multiple Blade
      Multiple Blade
      Powered Wheels
      With Second Function Attachment (e.g., Spreader; except Snow Blower)

CLASS 56 (Cont'd.)

HARVESTERS - GENERAL
Cutting
Rotary Cutters
Vertical Axis
Radial Blade(s) (Includes Flails)
Garden Or Lawn Type
54 With Grass Catcher
55 Wheels Adjustable For Height Control
56 Handles
57 Guards, Combs And Miscellaneous Attachments
58 Blades Per Se (No Machine Structure Shown)
59 Horizontal Longitudinal Axis
60 Horizontal Transverse Axis
61 Rolling Cutter
62 Flail Or Beater
63 With Recovery (e.g., Forage Harvesters)
64 Reel Type (Includes Rider Type Lawn Mowers)
65 Ganged
66 Hand Mowers
67 With Second Function Attachment
68 Motor Powered
69 Electric Motor
70 Cutter Bars And Blades (Includes Sole Plates)
71 Adjustable Height Control
72 With Grass Catcher
73 Pivoted Shearing Cutters
74 Single Pivoted Blade Or Pair

76 Endless Chain or Belt Type Cutters
77 Rigid Blade Draw Cutters
78 Reciprocating Cutters
79 With Plant Handling Before And During Cutting
80 Reels And Sweeps (Includes Drives And Adjustments)
81 With Axes Of Rotation Inclined To Horizontal
82 With Fingers Or Tines
83 Slat And Endless Chain
84 Reciprocating
85 Blower Or Suction
86 Plant Guides And Pickups
87 Swath Boards And Dividers
88 With Plant Handling After Cutting
89 With Binding
90 Frame Construction Arrangement
91 Tilting And Height Control
92 Conveying
93 Drives
94 Motor Operated
95 Bundle Forming (Includes Packers, Gavels, Binders And Ejectors)
96 With Tying
97 Straw Band
98 Butter Boards And Headers
99 Shelled Grain Savers
100 Bundle Carriers
101 Shocking Or Stooking
102 With Windrowing
103 Swather Frame Construction
104 Header Mounts (Particularly For Tractor Mounted Swather)
105 Center Delivery

Amended: 5 May 70

CLASS 56 (Cont'd.)

HARVESTERS - GENERAL
Cutting
Reciprocating Cutters
With Plant Handling After Cutting
With Windrowing
106 With Particular Swath Or Stubble Arrangement
107 Attachments For Mowers
108 With Seed Saver (e.g., Clover)
109 Side Delivery Apron Or Table With Rake or Sweep
110 Swath Rollers (Note: Accessory Only - No Cutting)
111 With Bunching (e.g. With Carrier Or Rake)
112 With Loading
113 To Thresher
114 Frame Construction And Arrangement (Includes Attachments, Ladders, Dust Covers, Etc.)
114.5 Grain Unloading Augers, Baggers and Tanks
115 Side Hill Harvester (Includes Header Mounts For Same)
116 Header Mounts (Includes Position And Balance Controls)
117 Drives (Power)
118 Conveyors
119 Auger Type
120 With Feeder
121 Feeders
122 To Comminutor or Waferer (e.g., Forage Cutter And Blower)
123 Hedge Trimmer
124 Reciprocating Transverse Cutter Bar
125 Ganged
126 Plural Counter-Reciprocating Coacting
127 Lawn Mower Type
128 Hand Operated
129 Motor Powered
130 With Brush Or Reel
131 Side Extending (Cantilevered)
132 Embankment Cutting (Includes Railroad)
133 Rear Tractor Mounted
134 With Castor Wheel(s)
135 Side Tractor Mounted
136 Ground Wheel Powered
137 Cutter Bar Mounting And Control
138 With Gearing And Knife Drive
139 Front Mounted Cutter Bar
140 Elements
141 Knife Drives
142 Cam Type
143 Pitman, Pitman Connections And Knife Heads
144 Knife And Sickle Bar Assembly
145 Knife Bars And Sections
146 Sickle Bars, Ledger Plates And Guards
147 Pressure Plates
148 Pickups
149 Swath Lifters, Aerators And Turners
149.5 With Binding (Static or Dynamic Pickup)
150 Elevating Loader (e.g., Conveyor)

Amended: 5 May 70

CLASS 56 (Cont'd.)

HARVESTERS - GENERAL
Pickups
Elevating Loader (e.g., Conveyor)
151 Combined With Receptacle (e.g., Forage Vehicle)
152 Dumping Receptacle (e.g., Stacking Or Bunching)
153 Reversed Flow With Rake
154 Rotating Fingered Reel Pickup
155 Reciprocating Conveyor Or Rakes
156 Sweep Rake To Conveyor
157 Rotating Fingered Reel Pickup
158 Retracting Fingers
159 Rotating Fingered Reel Or Brush (Includes Hand Propelled Grass And Leaf Pickups And Turf Groomers)
160 To Comminutor And/Or Blower
161 Retracting Fingers
163 Endless Conveyor With Fingers Or Bars
164 Rakes (Includes Swath Turners And Tedders)
165 Hand Propelled Lawn Type
166 Rotating Wheel
167 Horizontal Axis At Angle To, Or Parallel to, Direction Of Travel
168 Reversible Frames, Axes Relatively Changeable In Horizontal Plane, And Wheel Positions Relatively Changeable
169 Wheels, Tines And Tine Mounts
170 Rotating Reel Or Brush
171 Side Delivery
172 Tedders
173 Comb Type With Dumping
174 Sweep Or Buck Type
175 Teeth And Tooth Points
176 MISCELLANEOUS HAND TOOLS

Amended: 31 Jan 77

CLASS 111

PLANTING

Section: M-9

Revised: 8 Oct 69
B.K. Jeun

1 PLANTS
2 |With Removal From Previous Growing Location
3 | |Root Balling Or Wrapping
4 | |Manually Operated Implement
5 |With Gas, Liquid Or Solid Material Dispensing
6 |With Row Covering Or Ridge Forming
7 |Dibbler
8 PLANT PARTS
9 |Potato Planters
10 | |With Rotary Type Dispenser
11 | |With Conveyor Type Dispenser
12 | | |With Potato Grasping Or Picking
13 | | |With Potato Cutting
14 | |With Potato Cutting
15 | |Dibbling Type
16 SEEDS
16.1 |Seed Tapes Or Packages
17 |Combined With Earth Working Implement
18 | |Earth Pulverizing Type
19 |With Gas, Liquid Or Solid Material Dispensing
20 |With Drill Forming
21 | |Adjustable Drill Depth
22 | |With Seed Covering Or Ridge Forming
23 | | |With Growing Medium Compacting
24 | | | |Press Rollers Or Wheels
25 | | | |Drag Chains, Bars Or Plates
26 | | | |Furrow Closers
27 | | |Disc Type
28 | | | |Discs Per Se
28.5 | | | |Disc Cleaners
29 | | |Hoe Or Shoe Type
30 | | | |Hoes Or Shoes Per Se
31 |With Seed Covering Or Ridge Forming
32 |Dibbling Type
33 | |Manually Operated
33.1 |Pneumatic Dispensing And Distribution (Not Suction Pickup)
34 |With Rotary Type Seed Dispenser
35 | |With Traps Or Pockets
36 |With Conveyor Type Seed Dispenser
37 |With Valve Or Gate Controlled Seed Dispenser
38 |Seed Hoppers
39 | |With Discharge Operating Or Regulating Mechanism
40 |Seed Tubes
41 |Frame Construction
42 | |Adjustable
43 | |Sectional
44 | |Attachment
45 GAS, LIQUID OR SOLID MATERIAL (FOR AGRICULTURAL PURPOSES ONLY)
46 LAND MARKERS (FOR AGRICULTURAL PURPOSES ONLY)

CLASS 143

SAWING

Section: M-3

Revised: 27 November 70
J. Chiarelli

1 MITERING MACHINES
2 LATH AND SHINGLE MACHINES
3 CLEANING AND LUBRICATING DEVICES INTEGRAL WITH SAWS
4 | Band Saws
5 | Chain Saws
6 MACHINES WITH DIVERSE TYPE SAW BLADES
7 CHAIN SAWS
8 | Vehicle Mounted
9 | Chain Supporting And Guiding Devices (e.g., Saw Bars)
10 | Handles
11 BAND SAWS
12 | With Work Handling
13 | | Reciprocating Carriage
14 | With Band Tensioning
15 | With Multiple Bands
16 | Swinging or Tilting Frame
17 | Pulley Wheels Per Se
18 TUBULAR SAWS
19 CIRCULAR SAWS
20 | Ice Scoring (e.g., Ice Cube Forming)
21 | Vehicle Mounted
22 | | Ice Sawing Machine
23 | | With Horizontal Saw Blade (e.g., Tree Felling)
24 | | Blade Adjustable To Vertical Position
25 | Portable
26 | | Body Worn
27 | | Hand Held Type
28 | | Powered
29 | With Work Handling
30 | | For Round Bar And Tube Stock
31 | | Roller Feed
32 | | Chain Feed
33 | With Multiple Saw Blades
34 | | With Common Axis
35 | | Adjustable (e.g., Laterally Shiftable Saw Blades)
36 | Bench Or Table Saws
37 | | With Gauging Means
38 | | With Positionally Adjustable Blade Or Arbour
39 | Travelling Saw
40 | | On Radial Arm
41 | | Pivoted Or Swinging Frame
42 RECIPROCATING SAWS
43 | Hand Held Type
44 | | Powered (e.g., Saber Saw)
45 | | U-Frame Type
46 | | | Collapsible Frame
47 | | | Buck Saws
48 | | | Bow Saws
49 | | | Jig, Scroll Or Fret Saws (e.g. Coping Saw)
50 | | | Hack Saws
51 | | | Extensible
52 | | Handles And Handle-Blade Attaching Means
53 | | | Spindle Type
54 | With Work Handling
55 | With Multiple Saw Blades
56 | Jig, Scroll Or Fret Saws
57 | Hack Saws
58 | Special Tree Felling Type (Includes Post And Pile Cutting)
59 | With Return Mechanism
60 | Frame Supported Manually Operated Drag Saws
61 WORK HANDLING
62 | Log Turners
63 | Carriages
64 | | Feed Mechanisms
65 | | Offsetting Mechanisms
66 | Set Works
67 | | With End Dogs
68 | | Fluid Operated
69 | Dogs
70 | | Fluid Operated
71 CUTTING ELEMENTS AND HOLDERS THEREFOR
72 | Teeth Per Se
73 | | Detachable Or Insertable
74 | Chains
75 | Saw Bands
76 | Circular Saw Blades
77 ACCESSORIES
78 | Kerf Cleaners And Spreaders (e.g. Air Blowers)
79 | Saw Bucks (e.g. Saw Horses)
80 | Miter Boxes
81 | | Adjustable
82 | Safety Devices (e.g. Saw Guards)
83 | | For Circular Saws
84 | | For Chain Saws
85 | | For Band Saws
86 | Saw Guides (For Keeping Saw Blade In Kerf)

Class 143 (Cont'd)

	ACCESSORIES
	Saw Guides (For Keeping Saw Blade In Kerf)
87	For Circular Saws
88	For Chain Saws
89	For Band Saws
90	MISCELLANEOUS

CLASS 144

WOODWORKING

Section: M-3

Revised: 22 Feb 72
F. Lalande

1 MATCH MAKING
2 With Packaging Or Box Filling
3 Waxed Cord Or Paper Board
4 With Card Or Splint Cutting
5 With Framing And Dipping
6 With Framing
7 Splint Framing Or Carrying Mechanisms
8 BARK REMOVING
9 Methods
10 Combined
11 With Delimbing Means
12 Drums Or Basins
13 With Continuous Discharge Of Slabs Or Logs
14 Fluid Jets
15 Pivotted Or Rotating
16 Impact Type
17 Hollow Rotor Or Ring Type
18 Chain Or Cable Peeler
19 Cutter Positioned By Fluid Means
20 Cutter Or Presser Positioned By Fluid Means
21 Weighted Or Counterweighted Cutter Or Presser
22 Spring-Biased Cutter Or Presser
23 Implements
24 STUMP REMOVING
25 TREE HARVESTING
26 Chipping
27 Felling Or Trunk Subdividing
28 With Delimbing
29 With Bunching
30 With Bunching
31 Pivotted Cutting Means
32 Single Cutting Blade
33 Delimbing
34 Travelling Cutter-Head
35 Cutter Positioned By Fluid Means
36 Methods
37 PUNCTURING OR INCISING
38 Methods
39 REMOVING KNOTS OR OTHER IRREGULATITIES OR FILLING-UP HOLES
40 Methods
41 With Patch Cutting
42 SHAPING OR DIVIDING
43 With Assembling Or Securing
44 Shoe Lasts
45 With Surface Bonding
46 With Heat Application
47 With Separate Mechanical Fastening
48 Methods
49 Log Cutting Or Lumber Sawing
50 With Chip Production
51 Shaving Or Chip Production
52 Bending Or Straightening
53 With Turning Or Boring Step
54 Plural Cutting Operations
55 Simultaneous Production Of Chips And Lumber
56 Pin Pointing
57 Disks (e.g. Corks)
58 Paddles Or Oars
59 Hinge Seat Cutting
60 Multi-Operation Or Multi-Purpose Machines (e.g. Universal Machines)
61 For Specific Articles
62 Shingles
63 Handles Or Tools
64 Bobbins Or Spools
65 Pins, Plugs, Or Wedges
66 Clothes Pins
67 Blind Or Sash Cutting
68 Containers, Trays, Or Parts Thereof
69 With A Single Working Spindle (e.g. Convertible)
70 Planing And Matching
71 Planing And Sawing
72 With Sawing Means
73 With Boring Means
74 Matching (i.e. Tongue-and-Groove Cutting)
75 End
76 Veneer Lathes
77 With Presser Bars Or Rolls
78 Splitting
79 With Feeding Means
80 Riving
81 Splints Or Sticks (e.g. Match Splints)
82 Toothpicks
83 Excelsiors Or Fibers
84 Sawdust Or Powder
85 Shavings Or Chips

CLASS 144 (cont'd)

	SHAPING OR DIVIDING
	Shavings Or Chips
86	Bark Cutters
87	Rotary Disc
88	With Air Assisted Discharge
89	Cylindrical Or Conical
90	With Air Assisted Discharge
91	Bending Or Straightening
92	With Drying Means
93	Presses Or Rollers
94	Formers
95	Dovetailing
96	Mortising
97	Auger Cutter
98	Chain Cutter
99	Tenoning
100	Planing Or Thicknessing
101	Scrapers (e.g. Graining)
102	Rotary Cutter (e.g. Disc Type)
103	Cylindrical
104	Plural
105	Miter Cutting
106	Pattern Controlled
107	Rotating Modal
108	Template
109	Cam
110	Portable
111	Gaining
112	Grooving
113	Plural Cutter-Heads
114	Reciprocating Knives
115	Plural Cutter-Heads
116	Rotating Cutter-Head
117	SOFTENING OR HARDENING
118	PLYWOOD OR VENEER PRESSES
119	With Heating Or Glue Setting Means
120	Continuous
121	FEED OR PRESSER MECHANISMS
122	Presser Bar Or Chip Breaker
123	Endless Belt Or Chain
124	Feed Roll
125	Weighted Or Spring-Biased
126	CUTTER GUARDS
127	CUTTER HOODS
128	WORK GUIDES
129	MISCELLANEOUS

Amended: 1 Apr 70

Class 144 (Cont'd.)

209 VENEER LATHES
210 Convertible
211 Inclined Knives
212 Knives And Knife Blocks
213 Presser Bars And Rolls
214 Stay Logs
215 Strip Cutting Attachments
216 MITER CUTTERS
217 Angle Knife
CUTTERS
Rotary
218 Miscellaneous
219 End Thrust
220 Frusto Conical
Cylindrical
221 Spiral Bit
230 Slotted Bit Seat
Saw
Double
222 Intermediate Cutter
Single
223 Side Cutter
238 Wabble
239 Distorted
Polygonal
224 T-Slot Bit Clamp
225 Plane Bit Seat
226 Convex Bit Seat
227 Concave Bit Seat
Radial Arms
228 Plane Bit Seat
229 Slotted Bit Seat
Disk
Multiple Clamping Disks
231 Tangential Bit
232 Pivoted Bit
233 Shank Bit
234 Eccentric Segmental Bit
Side Attached Bit
235 Edge Cutting
Multiple
236 Pattern
237 Gang
240 Solid
241 Bits
FEED AND PRESSER MECHANISMS
242 Miscellaneous
243 Presser Bars And Chip Breakers
244 Sectional
245 Blank Feeders
Rolls
Feed
246 Miscellaneous
247 Spring Pressed
248 Weighted

FEED AND PRESSER MECHANISMS
Rolls
249 Presser
250 Sectional
251 CUTTER GUARDS
252 CUTTER HOODS AND DUST CONVEYORS
253 WORK GUIDES
WOOD BENDING
254 Bending And Drying
255 Bending Rollers
256 Presses
257 End Compressors
258 Hoop Gaging
Former
259 Fixed
260 Collapsible
261 End Thrust
262 Radial Arm And Roller
263 Strap And Windlass
264 Strap And Lever
265 Strap And Screw
266 Strap
267 Pivotal
268 Coiling
269 Clamps
270 Bends
271 Steaming
279 GLUE APPLYING AND PRESSING APPARATUS
281 VENEER PRESSES
282 Roller
283 Molding
284 CORK AND BUNG PRESSES
285 WORK BENCHES AND TOOL CHESTS COMBINED
286 WORK BENCHES
287 Adjustable Stock Rest
288 WORK HOLDING STANDS IN COMBINATION
309 PROCESSES

CLASS 212

MATERIAL OR ARTICLE HANDLING: CRANE HOISTS AND DRAGLINES

Revised: March 1,1967
Mr. Phillips

Section: M-9

1 COMBINED
2 With Dropped Load Scattering Or Distributing
3 ARTICULATED OR SPECIALLY SHAPED BOOM
4 HOISTING POINT ON WHEELED CARRIER
5 Bridge
6 Gantry Type
7 With Jib
8 Jib
9 Rotating or Swinging Mast Or Jib
10 Fixed Overhead Track Or Rail
11 Folding Or Portable
12 Litter Carriers
13 Slackline Cableway
14 Tautline Cableway
15 Elements
16 Wheeled Carrier And/Or Hoist
17 Rotating Hoist Or Load Contacting Device
18 Plural Lift Points And Compensating Devices
19 Hoist And Carrier Locks
20 Cableway
21 Cableway
22 Cabs
23 HOISTING POINT FIXED ON JIB OR BOOM
24 Jib Or Boom Pivoted In Vertical Plane
25 Horizontally Swinging Jib Or Boom
26 Level Luffing Cranes
27 Tower Cranes
28 Extensible Jib Or Boom
29 Unitary Structure On Turntable
30 With Dragline
31 With Dragline
32 Rotating Mast
33 Rolling Pivot Or Luffing Linkage
34 Pivoted Movement Produced By Fluid Operated Piston And Cylinder
35 Pivoted Movement Produced By Gears And/Or Screws
HOISTING POINT FIXED ON JIB OR BOOM
36 Horizontally Swinging Jib Or Boom
37 Rotating Mast
38 Elements
39 Turntables and Rotating Devices
40 Boom Or Mast Construction
41 Safety Devices and Load Indicators
42 DRAGLINES
43 With Slackline Cableway
44 With Load Lifting Ramp
45 Spar Trees and Towers
46 With Airborne Lifting Device Or Lift Assistant (e.g. Balloons, Kites, Etc.)
47 MISCELLANEOUS

CLASS 241

Amended: 24 Jan 77

GRAIN TREATMENT AND SOLID MATERIAL COMMINUTION OR DISINTEGRATION

Section: C-3

Established: 3 Oct 61
W.K. McKinnon

GRAIN TREATMENT
1 Apparatus
9 Powdering or Dusting Or Treating With Gas
10 Liquid Treatment
11 Insecticide or Fungicide
12 With Conveying Means
13 Steaming
14 Washing or Cleaning

SOLID MATERIAL COMMINUTION OR DISINTEGRATION
18 Apparatus
19 With Automatic Control
20 Feeders and Feed Regulators
21 With Screw
22 Hopper With Discharge Means
23 With Vibrating or Oscillating Element
24 Fluid Comminutor Type
25 Stationary Abutment Impact Only
26 Combined Machines
27 Jaw Crushers
28 With Multiple Sets of Jaws
29 Both Co-operating Surfaces Reciprocate
30 Link and Eccentric Type Actuator
31 Serial Pivoted Links or Link With Lever Type Actuator
32 Means Actuating Pivot of Serial Links
33 Elements
34 Gyratory Crushers
35 With Lubricating Means
36 With Feed or Discharge Devices
37 With Gyratory Member Sealing Means
38 With Means For Adjusting Setting
39 With Release Means
40 Eccentric Drive Sleeve Within Gyratory Member
41 With Eccentric Shaft Gyratory Drive
42 Eccentric Gyratory Sleeve Below Gyratory Member
43 With Upper Guide or Support for Gyratory Member
44 Elements
45 Roller Mills
46 With Sifters or Screens
47 With Plural Sets of Rolls
48 With Feed and/or Discharge Mechanism or Control
49 Both Co-operating Surfaces Rotate
50 Internal Comminuting Surface
51 Adjustable or Yieldably Mounted Rotary Surface
52 Co-operating Non-Smooth Surface Characteristics

SOLID MATERIAL COMMINUTION OR DISINTEGRATION

- Apparatus
  - Roller Mills
    - 53 With Non-Rotary Surface Moving Means
    - 54 Non-Rotary Surface Adjustable or Yieldable
    - 55 Co-operating Non-Smooth Surface Characteristics
    - 56 Elements
      - 57 Rolls and Concaves
  - 58 Hammer Mills and Beaters
    - 59 Fluid Applied to Material
      - 60 With Plural Comminuting Zones
      - 61 Gas Swept Comminuting Zone
        - 62 With Fan
    - 63 With Temperature Modification of Material
    - 64 With Separation or Classification of Material Exterior to Comminuting Zone
    - 65 Comminuting Surface Provided with Openings for Discharge
      - 66 Provided with Special Comminuting Surfaces or Characteristics
        - 67 Adjustable Hinged or Dumping Type Screen or Support
    - 68 Series Material Flow Through Plural Comminuting Zones
    - 69 With Feed and/or Discharge Mechanism or Control
    - 70 With Moving Co-operating Surface or Member
    - 71 Axial and/or Radial Flow of Material
    - 72 Circumferential or Tangential Flow of Material
    - 73 Rotor Structure
      - 74 With Striking Member Adjusting Means
      - 75 Striking Member Pivoted to Rotor
    - 76 Striking Members or Hammers
      - 77 With Attached Wear Members
  - 78 Stamp Mills
    - 79 Plural Stamps
    - 80 Elements
  - 81 Ball and Rod Mills
    - 82 Fluid Applied to Material
      - 83 Gas Swept Comminuting Zone
        - 84 With Recirculation of Gas to Comminuting Zone
    - 85 With Temperature Modification of Material
    - 86 With Separation or Classification of Material Exterior to Comminuting Zone
    - 87 Discharge from Comminuting Zone through Cylindrical Screen or Grating
    - 88 Discharge from Comminuting Zone through Screen or Grating forming Partition or End Wall
    - 89 Parallel Material Flow through Plural Comminuting Zones
    - 90 Series Material Flow through Plural Comminuting Zones
    - 91 With Feed and/or Discharge
    - 92 With Independent Means Moving Material or Grinding Bodies
    - 93 Compound Movement Receptacle
    - 94 Receptacles
      - 95 Lining
    - 96 Grinding Bodies

(Cont.)

Amended: 5 June 70

Class 241 (Cont'd.)

SOLID MATERIAL COMMINUTION OR DISINTEGRATION
Apparatus
97 Ball Roller Mills
98 With Internal Screen Classification
99 With Internal Air Classification
100 Multiple Race
101 Vertical Race
102 Edge Runner Mills
103 Multiple Runners
104 With Rotating Ring Or Pan
105 Axes Of Runners Stationary
106 Rotating Ring Or Pan
107 Disc Mills
108 With Feed And/Or Discharge Mechanism Or Control
109 Rotary Screw Or Hopper Supply
110 Two Co-operating Surfaces Rotating
111 Co-axial
112 With Yieldably Mounted Disc
113 Adjustable Rotary Member
114 Vertical Axis
115 Rotary Shaft Supported Above Rotary Comminuting Member
116 Elements
117 Grinding Plates Or Stones
118 Cone And Shell Mills
119 With Feed And/Or Discharge Mechanism Or Control
120 With Moving Co-operating Surface
121 Vertical Axis
122 Knife Action Comminutors
122.1 With Screening
123 Pointed Comminuting Instruments
124 Stationary Comminuting Surface Or Material Bed
125 Centrifugal Projection Of Material
126 Conveyor Material Forcing Means
127 Attrition Mills
128 Processes
129 With Solidifying, Consolidating Or Shaping
130 Laminated Or Fibrous Mineral Material
131 Cereal And Other Seeds And Seed Parts
132 With Operation To Detach Or Loosen Adhering Hull Portion
133 With Application Of Fluid To, Or Heating Or Cooling Of Whole Seed
134 With Separation Or Classification
135 With Application Of Fluid Or Lubricant Material
136 To Aid Dispersion Or Prevent Chemical Action, Etc.
137 With Additional Heating Or Cooling
138 Gas Or Vapor
139 To Classify Or Separate Material
140 Liquids Added To Classify Or Separate Material
141 With Heating Or Cooling Of Material
142 With Classification Or Separation Of Material

United States Patent Office Classification

July 1972

CLASS 37, EXCAVATING

Original Classification 1922

1 MISCELLANEOUS
2R STUMP AND STONE REMOVERS
2P . . Tree pushers and bumpers
3 PEAT EXCAVATORS
4 SELF-LOADING VEHICLES
5 . Snow
6 . . Railway
7 . Endless floor
8 . Endless conveyer
9 . Elevating wheel
10 SNOW COMPRESSOR
11 . Heater
12 SNOW EXCAVATORS AND MELTERS
13 . Road former
14 . Railway
15 . . Plow
16 . Hand operated
17 RAILWAY SNOW EXCAVATORS
18 . Explosion
19 . Fluid-current conveyer
20 . Rotary excavator
21 . . Longitudinal axis
22 . . . Twin excavator
23 . . . Auxiliary rotary excavator
24 . . Transverse axis
25 . . . Auxiliary conveyer
26 . . Vertical axis
27 . . . Auxiliary conveyer
28 . Scoop and conveyer
29 . Plow or scraper
30 . . V-shaped
31 . . . With rotary excavator
32 . . Inclined plane with V divider
33 . . . Switch
34 . . . Plural
35 . . Diagonal blade
36 . . Rail
37 . . . Third rail
38 . . . Rotary cutter
39 . . . . Plow
40 . . Hand operated
41 ROADWAY SNOW EXCAVATORS
43R . Rotary
43A . . . Rotary snow plow blade rotatable about axis inclined to vertical
43B . . . Paddle type cutter rotatable about longitudinal axis
43C . . . Screw type cutter rotatable about longitudinal axis
43D . . . Paddle rotatable about transverse axis
43E . . . Screw type cutter rotatable about transverse axis
43F . . . Paddle type cutter with adjustable rotor shaft
43G . . . Screw type cutter with adjustable rotor shaft
43H . . . Rotary cutters in V-shaped arrangement
43K . . . Rotary cutters driven about a vertical axis
43L . . . Combined snow plow and lawn mower
42R . Automobile
42VL . . . Vehicle mounted snow plow with yieldable or overload release means
44 . . V-plow
45 . Conveyer
46 . V-plow
47 . . Pusher
48 . . Diverging forwardly
49 . Inclined plane with V divider
50 . Diagonal blade
51 . . Track clearer
52 . . . Rut cutter
53 . Hand operated
54 DREDGERS
55 . Shellfish
56 . Submarine chamber
57 . With screen
58 . Suction
59 . . Vacuum pump
60 . . Endless bucket
61 . . With jet pump
62 . . . Jet digger
63 . . With jet digger
64 . . Rotary digger
65 . . . Vertical axis
66 . . . Transverse axis
67 . . . Longitudinal axis
68 . . . Suction-current operated
69 . Endless bucket
70 . Excavating wheel
71 . Scoop
72 . Pipe supports and couplings
73 . Bottom spud anchor
74 . Bank spud anchor
75 . Scouring
76 . . Digger
77 . . . Rotary
78 . . . Jet
79 . . Current deflector
80R DITCHERS
80A . . With side or auxiliary cutters
81 . Screw
82 . . Conveyer
83 . Endless bucket
84 . . Railway
85 . . Transverse cut
86 . . Longitudinal cut
87 . . . Rotary digger
88 . . . Reciprocating digger
89 . . . Longitudinal endless conveyer
90 . . . Transverse endless conveyer
91 . Wheel excavator
92 . . Longitudinal axis
93 . . . Conveyer
94 . . Transverse axis
95 . . . Conveyer
96 . . . . Longitudinal endless
97 . . . . Transverse endless
98 . Plow
99 . . Conveyer
100 . . . Wheel and belt
101 . . . Longitudinal endless
102 . . . . Transverse endless
103 . Shovel or scoop
104 RAILWAY GRADERS
105 . Side former
106 . . Scoop
107 . . . Endless conveyer
108R ROAD-GRADER TYPE
108A . . With forms for guiding road grader
109 . Transverse endless scraper or bucket
. Plow
110 . . Transverse endless conveyer
. . Conveyer wheel
111 . . . Transverse axis
112 . . . . Transverse endless conveyer
113 . . . Vertical axis
114 . . . Inclined axis
115 CABLE OPERATED
116 . Boom type
117 . Trolley supported

117.5	SCRAPER CONVERTIBLE TO OR COMBINED WITH SCOOP, SHOVEL OR THE LIKE
118R	SCOOPS
118A	. . Scoops pushed forwardly of vehicle to fill bowl
119	. Shellfish
120	. Fork or rake
121	. . Wheeled
122	. Sledded
123	. . Snow
124	. Wheeled
125	. . Cable operated
126R	. . Four wheel
126A	. . . . The earth containing compartment is disposed between front and rear supports
126AA	. . . . With coaction between apron and bowl
126AB	. . . . With coaction between apron and ejector
126AC	. . . . With significant bowl structure or manipulation
126AD	. . . . With significant apron structure or manipulation
126AE	. . . . Ejector structure per se and/or manipulation thereof
127	. . . Plural scoop
128	. . . Rear gate
129	. . Two wheel
130	. . . Hand operated
131	. . . Caster wheel or shoe
132	. . . Vehicle actuated
133	. . . Rear gate
134	. . . Lever and latch
135	. Cable operated
136	. . Valved
137	. Handled
138	. . Pivot and latch
139	. . . Reversible
140	. . Dumping runner
141R	. Digging edge
141T	. . . Bucket teeth details per se
142R	. . Teeth
142A	. . . . Resilient connection, or resilient element in connection between tooth and bucket
142.5	DITCH FILLER
182	ORANGE-PEEL BUCKETS
183R	CLAMSHELL BUCKETS
183A	. . Bucket provided with releasable catch hooks to support bucket and load
184	. Common pivot
185	. . Crossed lever
186	. Contiguous pivots
187	. Spaced pivots
188	. Link connected
189	ROTARY DIGGER
190	. Endless conveyer
191R	ENDLESS DIGGER
191A	. . Non-bucket type
192R	. Endless conveyer
192A	. . . Non-bucket type endless digger
193	MOLE PLOWS
194	SAWMILL-CARRIAGE WHEEL GUARDS
195	PROCESSES
	DIGESTS
DIG. 1	Excavators with automatic controls
DIG. 2	Bucket cleaners
DIG. 3	Combined implements
DIG. 4	Scoops with front aprons
DIG. 5	Scoops with front aprons in which the aprons perform a loading function
DIG. 6	Grave diggers
DIG. 7	Hydraulic motors
DIG. 8	Dredging of undersea modules
DIG. 9	Fluid pressure actuated scoops
DIG. 10	Fluid pressure actuated bulldozer
DIG. 11	Fluid pressure actuated scrapers
DIG. 12	Scoop or scraper attachments
DIG. 13	Land levelers, scrapers, bowl, etc.
DIG. 14	Semi-automatic land leveling scrapers, scoops, etc.
DIG. 15	Self-loading vehicles of front end loader type
DIG. 16	Side cutters for trenching machines
DIG. 17	Trenching machine drive details
DIG. 18	Vibration means for excavating tool
DIG. 19	Visual aids and indicators for excavating tool
DIG. 20	Automatic leveling excavators

Original Classification 1923

1	MISCELLANEOUS
1.1	MUSHROOM CULTURE
1.2	WATER CULTURE
1.3	ELECTROCULTURE
1.4	ALGAE CULTURE
1.41	POLLINATION
1.42	HEATING SEPARATED EARTH
1.43	CROP THINNING
1.44	FLAME CULTIVATING
1.5	PLANT SURFACE CONTACT MATERIAL APPLICATOR
1.7	MATERIAL DISTRIBUTOR WITH PLANT MANIPULATING, CULTIVATING OR SENSING (e.g., TO POSITION PLANT RELATIVE TO DISTRIBUTOR)
2	FROST PREVENTING
3	CELERY BLANCHING
4	HEDGE TRAINING
5	COTTON TREATING
5.5	LAYERING
6	GRAFTING
7	. Budding
8	TREE SURGERY
9	MULCHING
10	TURPENTINE AND RUBBER
11	. Buckets and spouts
12	. Tools
14	SEED TESTERS
15	. Roll
16	. With heater
17	GREENHOUSES
18	. Benches
19	HOTBEDS
20	TREE COVERS
21	. Single tree
22	. . With heater
23	TREE-TRUNK GUARDS
24	. Bolts
25	. Root
26	PLANT COVERS, SHADES AND SCREENS
27	. With irrigator
28	. Covers
29	. . Transparent top
30	. . Open top
31	. . Screen
32	. . Root
33	ORNAMENTAL BEDS
34	PLANT RECEPTACLES
35	. Hanging
36	. Window
34.11	. Shipment package
34.12	. Tiered plants
34.13	. Multiple
37	. Transplanting
38	. With irrigators
38.1	. . Wick or porous elements
39	PLANT STANDS
40	. Window
41	FLOWER HOLDERS
41.1	. Embedded
41.11	. Receptacle top supported
41.12	. Stem forced into penetratable holder
41.13	. Holder for stem end (e.g., frog)
42	TREE SUPPORTS
43	. Props
44	PLANT SUPPORTS
45	. Cage
46	. Linear
47	. Vertical
48.5	PLANT IRRIGATORS AND/OR FERTILIZERS
50	SAP BUCKETS
51	. Combined with cover and spout
52	. Spouts
53	. . With bucket support
54	. Covers
55	FALSE STEAMS
56	SEED TAPES
57.5	INJECTION
57.6	COATED OR IMPREGNATED SEED
58	MISCELLANEOUS PROCESSES

DIGESTS

DIG. 1	Methods of plant breeding and including chromosome multiplication
DIG. 2	Treatment of cut flowers for ornamental purposes
DIG. 3	Propagation of plant by cuttings
DIG. 4	Fertilizers and methods of application
DIG. 5	Use of hormones to regulate plant growth
DIG. 6	Plant growth regulation by control of light thereon
DIG. 7	Synthetic resins employed for horticultural purposes
DIG. 8	Treatment of plants and seeds with radio-active energy
DIG. 9	Physical and chemical treatment of seeds for planting
DIG. 10	Physical and chemical treatment of agricultural soils
DIG. 11	The application of protective coatings to plants
DIG. 12	Sonic or ultrasonic treatment
DIG. 13	Systemic treatment

Original Classification 1919

1 MISCELLANEOUS
2 CONVERTIBLE
3 . Cutter and detachable conveyer
. . Rake
4 . . . Vertical axis
5 . Cutter and detachable catcher
6 GANG
7 . Rotating cutting reel
8 MARINE
9 . With conveyer
10.1 MOTORIZED HARVESTER
10.2 . With condition-responsive operation
10.3 . . Release or slip of drive in response to overload
10.4 . . Retraction of cutter-unit in response to obstruction
10.5 . With randomly-operative control of motor (e.g., for starting or stopping motor)
10.6 . With plural sources of power
10.7 . . For disparate functions
10.8 . With selective control of drive means
10.9 . . By valve for controlling fluid-pressure motor
11.1 . . By means for varying speed-ratio of drive
11.2 . . By means for reversing drive
11.3 . . By brake and disengageable drive (e.g., clutch)
11.4 . . By controlling plural drive trains
11.5 . . . Including clutch-assemblages
11.6 . . By means for regulating tautness of belt drive
11.7 . . By clutch-assemblage
11.8 . . . Connecting motor to cutter or transit wheels
11.9 . Having fluid-pressure or stored-energy motor
12.1 . With means for reconditioning cutter or picker
12.2 . With means for using heat or exhaust from engine
12.3 . With means for lubricating drive train
12.4 . With drive train for imparting compound movement to finger-like elements
12.5 . . Rotating and orbiting elements
12.6 . With separable or vibration-damping drive train
12.7 . Including cutter yieldably mounted on its drive means
12.8 . Including driven air-blower unit
12.9 . . For drawing vegetation to harvester
13.1 . . . To suction head
13.2 . . . . With beater at suction head
13.3 . . For discharging crop from harvester
13.4 . . . By blower on cutter-driving shaft
13.5 . Including plural operating units and drive
13.6 . . Separately-acting cutter units
13.7 . . . For disparate cutting operations
13.8 . . . . In series arrangement
13.9 . . . . . With conveyer between units
14.1 . . Separately-acting opposed-roller-couple units
14.2 . . . With opposed-gatherer-couple unit
14.3 . . Gatherer unit and vegetation-cutter unit
14.4 . . . Horizontal-axis-reel gatherer
14.5 . . Cutter unit and conveyer unit
14.6 . . . With thresher or crop-separator unit
14.7 . Including motorized vehicle causing transit of harvester
14.8 . . With drive train to harvester powered by ground-engaging wheels
14.9 . . With hitch permitting movement of harvester relative to vehicle
15.1 . . . With drive from motor for re-positioning harvester
15.2 . . . . Cutter assemblage re-positioned
15.3 . . . With flexible drive train to re-positionable harvester
15.4 . . . By means for steering harvester
15.5 . . . By means for adjusting harvester laterally
15.6 . . . By hitch for separating harvester from vehicle
15.7 . . . By resilient or universal-action hitch
15.8 . . . . For "floating" harvester
15.9 . . . Hitch for pivoting harvester about horizontal axis
16.1 . . . . Tined crop-pickup rake on transverse pivot
16.2 . . . . Longitudinally-extending axis
16.3 . . . . With latchable lever means for pivoting harvester
16.4 . Having driven means for handling or treating crop
16.5 . . For separating one material from another
16.6 . . Delivering to receptacle or hopper
16.7 . Having motor on ground-supported carrier
16.8 . . With dispenser of fluent material
16.9 . . Motor used for plural devices or functions
17.1 . . And cutter adjustable relative to ground
17.2 . . . By adjusting ground wheel or skid relative to carrier
17.3 . . And element guiding vegetation to cutter
17.4 . . And guard
17.5 . . And rotatable blade on motor shaft
17.6 . . And drive train to reciprocating or oscillating cutter
27.5 TOBACCO
28 COTTON
29 . Flail or whip
30 . Pneumatic
31 . . Individually directed
32 . . Nozzles
33 . Strippers
34 . . Comb
35 . . . Moving
36 . Pickers
37 . . Individually directed
38 . . . Endless belt
39 . . . . Manually operated
40 . . Rotary or oscillating
41 . . . Spindle
42 . . . . Belt carried
43 . . . . . Cam-track guide
44 . . . . Rotary carrier
45 . . . . . Flexible spindle
46 . . . . . Reciprocating
47 . . . . . Cam-track guide
48 . . . Drum
49 . . Endless belt
50 . . Spindles
51 CORNSTALK TYPE
52 . Stalk breakers
53 . Cutters
54 . . Broom corn
55 . . . Reel gatherer
56 . . Toppers with catchers
57 . . . Reel gatherer
58 . . . . Horizontal axis
59 . . . Endless-chain gatherer
60 . . With choppers

CORNSTALK TYPE
. Cutters
. . With choppers
. . . With catchers
. . With strippers
. . With toppers
. . With pickers or huskers
. . . Reel gatherer
. . . Endless-chain gatherer
. . Self-binders
. . . Upright binder
. . . . . Endless-chain gatherer
. . . . . Binder position adjustable
. . With dischargers
. . . Crane type
. . . . With gatherers
. . . . . Reel
. . . . . Endless chain
. . . Endless apron
. . . . Reel gatherer
. . . . Endless-chain gatherer
. . . Horizontally moving and tilting
. . . . With gatherers
. . . . . Reel
. . . . . Endless chain
. . . Tilting
. . . . With gatherers
. . . . . Spiral
. . . . . Reel
. . . . . Horizontal axis
. . . . . Endless chain
. . . . . Fixed
. . . Retracting support
. . . . Reel gatherer
. . . Reel gatherer
. . . Endless-chain gatherer
. . With gatherers
. . . Spiral
. . . Reel
. . . . Horizontal axis
. . . Endless chain
. . . Fixed
. . . . Fixed cutter
. . Fixed cutter
. . Cutting members
. Pickers or huskers
. . Roller
. . . Plurality of rows
. . . . With endless-chain gatherers only
. . . Auxiliary ear detacher
. . . With endless-chain gatherers only
. . . Movable gatherer
. . . . Spiral
. . . . Endless chain only
. . . . . Adjustable roller frame
. . Fixed snapper
. . . Comb
. . . . With knife
. . Moving comb
. . Moving knife
. . . On endless chain
. Gatherers or guides
. Sheaf loaders
. Sheaf carriers
STALK CHOPPERS
. Gathering by air current
. With driven pickup
. Rotating on vertical axis
. Rotating on horizontal transverse axis
. . With transverse ledger plate
CUTTERS WITH PLANT OR CROP CONTACTING GAUGE (e.g., BEET TOPPERS)
. Laterally self-aligning gauging and cutting means
. With preliminary foliage arranging
. Plural cuts at successive heights and/or slitting
. With cut top disposal
. . Movable disposing members
. Gauge and cutter relatively adjustable responsive to height and/or size of plant
CUTTING, CONVEYING AND THRESHING
. Reciprocating cutter
. . Central swath, co-axial wheels
. . Longitudinally hinged cutter frame
SEED GATHERERS OR STRIPPERS
. Fixed comb
. . Rotary beater
. . . Central swath, co-axial wheels
. Moving comb
CUTTING, CONVEYING AND BINDING
. Wire-twister type
. Straw-band type
. Folding platform
. High outside binder
. . Folding binder frame
. . Binder position adjustable
. . . Knotting
. . Knotting
. Upright binder
. Endwise delivery
. . Knotting
. Low down
. . Curved path
. . . Knotting
. . Inside delivery
. . . Knotting
. . Outside delivery
. . . Through bull wheel
. . . Knotting
. . Knotting
. Knotting
CUTTING AND CONVEYING
. Endless cutter
. Oscillating cutter
. Rotary cutting reel
. Rotary cutting disk
. Reciprocating-cutter type
. . Folding platform
. . With binder's platform
. . . Self-raking mechanism
. . . Belt-carried endless path
. . Hand-raking mechanism
. . Self-raking mechanism
. . . Gaveling tongs
. . . Dumping catcher
. . . Rotating
. . . . Reciprocating head
. . . . Vertical axis
. . . . . Switch
. . . . . Automatic control
. . . . . Auxiliary manual control
. . . Reciprocating
. . . . Belt actuated
. . . . . Reciprocating belt
. . . Vertical circuit
. . . . Belt carried
. . . Horizontal circuit
. . . . Belt carried
. . Rake heads and arms
. . Endless carrier
. . . Deflected course
. . . Intermittent
. . . With discharging catcher

CUTTING AND CONVEYING
. Reciprocating-cutter type
. . Endless carrier
. . . Elevated delivery
. . . Central cutter, co-axial wheels
. . . . Tilting platform
. . . . . Pivoted tongue
. Swathing attachments
. Windshields
. Binder's platforms
CUTTING AND WINDROWING
CUTTING AND RAKING
CUTTING AND CATCHING
. Side cutter
. . Rear
. . Front
. Rotating cutting reel
. . Catchers
. . . Discharging
. Manually propelled
. Catchers
. . Discharging
. . . Revolving
. . . Upwardly swinging rear gate
. . . Rearwardly dropping member
SHELLED-GRAIN CATCHERS
PLATFORM ADJUSTMENTS
. Side hill
. Main frame
. . Traction operated
. . Vertically and longitudinally tilting
. . . Simultaneous vertical adjustment
. . Vertical
. . . Segment-rack and pinion
. . . . Simultaneous
. . . Simultaneous
TONGUE ADJUSTMENTS AND SUPPORTS
STANDING-GRAIN GATHERERS
. Rotating reel, horizontal axis
. . Adjustable position
. . . With driving means
. . . . Sliding angular gear
. . . . Belt with adjustable tension
. . . Concentric
. . Supplementary bat movement
. . Adjustable bats
TRANSPORTING ATTACHMENTS
CUTTING
. Railroad
. . Rotating cutting reel
. . Reciprocating cutter
. Hedge or plant-row trimmers
. . Plurality of cutters
. . . All rotary disk
. . . All reciprocating
. . Single cutter for top or side
. Successive cuts at different heights
. Hand-operated cutter
. . Oscillating
. . . Single pair of shears
. . Reciprocating
. . . Hand crank
. Endless cutter
. . Side cut
. Oscillating cutter
. . Vertical cut
. . Side cut
. Rotating cutting-reel type
. . Interchangeable cutting assembly
. . Sharpening
. . Auxiliary cutter
. . Cutter in front of wheel tread
. . Co-axial wheels central cut
. . . Internal gear single pinion
. Rotating-cutting-disk type
. . Vertical cut
. Reciprocating central cutter
. . Co-axial wheels
. . . Double sickle
. . . Pitman drive
. . . . With lever
. . . Cam drive
. . . . With lever
. Reciprocating side cutter
. . Through-wheel drive
. . Reversible
. . Horizontally folding
. . Rear cut
. . . Co-axial wheels
. . . . Cam or lever drive
. . Front cut
. . . Co-axial wheels
. . . . Power-operated lift
. . . . Automatic clutch shipper
. . . . Double sickle
. . . . Lifting and rocking cutter bar
. . . . . With foot lever
. . . . . Gag lever
. . . . . Cutter-bar mountings only
. . . . . Cutter-bar mountings only
. . . . . Gag lever
. . . . . Cutter-bar mountings only
. . . . Lifting cutter bar
. . . . . Cutter-bar mountings only
. . . . . With foot lever
. . . . . Gag lever
. . . . Cutter-bar mountings only
. . Alignments
. Cutter members
. . Endless
. . . Horizontal orbit
. . . With tension adjustment
. . Oscillating
. . Rotating cutting reel
. . Rotating cutting disk
. . Reciprocating
. . . Double sickle
. . . Sickles and guard fingers and bars
. . . Sickles
. . . . Detachable sections
. . . . . Detachable from end of bar
. . . . . Auxiliary locking bar
. . . Shoes and knife heads
. . . Antifriction devices
. . . Guiding clips
. . . Shock absorbers
. . . Guard fingers and bars
. . . . Modified finger
. . . . . With ledger plate
. . . . Fingers only
. . . . . With ledger plate
. . . . Supplemental lifting fingers
. . . . . Socket for guard-finger point
. Track clearers and dividers
. . Supplemental vertical cutter
. . . Reciprocating
. . Driven
. . With shoe-point socket
. . Foldable
. . Supplemental clearer
. Housing or guard
. . With discharge opening
ANTI-SIDE-DRAFT DEVICES
GRAIN WHEELS AND CASTERS
SEATS
GRAIN CRADLES

GRAIN CRADLES
. Connections
VEGETABLE GATHERERS
. . Asparagus harvesters
FRUIT GATHERERS
. . Tree shaker
. Catchers
. Berry strippers
. Berry clippers
. Pole supported
. . Pivoted jaw
. . . Chute
. . Pivoted knife
. . . Chute
. . Sliding jaw
. . Sliding knife
. . Fixed detaching member
. . . Chute
RAKING AND BUNDLING
. Hand
. Cord-knotter type
RAKING AND LOADING
. Endless carrier
. . Intermittent discharge
. . . With movable feeder
. . . . Stationary rake teeth
. . . Stationary rake teeth
. . Rear delivery
. . . With movable feeder
. . . . Stationary rake teeth
. . . Stationary rake teeth
. . Side delivery
. . . With movable feeder
. . . . Stationary rake teeth
. . . Stationary rake teeth
. . With movable feeder
. . . Stationary rake teeth
. . Stationary rake teeth
. Intermittent discharge
. Walking rake
. . Auxiliary rake
. Lifting reels
COMBINED RAKES AND TEDDERS
. Side-delivery rake
. Revolving rake
. Draft damping rake
. Transverse tedder crank shaft
TEDDERS
. Mower attachment
. Rotary, transverse axis
. Transverse crank shaft
. Tedder forks
RAISE RAKES
. Side delivery
. . Rotary
. Rear delivery
. . Revolving
. . . Wheels supported
. . . . Fixed rake axis
. . . . Rake-tooth-engaging stop
. . . Rake-tooth-engaging stop
. . Wheel supported
. . . Contractible
. . . Draft dumpers
. . . . Direct draft
. . . . Frictional
. . . . Spur gear
. . . . Sliding bolt or bar
. . . . Pawl and ratchet
. . . . . Transverse torsion rod
. . . Hand lever pulled back to dump
. . . Hand lever concentric with rake head
. Cleaners
. Wheel supported
. . With lifting means
. . . Draft operated
. Fenders
. Rake teeth and fastenings
HAND RAKES
. Rotary or endless
. . Impaling type
. Combined, convertible and attachments
. . With cutter, scraper or spreader
. . . Directed oppositely to rake
. . . Acting simultaneously with rake
. . With cleaner
. . . With ground support
. . . With actuating linkage
. . With guard or material receiver
. . . Grappling type
. . . With ground support
. . With ground support
. . . Skid or runner type
. With plural sets of tines
. Broom type
. . Adjustable or expansible
. Adjustable, folding or take down
. . Biased pivoted head or tines
. Tines or teeth
SWEEPERS
. Automatic feed
. . Self-binding
. . . Vertical position
. . . . Automatic shock-delivery trip
. . . . . Oscillating sheaf-delivery member
. . . Sheaf turned end for end
. . . Forwardly tilting shock
. . . . Automatic shock-delivery trip
. . Vertical position
. . . Rotary, vertical axis
. . . . Automatic shock-delivery trip
. . . . . Oscillating sheaf-delivery member
. . . Automatic shock-delivery trip
. . . . Alternating sheaf delivery
. . . Alternating sheaf delivery
. . Sheaf turned end for end
. . . Automatic shock-delivery trip
. . Forwardly tilting shock
. . . Automatic shock-delivery trip
. . . . Tripper
. . . Feed stopped during shock delivery
. . . Rearwardly opening former
. . Shock turned end for end
. Vertical position
. . Rotary, vertical axis
. . Direct drop
. Divided former
. Self-binding
. With compressor
. Props
COMPRESSING AND BINDING
. Cord knotter type
. . Adjustable position
. . . Knotting
. . Pressure tripped
. . . Upstanding compressor control
. . . . Packing
. . . . . Knotting
. . . Packing
. . . Knotting
. . Knotting
. . Packers
. . Auxiliary manual trip

COMPRESSING AND BINDING
. Cord knotter type
448 . . Needle cleaners and guards
449 . . Ejectors and discharge gates
450 . . Tension and take-up devices
451 . Wire twister type
452 . . Single wire
453 . . . Curved binder arm
454 . . . . Laterally mounted
455 . . . . Forked end
456 . . . . Twister on binder arm
457 . . Twisters
458 . Band-tucker type
459 . . Straw band
460 . . . Band forming
461 . . . . Rotating bundle
462 . . . Band formers
463 . Prepared band
464 . Cord band and clip
465 . . Flat metal clip
466 GRAIN ADJUSTERS
467 .. On deck
468 . . Head or butt evener
469 . . . Oscillating
470 . . . Endless apron
471 . . Feeders
472 . . Retarding arms
473 . Longitudinally moving straightening finger
474 SHEAF OR BUNDLE DISCHARGING CARRIERS
475 . Automatic discharge
476 . . Directly tilting
477 . Endless carrier
478 . Folding tines
479 . Opening bottom
480 . Directly tilting
473.5 CARRIERS

DIGESTS
DIG. 1 Crusher digest
DIG. 2 Methods digest
DIG. 3 Ground effect
DIG. 4 Friction Drive
DIG. 5 With material distribution
DIG. 6 Clutches and gearing
DIG. 7 Remote control implement
DIG. 8 Air gathering
DIG. 9 Detachable implement
DIG. 10 Uneven terrain compensation
DIG. 11 Hydraulic
DIG. 12 Brush
DIG. 13 Bermuda grass cutters
DIG. 14 Hitch
DIG. 15 Condition responsive
DIG. 16 Movable cutter without stationary cutter bar
DIG. 17 Cutter details
DIG. 18 Handles
DIG. 19 Beaters and wipers
DIG. 20 Blades, reels and guards
DIG. 21 Raking and windrowing
DIG. 22 Underslung yieldable rotary mower
DIG. 23 Dehydrating

Original Classification 1917

1 MISCELLANEOUS
2 PLANT SETTING
3 . Drilling machines
4 . Manually-operated implements
6 LIQUID OR GAS
7 . Drilling machines
7.1 . Hand manipulated
7.2 . . Implement carried supply
7.3 . . . Work operated valve
7.4 . . . Non-gravity fluid feed
8 DRILLING AND BROADCASTING
9 . Main and auxiliary frame machines
10 BROADCASTING
11 . Machines with scatterer
12 . . Main and auxiliary frame
13 . Main and auxiliary frame machines
14 DRILLING
15 . Hill-planting machines
16 . . Check correcting
17 . . . With automatic regulator
18 . . Frame and planting-element arrangement
19 . . . With tractive-belt feed drive
20 . . . Sectional main frame
21 . . . . Break joint
22 . . . Main and auxiliary frame
23 . . . . Rotary-marker operator
24 . . . . Hopper-carrying auxiliary
25 . . Depositing and marking mechanisms
26 . . . Powder marking
27 . . . Driving marking
28 . . . . Revolving
29 . . . Driven marker
30 . . . . Plunging
31 . . . . . Hill covering
32 . . . . Revolving
33 . . Marking mechanisms
34 . . Depositing mechanisms
35 . . . Interchangeably operable
36 . . . Primarily axle-driven
37 . . . . Intermittently controlled
38 . . . . . Check-wire tripped
39 . . . . . Both feeder and valve
40 . . . . . With wire-actuated valve
41 . . . . With wire-actuated valve
42 . . . Endless-belt tripped
43 . . . Line-wire driven
44 . . . . Reel carried
45 . . . . Check-wire tripped
46 . . . . Both feeder and valve
47 . . . . Trip-fork mechanisms
48 . . . . Guides
49 . . . . Wire-end-anchoring devices
50 . . . Manually operated
51 . . . Accumulators
52 . Frame and planting-element arrangement
53 . . Sectional main frame
54 . . . Flexible
55 . . . . With auxiliary frame
56 . . . . Break joint
57 . . . Extensible
58 . . . . V-shaped
59 . . Main and auxiliary frame
60 . . . Plurality of auxiliaries
61 . . . . Unitarily controlled
62 . . . Floating auxiliary
63 . . . . Hopper carrying
64 . . . . . Detachable
65 . . . . . Single row
66 . . . . Tool-bar type
67 . . . . . With lift and ungear
68 . . . With crank-axle lift
69 . . With adjustable planter elements
70 . . Rigid
71 . . . Single row
72 . . . . Manually operated depositing mechanism
73 . . . . Multiple depositing
74 . . . . Revolving hopper
75 . . . . Vibrating hopper
76 . . . . Vibrating delivery chute
77 . . . . Rotating dispenser
78 . . . . Axle mounted
79 . Single-row implements
80 . . Multiple depositing
81 . . Planter-element arrangement
82 . . Hand propelled
83 . Lister units
84 . Drag-bar units
85 . Drill sets
86 . Drill teeth
87 . . Rotary furrower
88 . . . Multiple disk
89 DIBBLING
90 . Revolving-hopper implements
91 . . Revolving-dibble-carrier implements
92 . Manually-operated implements
93 . . Machine attached
94 . . Spacing in hill
95 . . Regulated discharge
96 . . . Sliding-plunger control
97 . . Multiple-staff control
98 . . Footplate control
99 . Dibbles

DIGESTS

DIG. 1 Methods of planting seeds and miscellaneous compositions

Original Classification: 1900

50 MATCH MAKING
51 . Wax and paper
52 . Cutting, framing, and dipping
53 . . Die punches
54 . Cutting and framing
55 . . Die punches
56 . . . Fixed
57 . Cutting and coiling
58 . Framing and dipping
59 . Coiling
60 . Dipping
61 . Box filling
. Dipping frames
62 . . Emptying
63 . . Filling
64 . . . Hopper feed
65 . Dipping frames
66 . Splint feed mechanism
207 OSIER PEELERS
208R BOSSING BARK
208A . . Disk knife
208B . . Drums and tanks
208C . . Hand tools
208D . . Hydraulic
208E . . Hollow head cutter
208F . . Simultaneously rotating and advancing log
208G . . Non-traveling log
208H . . Step-by-step
208J . . Chain, cable, flail, hammer or percussive tool
208K . . Tree climber
2R SPECIAL-WORK MACHINES
2A . . Core and panel machines
2B . . Box hinging
2C . . Box making
2D . . Block surfacing
2E . . Cork cutting and making
2F . . Shuttles and bobbins
2G . . Ten pins
2H . . Bowling balls
2J . . Timber punching
2K . . . Perforating and expanding
2L . . Ring joints
2M . . Patch cutting
2N . . Stump removing
2P . . Ratan
2Q . . Ladder
2S . . Racks and grids
2T . . Stagging
2UA . . Oil cake trimmer
2V . . Wooden shoes and lasts
2W . . Coat hanger
2XA . . Golf clubs
2Y . . Lifters
2Z . . De-limbing
2AA . . De-knotting
3R . Combined
3A . . . Electrical sequence control
3B . . . Electrical, hydraulic sequence control
3C . . . Hydraulic sequence control
3D . . . Timber cutting and handling
3E . . . Assembly-line type
3F . . . Pivoted traveling
3G . . . Wheels and hubs
3H . . . Gaining and boring ties
3J . . . Tract car
3K . . . Spitting
3L . . . Box making
3M . . . Cord and strip wood connector
3N . . . Printing or marking
3P . . . Slabbing-off, log squaring
3Q . . . Mechanical sequence
3S . . . Mechanical sequence by tape
5 . . Blind and sash cutting
6 . . . Relishing
7 . . Box blank
8 . . Chair-round tenoning and sawing
9 . . Clothespin
10 . . Conveyor flight
11 . . Handle
12 . . Pin
13 . . Shingle
14 . . Spool
15 . . Wheel tenoning and boring
16 . . Wheel hub
18 . . Wheel-spoke tenoning and sawing
19 . . Window-stile-pocket cutting
4 . . Circular section
. Single or combined
20 . . Disk cutting and boring
21 . . Disk cutting
23 . . . Rotary tubular cutter
24 . . . Sweep cutter
25 . . Box hooping
26 . . Comb-teeth cutting
27 . . Hinge-seat cutting
29 . . Piano-hammer felting
28 . . Pencil-wood making
28.1 . . Pencil sharpening
28.11 . . . Hand-manipulable
28.2 . . . Including elongated work holder or guide for edge-beveling
28.3 . . . Movable tool
28.4 . . . . Work-actuated tool drive
28.5 . . . . Work-controlled switch for tool drive
28.6 . . . . Rotatable or revoluble
28.7 . . . . . Planetary
28.71 . . . . . Plural tools
28.72 . . . . . Including orbital or electric motor drive
28.8 . . . . . Work holder or guide also rotary
28.9 . . . . Rotary work holder or guide
30 . . Pin pointing
32 . . Screw driving
33 . . Tray making
34R . . Tree felling
34A . . . . Tree pullers and pushers
34B . . . . Tree felling methods
34C . . . . Anti-split clamps
34D . . . . Burning and charring
34E . . . . Shears
34F . . . . Single blade and pass
1R COMBINED MACHINES
1A . . Turret tools
1B . . Coaxial tools, different work levels
1C . . Tippable frame, shopsmith type
1D . . Combined bandsaw
1E . . Hand-held
1F . . . Attachments to hand-held
1G . . Different motor positions
1H . . Levels on machine
1J . . Flexible shaft drive
35R . Boring and sawing
35A . . . Attachments for converting one tool to other
36 . Planing and matching
37 . Planing, matching, and dividing
38 . Planing and polishing
39 . Planing and sawing
40 . Riving and shaving
41 . Shaping and dividing
42 . Slicing and scoring
43 . Slicing and shaving

COMBINED MACHINES
. Slicing and shaving
44 . . Converging knives
46 . Turning and boring
47 . Turning and polishing
48 . Turning and sawing
49 MISCELLANEOUS SINGLE-OPERATION MACHINES
MORTISING
67 . Multiple chisel
68 . . Portable
69 . Auger cutter
70 . . Portable
71 . . Automatic step feed
72 . Chain cutter
73 . . Portable
. Chisel
74 . . Boring and mortising
75 . Chisel
76 . . Portable
77 . Chisel reversers
78 . Hollow chisel and bit
79 . . Portable
80 . Oscillating chisel
81 . . Portable
82 . Rotary cutter
83 . . Portable
84 . Work supports
85 DOVETAILING
86 . Consecutive cutters
87 . Frusto-conical bit
88 . Inclined chisel
89 . Inclined rotary disk
90R MATCHING
90A . . Matching cutters
91 . End
92 BORING
93R . Special work
93A . . . Lasts
. Brush
96 . . Titling work holder
97 . Wheel hub
. . Axial
98 . . . Stationary bitstock
99 . . . Stationary work
100 . . . . Inclined bitstock
103 . Swinging
. Portable
104 . . Hand
106 . . . Angularly adjustable
. Long work
108 . . Hand-operated step feed
PLANERS
114R . Miscellaneous
114A . . . Sharpeners
115 . Scrapers
. Beveling
124 . . Lateral
. . Longitudinal
125 . . . Inclined work pocket
126 . . . Shifting cutter
127R . . . Shifting work support
127A . . . . Shingle planer
. Rotary cutter
. . Cylinder
116 . . . Double surfacers
117R . . Cylinder
117A . . . . Inclined
117B . . . . Edge trimmer
117C . . . . Traveling
131 . . . Bearings
118 . . Disk
119R . . . Traveling
119A . . . . Bowling alleys
120 . Stationary cutter
132 . . Bit adjustments
121 . Reciprocating cutter
122 . . Lateral
123 . Endless cutter carrier
128 . Endless bed
129 . Bed adjustments
130 . Cutter adjustments
133R GAINING
133A . . Tie gaining, ties (skepers) pass through machine
133B . . Traveling on railway track
SHAPING
134R . Miscellaneous
134A . . . Vertical spindle
134B . . . Overhanging
134C . . . Overhanging, horizontal swinging cutter
134D . . . Hand tools
134E . . . Sabot and shoe making
134F . . . Heel forming
135 . Box trimming
136R . Grooving
136A . . . Core boy
136B . . . Stringer
136C . . . Hand tool
136D . . . Hand holds
136E . . . Battery spacers
136F . . . Umbrella sticks
136G . . . Corner grooves
136H . . . Log or poles
136J . . . Gunstock
. Pattern
137 . . Miscellaneous
138 . . Polygonal forms, indexed work
139 . . Rotating table, shifting cutter
140 . . Gear-guided cutter
141 . . Crank-guided cutter
. . Cam
142 . . . Cutter guiding
143 . . . Work guiding
. . Templet
144R . . . Cutter guiding
144A . . . . . Tool support swingable in horizontal
144B . . . . . Propellers
144C . . . . . Violins
144D . . . . . Oars
144.5 . . . . Templets
145R . . . Work guiding
145A . . . . . Vertical spindle cutter
145B . . . . . Shaping lasts
145C . . . . . Vertical spindle, anti-friction collar
146 . Oscillating knife
147 . Reciprocating knife
148 . Reversible cutter
149 . Pattern knife, swinging frame
150 . Rotary cutter, end thrust
151 . Universally jointed cutter shaft
152 . . Curved-work guide
153 . Curved-bar work support
154 . Rotary work carrier
SHAVING
155 . Fixed knife
156 . . Circular knife block
157 . . Drum feed
158 . . Roller feed
159 . Knife pair
160 . . Gripper
161 . . Roller feed
162R SLICERS
162A . . Bottom cutting
162B . . Tapered products
163 . Reslicers
. Strip cutting

SLICERS
. Strip cutting
164 . . Converging knives
165 . . . Lathe feed
166 . . Lathe feed
167 . Arc cut
. Beveling
168 . . Alternate end feed
169 . . Shifting, knife guide
170 . . Tilting gauge
171 . . Tilting table
172 . Cylinder
173 . . Grooving
174 . . Radial knife
175 . Fixed knife
176 . Rotary disk
. Stay log
177 . . Oscillating
178 . . Reciprocating
179 . . Screw feed
180 . Hopper feed
181 . Roller feed
182 RIVING
183 . Beveling
184 . Fixed knife
185 SLIVERING
186 . Scoring plane
187 . . Endless belt
188 . . Rotary
189 . Gang saw
190 . Plunger and fixed knife
191 . Receiving and hindling devices
192 SPLITTING AND BUNDLING
193R SPLITTING
193A . . Fluid pressure wedge or anvil
193B . . Drop type
193C . . Hand tools
193D . . Wedges to be driven
193E . . Wedges, stationary
193F . . Anvils, chopping or splitting blocks
193G . . Splitting guns
193H . . Hand operated fixed splitting machines
193J . . Products are tapered or wedges shaped
193K . . With adjustable work support
194 . Self-feeding
195 . . Roller and belt
196 PUNCHING CUTTERS
197 . Fixed die
198R TENONING
198A . . Attachments to table saws
199 . Blind slat
200 . . Rotary cutters
201 . . Rotary gaining cutters
202 . Chisel pair
203 . Rotary gaining cutters
204 . . Multiple tenon
205 TENON TURNING
206 . Wheel spoke
209R VENEER LATHES
209A . . Log loading and/or centering
209B . . Eccentric curved cuts
209C . . Diagonal cuts and curved cutting edge
210 . Convertible
211 . Inclined knives
212 . Knives and knife blocks
213 . Presser bars and rolls
214 . Stay logs
215 . Strip-cutting attachments
216 MITER CUTTERS
217 . Angle knife
CUTTERS
. Rotary
218 . . Miscellaneous
219 . . End thrust
220 . . Frusto-conical
. . Cylindrical
221 . . . Spiral bit
230 . . . Slotted bit seat
. . Saw
. . . Double
222 . . . . Intermediate cutter
238 . . . Wabble
239 . . . Distorted
. . . Single
223 . . . . Side cutter
. . Polygonal
224 . . . T-slot bit clamp
225 . . . Plane bit seat
226 . . . Convex bit seat
227 . . . Concave bit seat
. . Radial arms
228 . . . Plane bit seat
229 . . . Slotted bit seat
. . Disk
. . . Multiple clamping disks
231 . . . . Tangential bit
232 . . . . Pivoted bit
233 . . . . Shank bit
234 . . . Eccentric segmental bit
. . . Side attached bit
235 . . . . Edge cutting
. . . Multiple
236 . . . . Pattern
237 . . . Gang
240 . . Solid
241 . . . Bits
251R CUTTER GUARDS
251A . . Vertical spindle
251B . . Laterally urged
252R CUTTER HOODS AND DUST CONVEYERS FEED AND PRESSER MECHANISMS
252A . . With sifters, sorters and/or separators
242R . Miscellaneous
242A . . . Non-feeding presser means miscellaneous
242B . . . Non-feeding presser means, feet
242C . . . . Rolls
242D . . . . Chains
242E . . . . Lateral
242F . . . . Reverse feed starters
242G . . . . Turnovers
242H . . . . Lifters
242J . . . . Four motion feet
242K . . . . Fluid pressure drive
242L . . . . Reverse feed
242M . . . . L-feeds
243 . Presser bars and chip breakers
244 . . Sectional
245R . Blank feeders
245A . . . Endless
245B . . . . With clamp
245C . . . Stackers
245D . . . Intermittent feed chain drive
245E . . . Pusher with retractable dog
245F . . . Feed from top of stack
. Rolls
. . Feed
246R . . . Miscellaneous
246A . . . . . Resilient feed rolls
246B . . . . . Oblique means urge work laterally
246C . . . . . Special shaped rolls
246D . . . . . Rolls feed in direction of cut
246E . . . . . On overhanging arm
246F . . . . . Work centering and feeding
246G . . . . . Feelers and pre-sensing devices

CUTTER HOODS AND DUST CONVEYERS FEED AND PRESSER MECHANISMS
. Rolls
. . Feed
247 . . . Spring pressed
248 . . . Weighted
249R . . Presser
249A . . . . Fluid pressure raised and/or lowered
249B . . . . Laterally acting
250R . . Sectional
250A . . . . Multiple parts rigid assembly
253R WORK GUIDES
253A . . Knife edge
253B . . Side or edge eveners
253C . . Centering
253D . . Roll or collar coaxial with cutter
253E . . Work held by corner and/or diagonal work
253F . . Work urged lateral
253G . . Adjustable inclined work-engaging face
253H . . Simultaneous adjustments along length
253J . . Vertical spindle
WOOD BENDING
254 . Bending and drying
255 . Bending rollers
256 . Presses
257 . . End compressors
258 . Hoop gauging
. Former
259 . . Fixed
260 . . . Collapsible
261 . . . End thrust
262 . . . Radial arm and roller
263 . . . Strap and windlass
264 . . . Strap and lever
265 . . . Strap and screw
266 . . . Strap
267 . . Pivotal
268 . . . Coiling
269 . Clamps
270 . Bends
271 . Steaming
278R MACHINE WORK CLAMPS
278A . . Vacuum operated
278B . . Lasts, heels
281R VENEER PRESSES
281A . . Flexible pressure
281B . . Endless belt
281C . . Electrically heated
281D . . Multiple platen equalizers
281E . . Non-planar product without fluid pressure
282 . Roller
283 . Molding
284 CORK AND BUNG PRESSES
285 WORKBENCHES AND TOOL CHESTS COMBINED
286R WORKBENCHES
286A . . Special shapes and structures
287 . Adjustable stock rest
288R WORK-HOLDING STANDS
288A . . Wheel holders
288B . . Aeroplane jigs
288C . . Work-holding jigs or stands
288.5 LATH HOLDERS
306 BENCH DOGS
307 . Clamping
308 . Removable
309R PROCESSES
309A . . Ornamental
309B . . Bending or straightening
309C . . Propellers
309D . . Compressing
309E . . Lasts
309F . . Burning
309G . . Dividers
309H . . Rackets
309J . . Tube
309K . . Gutters
309L . . Joint making
309M . . Dowel joint
309N . . Doors
309P . . Panel single layer
309Q . . Panel, multiple layers
309S . . Wheels
309T . . Boxes
309UA . . Celluloid
309V . . Sand blasting
309W . . Veneer tape
309XA . . Barbco
309Y . . Wood treatment
309Z . . Burnishing
309AA . . Musical instruments
309AB . . Ships or boats
309AC . . Tree harvesting
310R . Repairing or reconstructing
310A . . . Bowling pins
310B . . . Plywood and boards
311 . Bark removing
312 . Log cutting or lumber sawing
313 . Securing
314R . . With step(s) of cutting and/or forming
314A . . . . Panels with edgewise core
314B . . . . Nestable cutouts
315R . . . Including surface bonding
315A . . . . . Composite articles with curved outline
316 . . . . With subsequent cutting and/or forming
317 . . . . With heat and/or pressure application
318 . . . With separate mechanical fastening
319 . . . With cutting; or with cutting and forming
320 . Fiber working or reorientation
321 . Mechanical shaping of part(s)
322 . . With combined steps of cutting and forming
323 . . By cutting
324 . . . With step(s) of heating or fluid treatment
325 . . . Turning, boring, or drilling
326R . . . Plural cutting operations
326A . . . . . Special or variable sizes and shape chips
326B . . . . . Paper pulp chips
326C . . . . . Chip boards chips
326D . . . . . Fibers for wood felt
327 . . With step(s) of heating or fluid treatment
328 . . Embossing or imprinting

CLASS 171, UNEARTHING PLANTS OR BURIED OBJECTS

Original Classification: W. S. Cole 1957

1 METHODS OF RECOVERING BURIED OBJECTS
2 PLURAL ALTERNATELY USEABLE UNEARTHING UNITS
3 STABILIZING COLTER OR FIN
4 WITH ADDITIONAL EARTH OR PLANT ROLLING IMPLEMENT
5 WITH VERTICAL CUTTER FOR VEGETATION
6 WITH EARTH MARKER OR TRAILING EARTH CONDITIONER
7 PERIODIC DUMPING IN PILES
8 DRIVE TRIGGERED BY DESIRED OBJECT
9 SUPPORT OVERLOAD RELEASE AND RESET; DRIVE OVERLOAD RELIEF; OR AUTOMATIC CONTROL
10 WITH PRELIMINARY REMOVAL OF UNDESIRED EARTH MATERIAL
11 REMOVABLE OR ALTERNATE COLLECTION RECEPTACLES
12 WITH APPARATUS CLEANER IN NON-RECOVERY ZONE OF UNEARTHING UNIT
13 WITH TOOTHED MOVING STRIPPER OR PICK-OFF FOR UNDESIRED OBJECT
14 RECOVERED OBJECT PASSES THROUGH SEPARATOR INTERSTICES
15 . Assorting by size
16 RAILROAD BALLAST REMOVAL AND ASSORTING OR SEPARATING
17 SEPARATION OR ORIENTATION BY FLUID CURRENT OR SUSPENSION
18 SEPARATION BY PHYSICAL CHARCTERISTICS
19 WITH RAKE OR LATERAL DEFLECTOR FOR GROUND CONTACTING RECOVERED OBJECTS
20 WITH MANUAL OPERATION STATION (E.G., TOPPING, SEPARATION INSPECTION)
21 HOLDING AND SEVERING PLANT PORTION IN SITU
22 . Plural level cutters
23 WITH SELECTIVE DELIVERY TO ALTERNATE LOCATIONS (E.G., BY-PASS)
24 WITH COMMINUTING OR MULTIPLE CUTTING OF RECOVERED PLANT PART
25 WITH CLEANING OF RECOVERED OBJECT BY BRUSHING OR WIPING
26 WITH ABOVE GROUND MEANS FOR DETACHMENT OF PLANT PART
27 . Detachment by pulling, beating, shaking or crushing
28 . . By opposed rotary gripping elements
29 . Separate successive topping stations
30 . By non-driven rotatable cutter (e.g., rolling)
31 . Conveyer feed to or from cutter
32 . . Cutter positioned by gage
33 . . With driven gage
34 . . With gage
35 . . . Moved into transverse horizontal position for cutting
36 . . Held by conveyer during cutting
37 . . . With lateral disposal of cuttings
38 . . . Opposed belt conveyers
39 . . . Wheel-like conveyer
40 . With deflector or conveyer for detached plant part
41 . Moving topping cutter
42 . . Rotary or endless
43 COMBINED OR CONVERTIBLE
44 POWER MEANS TO SHIFT UNEARTHING UNIT PART
45 TRACTOR POWERED TRAILING UNEARTHING UNIT
46 UNEARTHING UNIT DETACHABLE FROM VEHICLE CHASSIS
47 UNEARTHING UNIT LATERALLY SHIFTABLE ON SUPPORT
48 SEPARATE DRAFT CONNECTIONS TO UNEARTHING UNIT AND UNEARTHING UNIT SUPPORT
49 MOVED OBJECT VOID FILLING OR EARTH HOLD DOWN
50 EXTRACTOR
51 . With agitator for extractor or extractor-carried object
52 . With movable stripper
53 . Plant impaling or snagging (e.g., roots or tops)
54 . . Retractible to strip
55 . Opposed plant engagers
56 . . Jaw means relatively movably mounted on carrier means
57 . . Screw
58 . . Disc or roller
59 . . Claw type
60 . . One a belt or belt carried member
61 . . . Opposed belts or belt carried members
62 . With digger or root cutter
63 STONE GATHERING AND/OR UNEARTHING BY IMPELLING ABOVE-GROUND PLANT OR OBJECT PORTION
64 . With underground stalk or root severing
65 . Impeller inclined to line of draft
66 GROUND ENGAGING CHAIN SEPARATORS
67 WITH PRELIMINARY DEFLECTOR FOR SURFACE MATERIAL
68 . Driven deflector
69 . Moving deflector
70 TRANSVERSELY MOVING SINGLE TINE BOW
71 PLOW OR BLADE CONTIGUOUS TO VIBRATING SEPARATOR
72 . With resilient support or drive connection
73 . Transversely curved or inclined separator
74 . With side walls or guides
75 . Plural separator sets or with articulated elements
76 . . Relatively moving interdigitated sets
77 . Non-circular rolling support for a separator
78 . Ground supported trailing separator
79 . Supported on longitudinally spaced links
80 . Swinging about longitudinal or inclined axis
81 . Shifting laterally
82 UNEARTHING UNIT ROCKING OR FULCRUMED ON GROUND
83 LEADING PLOW OR CUTTER WITH CONTIGUOUS, FIXED, INCLINED SEPARATOR
84 SEPARATING DIGGER (E.G., VERTICAL COLLECTING TINES)
85 . Moving impeller with cooperating circular arcuate guide
86 . Movable on supporting frame (e.g., pivoted)
87 . . With ejector on digger or digger carrier
88 . . Plural cooperating moving diggers
89 . . Moving diggers with intercepting moving stripper or conveyer
90 . . Moving digger with intercepting stripper or chute
91 . . Moving digger carrier with relatively moving digger

	SEPARATING DIGGER (E.G., VERTICAL COLLECTING TINES)
	. Movable on supporting frame (e.g., pivoted)
92	. . Separator or collector within annular or endless digger
93	. . Rolling or coaxial with traction wheel
94	. . Carried by endless flexible member
95	. . Rotary
96	. . . Conical digger portion
97	. . . Horizontal axis (e.g., longitudinal axis)
98	. . . . Transverse axis
99	. . Cyclic
100	. . Pivoted about ground wheel axle
101	. Separating digger intercepted by moving conveyer or impeller
102	. Laterally deflecting diggers
103	. Spaced, inclined shares or guides (pairs)
104	. Inclined lifting surfaces
105	. . Tines (e.g., forks)
106	. . Vertically stepped transverse elements
107	. Tooth or tine arrangements or details
108	TRACTION WHEEL DRIVE DETAILS FOR UNEARTHING UNIT PART
109	UNEARTHING UNIT ON VEHICULAR BREAK-FRAME
110	DIGGER AND MOVING CONVEYER UNIT ADJUSTABLE RELATIVE TO CHASSIS
111	EARTH REMOVAL AND SEPARATION
112	. Rolling screen or sieve (e.g., wheel or belt)
113	. Spiral conveyer for excavator or separator
114	. With impeller or clod breaker for excavator or separator
115	. . Transversely moving rotary member
116	. . Rotary
117	. . Endless belt type impeller or breaker
118	. . . Opposed endless members
119	. . . Excavator or separator within confines of endless impeller or breakers
120	. . . Endless impeller or breaker above excavator or separator
121	. . Impeller or breaker driven through cyclic path
122	. Clod pulverizer outside separating zone
123	. Conveyer disposed below separator
124	. Moving conveyer, digger or separator
125	. . Rolling non-separating elevator or conveyer
126	. . Moving open separator or separating conveyer
127	. . . Compound motion (e.g., with agitator)
128	. . . Rotary cylinder with radially extending separating elements
129	. . . Rotary drum type
130	. . . Plural, successive, endless belt type
131	. . . Plural successive separators, one a belt
132	. . . Moving screen or grate (e.g., shaker)
133	. . . Relatively moving separator elements (e.g., rollers)
134	. . Moving digger and separate separator
135	. Separator formed in collector receptacle
136	. Digger and fixedly interconnected contiguous separator
137	WITH PROTECTIVE GUARD OR CASING
138	WITH MATERIAL REDIRECTING CONVEYER OR CHUTE
139	UNEARTHING UNIT FIXED ON VERTICALLY SHIFTABLE VEHICLE FRAME
140	UNEARTHING UNIT WITH CAGE RUNNER OR WHEEL
141	LIFTING OR TILTING MEANS FOR UNEARTHING APPARATUS
142	DRIVE DETAILS (E.G., CLUTCH OR GEARING)
143	FRAMES AND/OR WHEELED CHASSIS
144	MISCELLANEOUS (E.G., HOPPER OR COLLECTOR

Original Classification: W. Berlowitz, E. R. Mackert 1958

1 PROCESSES
2 AUTOMATIC POWER CONTROL
3 . Motive power control
4 . Constant depth type
4.5 . Land leveller type
5 . Obstruction sensing type (includes plant sensing)
6 . . Electrical
7 . Draft responsive
8 . . Variable rate responsive
9 . . With position control
10 . . Sensitivity adjustment
11 . . With excess draft release
12 . . Overload lift type
13 LAWN EDGER
14 . With or convertible to non-earth working implement
15 . Rolling or driven cutter
16 . . With fixed cutter or furrower
17 . With wheel or roller
18 . Impact or grapple
19 SOD CUTTER
20 . With means for vertical transverse cutting while moving
21 EARTH PERFORATOR (E.G., LAWN AERATOR, ETC.)
22 . Earth removing
23 DRIVEN FROM OR GUIDED BY STATIONARY OBJECT, OR ANCHORED
24 . Around tree or stake
25 . Rotatable about vertical axis
26 . Guided by surface track or previously formed shoulder
26.5 . Dragline scraper
26.6 . . Scraper part rearranged upon reverse movement
27 WITH MEANS FOR CUTTING OR SHREDDING PLANTS WITHOUT SOIL DISTURBANCE
28 . Driven
29 WITH MEANS FOR SHIFTING SURFACE MATERIAL WITHOUT SOIL DISTURBANCE
30 . Driven shifting means
31 . Combined with rolling or vertically acting transverse cutter
32 WITH SEPARATING AFTER EARTH WORKING
33 WITH POWER DRIVEN MOLDBOARD, CONVEYER OR HANDLER
34 COMPLETE APPARATUS ADAPTED FOR USE UPSIDE DOWN
35 WITH DRIVE MEANS FOR TOOL OR CLEANER
36 . Subsurface shears or nippers
37 . Tool rotated by attendant
38 . With obstruction feeling device for moving or releasing implement
39 . With cleaner or comminutor spaced from ground surface
40 . Vibrating tool
41 . Attendant supported tool
42 . Guided by walking attendant
43 . . With ground support vertically adjustable relative to frame
44 . Subsurface shaft or bar (e.g., rod weeder)
45 . Flails
46 . Coaxial tools oppositely rotated
47 . With mast type hitch (e.g., three point hitch)
48 . Plural driven tools
49 . . Contiguous cooperating or intermeshing rotary ground engaging tools
50 . . Diverse tools
51 . . . All rotary
52 . . . . Parallel axes
53 . . . Rectilinearly reciprocating tool
54 . . . Oscillating tool
55 . . Plural groups of disks
56 . . Staggered tools
57 . . Laterally spaced tools
58 . . . Longitudinal axes
59 . . . Vertical axes
60 . . . Transverse axes
61 . Intermittent drive for tool
62 . . With spring return
63 . With non-driven tool (e.g., plow, harrow, drag, scraper, knife or roll, etc.)
64 . . Non-driven furrow opener and driven dam former
65 . . Interdigitating non-driven and driven tools
66 . . Cooperating driven cleaner or comminutor and contiguous tool
67 . . Driven comminutor at outlet of earth guide
68 . . Rolling tool
69 . . . With tool drive from rolling tool
70 . . Fore-and-aft non-driven tool
71 . . Non-driven tool follows path of driven tool
72 . . . Leveling drag or furrow shaper
73 . . Staggered driven and non-driven tool (e.g., cotton chopper, etc.)
74 . With power take-off from tool drive to adjust tool
75 . Interconnected tool lift and drive control
76 . Implement with ground support and articulated connection to vehicle
77 . . Vertically biased implement
78 . . Vertically adjustable ground support
79 . . Tool driven from prime mover on vehicle
80 . With wheel substitute (e.g., runner, etc.)
81 . With plant deflector or protector
82 . Driven tool selectively shiftable along line of travel
83 . . Tool drive interrupted by shifting tool
84 . Simultaneously reciprocating and oscillating blade having elongated shank
85 . . Transverse chopping type
86 . . . With plural cranks or cams driving each blade
87 . . . Means for varying contour of path of blade
88 . . With plural cranks or cams driving each blade
89 . . Means for varying contour of path of blade
90 . Irregular or off center ground engaging wheel or support
91 . Blade movable with respect to cyclically driven carrier
92 . . With means for moving blade
93 . . . Rectilinearly reciprocating blade
94 . . . Blade oscillating arcuately or swivelly with respect to rotary carrier
95 . . . By cam or crank
96 . . Blade flexible or with yieldable mount on carrier
97 . Compound motion for tool
98 . Tool mounted for lateral shifting
99 . . About generally vertical axis
100 . Blade on endless driven belt or chain
101 . Tool guided for rectilinear reciprocation
102 . . Tool moves in horizontal, transverse path

WITH DRIVE MEANS FOR TOOL OR CLEANER
. With overload relief or clutch in drive train (e.g., overload release, etc.)
. . Unidirectional clutch in drive from ground wheel
. Driven from rolling or driven ground wheel
. . Belt or chain drive
. Tool driven about horizontal, longitudinal axis
. . Rotary driven tool
. . . Adjustable tooth or blade
. Tool driven about generally vertical axis (e.g., oscillating choppers, etc.)
. . Rotary driven tool
. With deflector or shield for thrown material
. . Laterally directed outlet flow
. Specific propelling means
. . Tool steers implement
. . Tool propels implement
. Tool freely or yieldably mounted on chassis
. Tool driven about axis transverse to draft line
. . Screw or spiral rib, blade or tooth row
. . Disk or planar cutter (e.g., saw, etc.)
. . Laterally extending bar or blade with skeleton support (e.g., lawn mower type, etc.)
. . Drum with teeth or blades
. . Rotary driven tool
. Tool driven about diagonal axis
. Tool drive details

WITH EARTH MARKER
. Marker shiftable on turning
. Marker adjusted upon raising implement
. Ground wheel operated marker control
. Multiple interconnected markers
. . Markers on laterally shiftable member
. Marker swingable about longitudinal axis to both sides

SCRAPER SUPPORTS NARROW DEPENDING TOOL
. Tool supporting clamp means engage upper and lower edges

SCRAPER POSITION AUTOMATICALLY CONTROLLED BY LINKAGE FOR LEVELLING

SCRAPER BETWEEN WIDELY SPACED FRONT AND REAR GROUND SUPPORTS

SCRAPER BETWEEN FRONT AND REAR GROUND SUPPORTS OF VEHICLE
. With laterally offset inclined shoulder forming tool
. With scraper attached ground support
. With diverse tool or portion
. . Non-scraping tool precedes and spaced from scraper
. Plural scrapers
. . Spaced and in same path
. Push frame for scrapers
. Actuator for bodily shifting scraper subframe draft connection
. Counterbalance means for scraper adjustment
. Three or more independently operable scraper actuators
. . Scraper adjustable about vertical axis of annular support
. . . Actuator for laterally shifting support
. Spring biased into ground contact
. Specific actuator between frame and scraper
. . For adjustment about vertical axis
. . For adjustment about longitudinal axis
. Actuator for tilting wheel relative to vehicle frame
. Specific means for horizontally angling wheel relative to vehicle frame

DIVERSE TOOLS
. One located in path of implement wheel
. One implement surrounds another
. Tools usable alternately only
. With means to vary spacing of tools upon turning
. With interconnected vertical adjustment
. . Plow and colter
. With independent means for vertical movement
. Interconnected adjustment of horizontal angle of rolling and position of diverse tool
. Including spring formed tool or standard
. Including intermittently rolling tool
. Colter, jointer and plow
. Three or more diverse implements following same path (A, B, C or A, B, A)
. . Four or more
. . . Alternately diverse (A, B, A, B)
. . Longitudinally spaced like implements with intermediate diverse implement (A, B, A)
. . Including rolling tool
. . . Smooth levelling roller
. . . Diverse rolling
. At least four alternarely diverse laterally spaced tools (A, B, A, B)
. . Alternate rolling and non-rolling
. . All rolling
. Laterally spaced like tools with intermediate diverse tool (A, B, A)
. . Spaced rolling with intermediate non-rolling
. . Spaced non-rolling with intermediate rolling
. . All rolling
. . Spaced right and left hand tools with intermediate symmetrical tool
. . Including spike tooth
. Including implement alternating for right or left hand operation
. . Reversal of implement adjusts diverse tool
. Jointer and plow
. . Rolling jointer
. Including colter
. . Rolling colter
. Fixed point or share with rotary moldboard
. Rotating tool with fixed moldboard
. Including tool rotatable about vertical axis
. Including smooth levelling roller
. . Spaced from moldboard side of plow
. . With diverse rolling tool
. . With teeth
. Rolling and non-rolling
. . Following same path
. . . Furrowing or ridging implement followed by furrow or ridge roller
. . . Rolling tool has circumferentially spaced blades, tines or the like
. . . Including disk gang
. . . Non-rolling tool group with laterally co-extensive rolling tool
. . . Rolling precedes non-rolling (same path)

DIVERSE TOOLS
. Rolling and non-rolling
. . Following same path
. . . Rolling precedes non-rolling (same path)
181 . . . . Concave furrowing disk with trailing tool
182 . . Laterally spaced
183 . . . With scissors or shearing action between adjacent faces
184 . Diverse rolling
185 . . Spaced on same axis of rotation
186 . . Plane and dished disks
187 . . Differing in size
188 . Runner attached
189 . Including fabric or flexible tool
190 . Including vertical longitudinal blade (e.g., stabilizer, etc.)
191 . . Plural
192 . Including horizontal knife or cutter
193 . First tool with spaced trailing sweep
194 . . Sweep adjustable
195 . Second implement follows path of first
196 . . Including subsoiler
197 . . Teeth and scraper, leveller or drag
198 . . Including teeth
199 . . Including drag, scraper or levelling blade
200 . . . Proceeded by implement of different type
201 . Laterally spaced
202 . . Spaced from moldboard side of plow
203 . . . Connected to moldboard or handle
204 ALTERNATING FOR RIGHT OR LEFT HAND OPERATION (OTHER THAN SCRAPER)
205 . Draft revoluble on transverse axis
206 . Interrelated tool shift and lateral movement of draft member
207 . . Draft member reversed
208 . . Draft member latch control
209 . Interrelated tool lift and shift
210 . . Mast type hitch
211 . . Lift by ground support manipulation
212 . Interrelated tool shift and ground support manipulation
213 . Tools oriented for movement in opposite directions
214 . . Wheeled frame with reversible draft member
215 . . Tilting beam
216 . . Pivoted about spaced transverse axes, or translated
217 . . With movable deflector
218 . Shiftable moldboard
219 . Tool shifted for opposite throw
220 . . Reversible disk with reversible cleaner
221 . . Plural tools shifted about individual vertical axes
222 . . . With translational movement of axes
223 . . Moldboard type shiftable about longitudinal axis
224 . Axially rotatable implement
225 . . With actuator
226 . . . Gearing
227 . . . . Chain or cable
228 . Parallel separate tools
229 . . Interconnected for simultaneous raising and lowering
230 . . Independently operable
231 . . . Power derived from ground wheel
232 . Oblique axis in longitudinal vertical plane
233 WITH OBSTRUCTION FEELER FOR MOVING OR RELEASING IMPLEMENT TO AVOID OBSTRUCTION (INCLUDES DAM FORMER)
234 . Relatively movable
235 . . Latch releasing
236 GROUND ENGAGEABLE DRAFT RESPONSIVE LEVER
237 . Roll over type implement
238 GROUND SUPPORT MOVED VERTICALLY RELATIVE TO FRAME BY DRAFT MEANS
239 DRAFT, PITCH OR GROUND LEVEL RESPONSIVE DEPTH CONTROL
240 WITH GROUND SUPPORT ENGAGEABLE WITH GROUND FOR TRANSPORT ONLY
241 . Apparatus inverted to engage ground support with ground
242 . Implement tiltable on longitudinal axis
243 . Tool changeable to or replaced by ground support
244 . Tool and ground support moved together relative to frame
245 CONVERTIBLE; OR CHANGEABLE BY DISASSEMBLY OR ASSEMBLY
246 . To land vehicle with body
247 . To device classifiable in another class
248 . To different type of hitch
249 . Plural simultaneously useable tools to single tool
250 . Changeable by disassembly or assembly
251 . . Tool changeable to diverse tool
252 . . . Tool plus added part forms diverse tool
253 . . Tool added or substracted
254 . . Tool rearranged on support structure
255 TURN LIFTS TOOL OFF OR LOWERS TOOL INTO GROUND
256 PROPULSION UNIT GUIDED BY WALKING ATTENDANT OR PART OF ARTICULATED VEHICLE
257 . Riding attendant
258 . Endless track or single driven wheel
259 . With vertically adjustable wheel
260 . With actuator for moving earth working element vertically
261 OVERLOAD SHIFTING
262 . Alternate tool brought into operation upon shift
263 . Actuator released
264 . Against spring return device
265 . . Swinging about fixed pivot axis
266 . . . Including toggle linkage
267 . . . . Toggle adjustable
268 . . . . Toggle links at acute angle
269 . Resilient latch
270 . Friction lock
271 . Frangible lock (e.g., shear pin, etc.)
272 WITH MEANS TO FACILITATE MOUNTING OF IMPLEMENT ON MOTOR VEHICLE
273 . Tool forward of rear of motor vehicle
274 . Implement has ground support
275 . Self-coupling by horizontal movement
276 TOOL AHEAD OF MOTOR VEHICLE
800 . Rear mounted hitch actuator for manipulating tool
801 . Tool is transversely elongated blade (e.g., bulldozer, etc.)
802 . . Having relatively adjustable earth engaging parts
803 . . Means between tool and push arm to adjust tool about longitudinal axis
804 . . . And vertical axis
805 . . Means between tool and push arm to adjust tool about vertical axis
806 . . Means between tool and push arm for relative adjustment

TOOL AHEAD OF MOTOR VEHICLE
. Tool is transversely elongated blade (e.g., bulldozer, etc.)
. . Tool adjustable about longitudinal axis
. . Cable connects actuator and tool or push arm
. . Plural servo-motor actuators for moving tool vertically
. With ground support
WITH WHEEL STEERING OR ACTUATOR FOR HORIZONTALLY ANGLING WHEEL AXIS
. Implement part interconnected with motor vehicle steering means
. . Implement wheel steered
. . Transverse tool bar laterally shiftable
. Wheel on trailing implement responds to turning movement
. . Interconnected with adjustable tool
. . With additional angular adjustment of wheel
. . Rear wheel turned or controlled
. Wheel on non-propelled device
. . Wheel interconnected with tool
. . Plural interconnected relatively movable wheels
. . . Transversely aligned stub shafts
. . Swinging axle
. . Wheel behind tool
SPECIFIC PROPELLING MEANS
SERIES OF LIKE ELEMENTS SEQUENTIALLY OPERATED BY POWER CYCLE
. Sequentially operated servo-motors
. Tool forward of rear of motor vehicle
. Shaft with spirally arranged projections
TOOL FORWARD OF REAR OF MOTOR VEHICLE
. With ground support
. Power actuator with cut-out or lock-out means
. With rearwardly mounted tool
. . Tools actuated by independent power units
. . . Front and rear independent
. Power actuator with manual adjusting or supplemental manual actuating means
. Tools independently actuatable
. With means for moving tool laterally
. Connected to front axle
. Parallelogram type lift
. With push bar
. Pivoted on horizontal diagonal axis
PLURAL WHEELED IMPLEMENTS
. Outrigged implement adjustable inwardly
. Implement draft connection forwardly of rear of self-propelled vehicle
. Laterally spaced with separate draft tongues
. Implements in echelon (e.g., gang plows, etc.)
ACTUATOR ON TRAILING IMPLEMENT, CONTROLLED FROM PROPELLING VEHICLE
. Servo-motor on implement
ACTUATOR ON VEHICLE FOR RELATIVELY MOVING PARTS OF TRAILING IMPLEMENT
. Actuator on vehicle moves implement ground support vertically relative to implement frame
. . Interconnected means for moving hitch
. Disk gang angling
ACTUATOR ON VEHICLE FOR MOVING WHEELED IMPLEMENT
WITH ACTUATOR FOR ROCKING TOOL ABOUT WHEEL AXIS
. Unstable wheeled frame moved by actuator
WITH ACTUATOR ON TRAILING GROUND SUPPORTED FRAME FOR MOVING DRAFT MEANS LATERALLY OR VERTICALLY
. Tool rigidly connected to tongue
. Vertically
. . With vertically adjustable ground support
. . . Interconnected means for adjusting draft means and ground support
GUIDED BY WALKING ATTENDANT; SUPPORTED, PROPELLED, OR HELD IN POSITION BY ATTENDANT
. With seat for moving hitch
. Hitch guided relative to supporting frame
. Tool manipulated with respect to mounting frame
. . Arched wheel frame (i.e., straddle row, etc.)
. . . Seat counterbalanced beam
. . . With spring biasing means
. . . . Spring biased upwardly during operation
. . . Combined implement lift and wheel adjustment
. . . Tongueless, animal draft
. . . . With balancing means
. . . Multiple plant row type
. . . With added intermediate tool
. . . Cross connected drag bars
. . . Foot operated
. . . With support bracket for transport
. . Manipulated about longitudinal axis
. . Plural tools independently or oppositely manipulable
. . Spring biased
. . Vertically manipulated
. Rolling tool
. . Handle swingably mounted on axis of tool
. Guided or propelled by walking attendant and with ground support or draft means
. . With stepper propulsion means
. . With body harness or engaging means
. . With wheel
. . . Alternately usable tools rocked about wheel axis
. . . Plural longitudinally spaced wheels
. . . Handle forward of tool
. . . Tool forward of wheel
. . . Tool and handle relatively vertically adjustable
. . With wheel substitute (e.g., runner, etc.)
. . Handle connected to tool or runner
. . Tool standard connected to handle
. . Plural handles associated with relatively adjustable tools
. . Handle mounted tool adjusting, latching or locking mechanism
. . Tool and handle relatively adjustable
. . . Vertically
. . Multiple handles connected to multiple longitudinal tool carrying beams
. . Plural handles connected to opposite sides of longitudinal beam
. . . With brace member
. With attendant attaching means
. Hand tool
. . Adjustable
. . . Plural tools relatively adjustable
. . . . At least one tool immovably secured to handle

GUIDED BY WALKING ATTENDANT; SUPPORTED, PROPELLED, OR HELD IN POSITION BY ATTENDANT
. Hand tool
. . Alternately usable diverse tools or parts
. . Loop type
. . Channel type
. . Plural prongs, teeth or serrations
. . . Plural rows
. . . Made from sheet material
. . Non-planar earth working portion
MULTIPLE LEVEL TOOLS
AXIS OF ROTATION OF WHEEL LOCKABLE OR ANGULARLY ADJUSTABLE
. With actuator for tilting in a vertical plane
. Adjustable stop
. Lockable against free swinging
WITH WHEEL SUBSTITUTE (e.g., RUNNER, ETC.)
. With wheel
. Spring tooth implement
. . Parallel pivoted tooth bars
. Spike tooth implement
. Plural runner supported implements relatively movable during operation
. Spaced parallel runners with tool mounted therebetween
. Disk type tool
WITH GROUND SUPPORT VERTICALLY ADJUSTABLE RELATIVE TO FRAME
. Vertically adjustable or selectively lockable hitch
. Tool land ground support moved together relative to frame
. . Linkage to tool
. With power take-off from plural wheels
. Actuator and interconnected means for adjusting wheels on different axles
. . Three or more adjustable wheels on different axles interconnected
. . . With power take-off from self-adjusted wheel
. . With power take-off from wheel
. . . Wheel adjusted by own power
. . One wheel translates another swings
. . With additional actuator changing relative position of wheels
. Power operated adjustment
. . Wheel actuates its crank axle mount
. . . Wheel lockable to crank axle arm
. . . Intermittently rotatable member swingable with crank
. . . . "Constant height" depth adjustment
. . . Swingable arm engageable with wheel
. . Servo-motor adjusting means
. Flexible or lost motion connection to actuator
. Translating motion
. . One ground support translates and another swings
. . Parallel links
. . With actuator
. . . Screw jack type
. . . Rack and pinion or ratchet type
. Plural ground supports vertically adjustable relative to each other and the frame
. Crank axle with angularly spaced wheel carrying arms
. With actuator
. . Spring assisted
. . Gearing
. . . Worm gear
. . . Screw jack type
. . . Rack and pinion or ratchet type
. . Manually operated lever rigid with crank axle
WITH INDICATING OR SIGHTING MEANS
WITH SEAT OR ATTENDANT'S STATION
. Plural
. Riding attachment
. Movable to non-use position
. Operator changes position or seat adjustable
. Mounted on transverse member connecting plural implements
WITH TOOL SHARPENER
COMBINED
MAST TYPE HITCH (e.g., THREE POINT HITCH, ETC.)
. Angled gangs liftable as a unit
. . Tandem gangs
. . . With actuator for angling groups relatively
. Struts on trailer or between implement parts
. Hitch quadrilateral modified during lift
. With means operated by vertical hitch movement
. Laterally adjustable tool
. . Rockable about vertical axis
. With auxiliary vertical adjustment
. Tool movable relative to mast while earth working
. Sway limiting means or swayable tool
. With tools beyond lateral sides of hitch
WITH ACTUATOR ADAPTED TO LIFT TOOL FOR TRANSPORT ON WHEELED FRAME OR BROADLY CLAIMED IMPLEMENT
. Actuator electrically powered
. Angled gangs lifted as a unit
. . Tandem gangs
. Central group liftable vertically, side groups movable inwardly
. With means to restrain lateral sway when raised
. Vertical movement interrelated with another
. Pivotable about longitudinal axis (e.g., lateral levelling, etc.)
. . Tool independently vertically adjustable at transversely spaced points
. Tool lifted with respect to stationary or relatively movable cleaner
. Plural tools, individually spring biased down, lifted as unit
. Lift actuator moves with tool or forms removable unit therewith
. Servo-motor forces tool down
. Servo-motor with follow-up control (e.g., motion responsive position control, etc.)
. Tool held raised for relieving load on servo-motor
. With shiftable hitch causing vertical movement
. Plural tools, independently actuatable
. . By single selectively connectable actuator
. . With separate actuator for concurrent lift or with interlock
. . Three or more independent actuators
. Plural tools simultaneously raised, individually lowered
. Tool differentially or sequentially lifted at longitudinally spaced points

WITH ACTUATOR ADAPTED TO LIFT TOOL FOR TRANSPORT ON WHEELED FRAME OR BROADLY CLAIMED IMPLEMENT
474 . Tool rocked about independently vertically adjustable transverse axis
475 . . Plural longitudinally spaced actuators
476 . With lateral adjustment
477 . . Tool adjustable about vertical axis
478 . Tool and lift actuator on opposite sides of transverse pivot axis
479 . Tool lifted forward of transvers pivot axis
480 . Tool swung about freely shiftable or delayed pivot
481 . With separate latch
482 . Tool swings about rock shaft axis
483 . Translatable tool
484 . . By parallel links
485 . Power actuator with manual adjusting or supplemental manual actuating means
486 . . Manual actuation coextensive with power
487 . . Constant height depth adjustment
488 . Single lift actuator for plural relatively movable tools
489 . . Tools relatively moved during lift
490 . Rotary drum actuator
491 . Servo-motor actuator
492 . With power take-off for actuator
493 . . Position controlled power disengagement
494 . Overcenter or toggle holding means
495 . Foot operated actuator
496 . . With combined or optional hand actuation
497 . Tool spring biased during operation
498 . . Biased to neutral position
499 . . Spring means alternately biases tool in opposite directions
500 . . Tool spring pressed downwardly
501 . Lost motion connection between actuator and tool
502 . . Flexible connector
503 . Actuator slidably connected to tool
504 . Screw actuator
505 . Tool connected to frame by bail
506 . Spring assisted or spring actuator
507 GROUND SUPPORT MOVABLE HORIZONTALLY
508 WITH GUARD, SHIELD OR PLANT DIVERTER
509 . Fender for deflected earth
510 . . Rotary
511 . . Perforated or screening type
512 . . Inverted U-shape
513 . . Laterally spaced fenders for inwardly thrown earth
514 . Weed turner or trash holddown
515 . . Spring biased or spring formed
516 . . . Plural cooperating elements
517 . Plant deflector
518 ROLLING, ROTATING OR ORBITALLY MOVING TOOL
519 . Yieldable material rim (e.g., rubber, etc.)
520 . Tools on different axes in mutual driving relationship
521 . With power take-off from tool or wheel
522 . Axis substantially vertical
523 . . With vertically extending teeth
524 . . . Positioning means engaging circumference
525 . . . With weight
526 . . . Plural tools
527 . Axis substantially longitudinal
528 . With means for stopping or retarding rotation
529 . . Positive stop
530 . . . Wheel or motor controlled
531 . Wobble discs
532 . Screw or spiral
533 . Clutch between shaft and rotating element
534 . Wheel or roller with peripherally spaced plant saving means
535 . Detachable rim for disk
536 . Wheel, roller or gauge and axially adjacent tool on same axis
537 . Corrugated surface rollers
538 . Paired press rims (e.g., planter press wheels, etc.)
539 . Smooth roller with groove, rim or disk
540 . Tool has circumferentially spaced teeth, tines, blades or the like
541 . . With means for preventing ground engagement of teeth or blades
542 . . Tooth or blade on endless carrier
543 . . Spring tooth or blade
544 . . Spring moving or mounting means for tooth or blade
545 . . Blades or teeth change position relative to each other or rotating support during rotation
546 . . . With means for causing movement
547 . . With cleaning means
548 . . Tooth or blade units on single axle
549 . . . Tooth or blade units angularly adjustable on axle
550 . . Tooth or blade adjustable on carrier
551 . . Rolling tool spring biased into ground contact
552 . . Laterally extending bar or blade with skeleton support (e.g., lawn mower type, etc.)
553 . . . Toothed bar or blade
554 . . Drum with axially spaced teeth or blades
555 . . Integral disk
556 . . Tooth or blade axially clamped to hub face (e.g., hoe wheel type, etc.)
557 . Rim with spokes
558 . With disk cleaning means
559 . . Rotatably mounted cleaning means
560 . . Cleaner for pair of converging disks
561 . . Cleaners for opposite sides of disk
562 . . Plural cleaners for single disk
563 . . Cleaners with common operator
564 . . . Mounted on rock shaft
565 . . . Operating means moves parallel to disk gang axis
566 . . Spring biased toward disk
567 . Disk gang and single disk on diverse axes
568 . Disk gang with movable or removable section
569 . Disks pivoted on vertical axes with interconnected means for moving them identically
570 . With spring means other than for detent
571 . . Spring is for tool group horizontal angling
572 . . Spring acts to move tool vertically
573 . . . Plural tools, individually spring urged
574 . Plural disks with individual mount or axis
575 . . Touching disks
576 . . With interconnected means for adjusting a plurality of disks
577 . Reversible group
578 . With wheel (not on motor vehicle)
579 . Plural groups of disks
580 . . Power operated actuator
581 . . Groups changeable to different types of arrangements

ROLLING, ROTATING OR ORBITALLY MOVING TOOL
. Plural groups of disks
. . With independent lateral adjustment
. . Vertically adjustable group
. . Horizontally angularly adjustable group
. . . Groups of unequal length
. . . More than two laterally positioned groups
. . . Laterally spaced and unaligned
. . . With [illegible] movable on [illegible] to east
. . . [illegible] for draft connection
. . . Latch responsive to tractor motion
. . . With manual actuator
. . . . Concentric controls
. . . . Separate handles for independent gang adjustment
. . . . Double tandem groups
. . . Double tandem groups
. . Tandem groups
. . . Toggle joint between groups
. . . Thrust means directly between group axles
. Disk gang
. . Supported for tilting and horizontal angling adjustment
. . Disks rotatable relative to axle
. Single disk freely swayable
. Disk horizontally angularly changeable
. Detailed disk structure per se
SHIFTABLE HITCH MOVES TOOL RELATIVE TO FRAME
WITH CLEANER
. Cleaner surrounds tooth
. Clearing roller
. For plural tools
. Scraper
WITH WEIGHT
FABRIC OR FLEXIBLE TOOL
PLURAL RELATIVELY MOVABLE TOOLS
. Tool pivots on pivoted member when member moves
. . Tools connected to parallel pivoted bars
. . . Bars pivoted about vertical axis
. . . . Also pivoted about horizontal axis
. Tools assume different angularity for opposite draft
. Plural tool groups relatively vertically movable because of operation
. . Parallel transverse tooth bars
. . . Spring biased bars
. . . With actuator to vary inclination of teeth
. . Groups abreast and in tandem
. . Plural groups movably connected to forward transverse draft bar
. . . With alternate draft means (spaced 90 degrees)
. . . Sectional draft bar
. . . Groups also connected to one another
. . Similar groups arranged to form a triangular shape
. . Three or more laterally spaced groups
. . Groups pivoted to opposite sides of longitudinal draft member
. . Groups movable about common longitudinal axis
. . Group movable about oblique horizontal axis
. . Group pivotal about intermediate transverse axis
. Parallel, pivotally adjusted tool bars
. . With actuator
. . . Tools also adjustable about vertical or longitudinal axes
. . . Plural actuators, independently pivoted tool bars
. . . Gear
. . Specific mounting for pivoted tool bar
. Tool group pivotally adjustable about horizontal axis
. Beam spreader of the pivoted yoke type
. Pair of tools cooperate to move earth to or from plant row
. Spring formed tool or standard
. Tools longitudinally adjustable to and from transverse alignment
. Tools relatively adjustable horizontally without causing vertical displacement
. . Laterally adjustable tools, independently free to move vertically
. . Tools simultaneously adjustable about their individual, spaced vertical axes
. . Collapsible lazy tong group
. . Tool groups relatively horizontally adjustable
. . . Also vertically adjustable
. . . Group pivoted about vertical axis
. . . . V-shaped
. . . . . Nested
. . Main central beam, tools laterally adjustable relative thereto
. . Tool adjustable vertically and laterally
. . Tool laterally adjustable
. Relatively movable because of operation
. . With interconnecting means to prevent independent lateral movement
. Adjustable about spaced horizontal axes
. . Concurrent adjustment
. Vertically translatable tool
. Tool movable to non-use position
WITH ACTUATOR
. For relatively movable earth engaging parts
. . Tool and runner
. For adjustment about longitudinal axis
. For lateral adjustment
. For vertical adjustment with respect to wheeled frame
WITH WHEEL; OR SUPPORTED ON WHEEL FRAME OR BROADLY CLAIMED IMPLEMENT
. All wheels on one side of tool
. Mounted on single longitudinal beam in tool path
. . Wheel secured to tool
. Laterally adjustable tool
. With bracket to hold tool off ground
. Vertically adjustable tool
. Tool follows wheel path
WITH DRAFT DETAIL
. Spring biased hitch
. Adjustable
. . Vertical
TOOL, STANDARD OR CONNECTION
. Tool flexed to change contour
. Latched in earth working position
. Tool pivots on member when member moves
. Plural tools
. . Right and left hand type
. . Longitudinally spaced rows
. . . Staggered
. . Closed geometrically shaped frame
. . V-shaped frame

TOOL, STANDARD OR CONNECTION

. Plural tools
691 . . Mounted on transverse or oblique tool bar
692 . . . Angularly adjustable bar
693 . . . Oblique bar
694 . . Laterally spaced tools
695 . . . Tools in echelon (3 or more)
696 . . . Tools on opposite side of longitudinal beam
697 . . . Tools in transverse alignment
698 . Tool with laterally spaced standards
699 . Subsoilers
700 . . With separate vertically spaced earth working portion attached to same standard
701 . Ridgers
702 . Reversible part
703 . . Earth engaging means
704 . . . Portion of earth engaging assembly
705 . Spring biased or formed tool or tool part
706 . . Plural earth engaging parts relatively movable during operation
707 . . Spring formed tool or standard
708 . . . With separate or rigid earth working portion
709 . . Laterally biased
710 . . Pivoted tool biased beyond pivot
711 . . Leaf or torsion spring
712 Tool assumes different position for opposite draft
713 . Tooth
714 . Plural earth engaging parts relatively movable because of operation
715 . . Rotary landside
716 . . Movable moldboard for inverting furrow slice
717 . . . Belt
718 . . . Roller
719 . With add-on cutting or wearing edge, point or surface
720 . Subsurface blade (e.g., weeder, etc.)
721 . Non-rectangular, symmetrical type
722 . . Earth breaking part and separately attached wings
723 . . . Draw cut point
724 . . . Wings integral
725 . . With separable vertical cutter on centerline
726 . . Having separable parts jointed at centerline
727 . . With attached runner or depth gauge
728 . . . With additional blades attached to runner
729 . . . Adjustable
730 . . Winged
731 . . Lateral extent decreases upwardly
732 . . Triangular blade
733 . . Constant height and V-shape
734 . Adjustable
735 . . To present different working portion
736 . . Relatively adjustable earth engaging parts
737 . . . Element adjusted for wear compensation
738 . . . Relatively adjustable tool and runner
739 . . Adjustable about horizontal transverse axis
740 . . . Tool adjustably connected to standard
741 . . Laterally adjustable
742 . . . Adjustable about a vertical axis
743 . . . Adjustable about a longitudinal axis
744 . . Vertically adjustable
745 . Welded
746 . With portion extended beyond landslide
747 . Specific material
748 . Pivoted tool
749 . Having separable parts interconnected without detachable fastening means
750 . . Self-engaging snap fastener
751 . . Captive fastener or wedge tightened or engaged after assembly
752 . With separable vertical planar longitudinal cutter (e.g., colter, etc.)
753 . Interlocked or interfitted parts
754 . Share and furrow slice inverting moldboard
755 . . Heating or lubricating
756 . . Skeleton
757 . . Furrow slice retainer
758 . . Furrow slice cutter or breaker
759 . . With additional element juxtaposed to moldboard
760 . . Specific moldboard shape
761 . . Serrated, toothed or notched point or share
762 . Specific tool and standard connection
763 . . With specific standard and beam connection
764 . With separate runner, gauge, shoe or landslide
765 . Specific tool shape
766 . . Tool with parallel fingers or blades
767 . . Packer, smoother or scraper
768 . . Draw cut type
769 . . Separable parts
770 . . Angularly related tool surfaces
771 . . With curved surface
772 . Tool comprises plural parts
773 . Specific standard
774 . . With lateral offset
775 . . Braced
776 MISCELLANEOUS (E.G., FRAMES, ETC.)

Original Classification 1917
Subsequent Revision: P. Arnold 1952

1R MISCELLANEOUS
1H . . Apparatus for erecting buildings
1E . . Attachments for earth-moving devices
1F . . Feed tables for shearing machines
1GD . . Gravity dumping devices
1A . . Auto and boat tilting and lifting devices
1S . . Sheet and slab handling
1SW . . . Wall and ceiling board manipulators
1B . . Transfer devices
1BA . . . Endless chain or endless chain-mounted grippers
1BB . . . Reciprocating type
1BC . . . Horizontally swingable
1BD . . . Vertically swingable
1BS . . . Including suction grippers
1BT . . . . Reciprocating type
1BH . . . . Horizontally swingable
1BV . . . . Vertically swingable
1BE . . . Devices producing air film support
1D . . Dolly mounted manipulators
1Q . . Turnover devices
1QA . . . Including coacting opposed movable arms
1QB . . . By rolling object along a surface
1QC . . . Rotation of object by flexible sling
1QD . . . Overhead pivotal suspension means to object
1QE . . . Manually operated rocking devices
1QF . . . Pivotable about two perpendicular pivots
1QG . . . Bar and billet turners
1P . . Pipe handling devices
1PA . . . Pipe laying
1PB . . . Including ramp and retractable stop or ejector
1PE . . Photo-electric control
1C . . Counting aids
1L . . Laundry handlers
1M . . Mail handlers
1MD . . Measuring devices
1MS . . Mining systems
1N . . Vehicles with removable bodies
1T . . Tables with eating equipment operated without arms
1CM . . Remote control manipulator
1.1 STOCK PULLING OR PUSHING
1.2 . With means ejecting stock remnant
1.3 . With additional diverse motion of stock
1.4 . With fluid pressure actuated pushing or pulling means
1.5 . Stock end face pushers
1.6 . . For sheet stock
1.7 . Sheet stock lead end pullers
2 WITH WEIGHING
2.5 WELL PIPE OR ROD RACKING MECHANISM
3 POLE OR TREE HANDLERS
3.1 GLASS CYLINDERS
5 HAY DISTRIBUTERS
PILING OR ARRANGING APPARATUS
5.5 . Tobacco stringers or unstringers
6R . Article
6A . . . Brick stackers
6B . . . Mobile stackers
6BA . . . Stacking from below
6C . . . Vertically swingable stack orienter
6D . . . Free fall stackers
6DS . . . . Including magnetic or suction endless conveyer
6DK . . . . Including retractable dropper
6F . . . Top stacking without free fall
6FA . . . Including endless shelf depositor
6G . . Elevatable depositor
6H . . Lowerable receiver
6FS . . Carriage-mounted suction or magnetic means
6M . . Multiple supply
6N . . Staggered stacking
6P . . Palletizers
6S . . Stack shapers
6.5 . . Stacking tapered articles (e.g., matchbooks)
7 . . Edge piling
8 . . Frame and handler
8.5R . Article unpiling
8.5A . . . Stack advancing
8.5B . . . With article offset
8.5C . . . Gripping
8.5D . . . . Suction or magnetic
8.5E . . . Air blast ejectors
8.5F . . . Lateral pushers
8.5G . . . Endless conveyer ejector
8.5H . . . Rotary ejector
8.5K . . . Escapement type
8.5SS . . . Separating sub stacks
9 . Stack shapers
10 . Coal-storage type
10.5R . Piles, arrangements, holders or spacers
10.5D . . . Inflatable spacers
10.5S . . . Stack layer interlock
11R MANUALLY CONTROLLED SELECTIVE DELIVERY
11A . . With auxiliary synchronized timer
11C . . Memory devices
12 MARINE LOADING OR UNLOADING SYSTEMS
13 . Ships at sea
14 . Ship and shore
CHARGING OR DISCHARGING APPARATUS
15R . Ship
15A . . . With weather cover
15B . . . Water conveying
15C . . . Hoist line bucket, scoop or scraper
15D . . . Non-hoist type conveyors
15E . . . Adjustable conveyor
16R . Storehouse
16B . . . Discrete article
16.1R . . Wheeled vehicle
16.1A . . . . Radially arranged parking stalls
16.1B . . . . Storage carriers movable in endless vertical path
16.1BA . . . . . Circular path
16.1BB . . . . . Carriers pivotally supported from endless member
16.1C . . . Vehicle carried into storage stall
16.1CA . . . . By wheel engagement
16.1CB . . . . . Interfingering deposit
16.1CC . . . . . Pallet type
16.1CD . . . . . Endless horizontal travel path
16.1CE . . . . . With elevator handling of pallet
16.1CF . . . . . Conveyor in stall floor
16.1D . . . Rolling or skidding of vehicle on its wheels
16.1DA . . . . By tiltable platform
16.1DB . . . . By push-pull device
16.1DC . . . . . Wheel engager type
16.1E . . . Vehicle self-propelled into parking lot
16.1ED . . . . Stall is tiltable platform
16.1EA . . . . Stall serviced by horizontally shiftable carrier
16.1EB . . . . . Carrier also vertically shiftable
16.1EC . . . . Vertically shiftable stall
16.4R . . Plural shelf type
16.4A . . . . Elevator has horizontal motion also

CHARGING OR DISCHARGING APPARATUS
. Storehouse
. . Plural shelf type
16.4B . . . . Inter-aisle transfer
16.4C . . . . Flow-through shelves
16.6 . . . Simultaneously shelved
17R . Bin or tank
17A . . . Charging and discharging
17B . . . Seals
17C . . . Charging
17CA . . . . Controls
17CB . . . . Rotary distributor type
17CC . . . . Multichamber rotor
17D . . . Non-gravity discharge
17DA . . . . Bottom; compound motion type
17DB . . . . Top; compound motion type
18R . Furnace type
18N . . . Charging nuclear reactor
18GD . . . Glass furnace charging
18SC . . . Scrap charging
19PM . . . Portable hoppers
18K . . . Charging rotary kiln
18V . . . Charging vertical shaft furnace
18.2 . . Material controlled
18.22 . . Thrower type
18.24 . . . With conveyer feed
18.26 . . . . Screw
18.28 . . . . Plunger
18.3 . . . Modified or directional flow
18.34 . . . Reciprocating
18.36 . . . . Pivoted
18.38 . . . Rotary
19 . . Inclined elevator
20 . . . Bucket orienting
21 . . Endless or rotary carrier
22 . . Rotary levelers
23 . . Reciprocating-bar conveyer
24 . . . Multiple
25 . . . With endless or rotary carrier
26 . . . Charge supporting
27 . . . . Grab
28 . . . . . Horizontally swinging
29 . . . . With discharging pusher
30 . . . . . Charge-spreading or furnace-discharging feature
31 . . . . Axially rotatable
32 . . . Horizontally and vertically swinging
33 . . . Horizontally swinging
34 . . . Sectional
35R . . Gravity type
35A . . . . Rotary valve
36 . . . Bell and hopper
37 . . . . Rotary feature
38R ROADWAY VEHICLE LOADING OR UNLOADING WITH EXTERNAL COOPERATING MEANS
38A . . Laterally swinging of load
38B . . Platform alignment
38BA . . . Vertical (only)
38BB . . . Horizontal (only)
38C . . Lifting transfer of load
38CA . . . Overhead hoist
38CB . . . Inclined plane
38CC . . . Complete transfer by lift alone
38D . . Separable load rack or carrier
39 . Rural mail
40 . Railway car and hoist
41 . Vehicle loading
42R . . Moving vehicle
42A . . . . Alignment of discharge means during turning of vehicle
42B . . . . Means preventing spillage between cars
43 . . . Traveling hopper
44R . Vehicle unloading
44A . . . Scraper or scoop
44B . . . Flexible bed
44C . . . Vehicle tilting device
45 . . Vehicle dump and carrier
46 . . . Endless carrier
46.22 . . Tilting track with switch system
46.24 . . Non-fixed pivot
46.26 . . . Material discharge control
46.28 . . . Elevator type
46.3 . . . . Side dump
46.32 . . . Rolling cradle type
46.34 . . Vehicle end engaging
47 . . Tilting track section
49 . . . Wagon-dump type
52R . . . Side tilt
52B . . . . . Multiple vehicle holder
52C . . . . . Rotary cage
53 . . . Shaking or jarring
54 . . . Vehicle-door-operating feature
55 . . . Car feeding or holding
56 . . . . Second car releasing first
57 . . Plows
58 . . Moving vehicle
59R . . . Suspended
59A . . . . . Concrete distribution
60 . . . . Selective delivery
61 . . . . Tilting
62R . . . Tilting
62A . . . . . Side tilt
63 . . . Door-closing feature
64 . . Tilting vehicle body
64.2 . . Jarring or vibrating type
300 RECEPTACLE EMPTYING DEVICES
301 . Combined with receptacle filling
302 . . Storage bin type receiver
303 . . . With receptacle controlled inlet means
304 . With container opening means
305 . . Rupturing or cutting type
306 . Successive dumping from conveyed stack
307 . With gate or closure-type discharge control means
308 . With jarring means
309 . Non-gravity type
310 . . Ejector
311 . Orienting endless, roller or gravity conveyer
312 . Rotary cradle
313 . . Non-fixed pivot
314 . . Oscillated
315 . Elevator type
316 . . Differentially operated cables
317 . . Co-acting catch or support
318 . Up-ending, e.g., rocking or tilting about end
330 WHEEL AND WHEEL TYPE ARTICLE HANDLER AND TRANSPORTER
331 . Elevator type engaging means
332 . Vertically swinging article engager
333 . Opposed horizontally reciprocable engaging elements
334 . Ramp type truck
338 ARTICLE ENGAGED BETWEEN ENDS FOR ROTATION AND ADVANCEMENT
339 . Driven canted roll or ring
340 ARTICLE ROTATOR, ROLLER TYPE
350 MOTION OR DRAFT RESPONSIVE LOAD HANDLER AND TRANSPORTER
351 . Movably connected vehicle sections, e.g., articulated
352 . . Vertically swinging
353 . Ground engageable means
354 . . Lifting leg type

MOTION OR DRAFT RESPONSIVE LOAD HANDLER AND TRANSPORTER
. Ground engageable means
. . Wheel operated
. . . Locked to wheel
. . . Elevator type
. . . Vertically swinging support
. . . . Cable and drum actuated
TILTING VEHICLE TYPE HANDLER, I.E., PORTABLE GRAPPLE
. Article actuated engaging means
. Separable load rack
. Successive engaging means
. With band type engager
. Flexible strand attached load gripper
. Opposed movable jaw grippers
. . Slidable
. . Toggle type operator
. Single movable jaw gripper
. . With operating means
. . Adjustable
. . . Slidable
. Rigid type grapple engaging means, e.g., hooks
OPPOSED SHELF TYPE ELEVATOR AND TRANSPORTER
. Load bridging vehicle
LOAD BRIDGING VEHICLE
. Removable transverse load support
VEHICLE ATTACHED AUXILIARY CARRIERS
. For rim, tire or wheel
. . Plural
. . Movement about spaced pivot axes
. . Simple arcuate or rectilinear movement
SELF LOADING OR UNLOADING VEHICLES
. Having pivoted load body
. . Elevatable type
. . Discharge gate carried loading means
. . Interrelated movements or drives for load body and loading means
. . Movable to provide loading ramp
. . . Rockable on running gear
. . Rotary drum type
. . With conveyer means
. . . Movably mounted conveyer
. . . Reciprocating, e.g., ejector type
. . . . Two wheel hand truck
. Having elevating load body
. . With traversing hoist
. . With reciprocating conveyer, e.g., ejector type
. Separable load rack
. . Conveyer operated
. . Cable operated
. Successive handling means
. . Power driven conveyers
. . . Movably mounted
. . . . Universally
. . . . . Pivotally
. Drag line and vertically swinging support
. Elevator
. . . Laterally shiftable upright guide
. . . Elevator also has traversing (horizontal) motion
. . . Tailgate type
. Vertically swinging load support
. . . Tailgate type
. . Shovel or fork type
. . . Auxiliary rake
. . . Swinging laterally from vehicle
. Ejectors or followers
. Conveyer
. . With worker support
. . Power driven with cooperating handling means
. . With gate means
. . . Multiple gates
. . With movable upright plate
. . Laterally movable rigid platform type
. . Shiftable or removable conveyer unit
. . Fluid type
. . Reciprocating type
. . Screw type
. . Flexible conveyer type
. . . Endless
. . Roller way
. . Skidway
. . . With haulage means, e.g., cable
. Haulage cable
TRAVERSING-HOIST TYPE
. . Tow truck type
. Traveling crane
. . Switch systems
COMBINED CARRIERS
. Hoist and endless or rotary carrier
. Vertically swinging shovel and auxiliary carrier
. . . Orbital path
. Vertically swinging load support and endless or rotary carrier
. . . Bottle handling
. Vertically swinging load support and hoist or drag line
. Endless or rotary carrier and dragline scoop
. Skidway with hoisting rope
SELF LOADING AND/OR UNLOADING ELEVATOR OR HOIST TYPE
. . Folding masts
. Mail
. Load lowering, automatic return
. Inclined
. . Ditching type
. . . Pivoted track
. . Tilting carrier
. . . Tilting track section
. . . Running out from base
. . . . Return, buffer, or counterweight feature
. . . Return, buffer, or counterweight feature
. . . Skeleton or fork
. . Outhaul feature
. . Carrier running out from base
. Magnet and grab
. Convertible attachment
. Separable rack
. With external cooperating movable feeding or discharging means
. . Elevator carrier movement responsive
. . . Vehicle handling
. . . Loading means
. . . . Flow control mechanism, i.e., volume
. . . . . Trap chamber type
. . . . Movable to feeding position over carrier
. . . Valved carrier
. . Adjustably mounted discharge guide
. Grab
. . . Suction gripper type
. . Cantilevered type, e.g., industrial truck
. . . Movable about horizontal axis
. . . Movable rigid jaw clamping type
. . . . Horizontal support with co-acting element or holddown

SELF LOADING AND/OR UNLOADING ELEVATOR OR HOIST TYPE
. Grab
. . Cantilevered type, e.g., industrial truck
. . . Movable rigid jaw clamping type
655 . . . . Multiple article or rack type
656 . . Clamshell
657 . . . Guided
658 . . Suspended
660 . Movable guide with tilting carrier
670 . Movably mounted guide
671 . . Swinging
672 . . . Vertically, i.e., about horizontal axis
673 . . . . Limit control
674 . . . . Hydraulic actuating means
700 . Tilting carrier
701R . . Selective
701P . . . . Forward tilt
701Q . . . . Lateral rotation
702 . . Sectional platform type
703 . . Valved
704 . . Latch release
705 . . . With carrier engaging cam means
706 . . . Cantilevered carrier
707 . . Camming trackway
708 . . . Adjustable
709 . . . Yoke suspended carrier
710 . . Tethered type
711 . . Abutment or limit stop
712 . . . Swinging
713 . . . Engageable upon reversal or lowering of carrier
714 . . . . Cantilevered carrier
715 . . . Carrier and guide supported cooperating elements
730 . Laterally adjustable carrier
731 . . Individual prong elements
740 . Valved
741 . . Cam or abutment operated
750 . Carrier or load engaging structure
127 . Return, buffer, or counterweight feature
128 . Automatic stop
130R VERTICALLY SWINGING LOAD SUPPORT
130A . . Tilting cradles
130B . . Concrete handling
130C . . Coil handling
131R . Shovel or fork type
131A . . . Removable vehicular mount
132 . . Horizontally swinging
133 . . . Vertically adjustable
134 . . . Trolley supported pivoted handle
135R . . . Reciprocating handle
135A . . . . . Single cable for crowding and hauling
136 . . . . Link supported
137 . . . . Tilting
138R . . . Handle pivoted to boom
138C . . . . . Adjustable horizontal swing axis
139 . . Guided
140 . . Tilting
761 . . . Including indicator
762 . . . Control means responsive to sensed condition
763 . . . . To maintain pitch during swinging
764 . . . . To stop tilting at selected angle
765 . . . Overshot type
766 . . . Swinging member attached to rear mounted draft member
767 . . . Including load ejector, striker or retainer
768 . . . Laterally tiltable or shiftable shovel or fork
769 . . . During swinging to stabilize pitch
770 . . . . On link mounted swinging support
771 . . . . By hydraulic compensation
772 . . . . By tensioned flexible connector
773 . . . . By linkage pivoting on base vehicle
774 . . . . . Yoke mounted shovel or fork
775 . . . . . Linkage extensible for other tilting
776 . . . . . Swinging support mounted linkage
777 . . . Induced by swing of swinging support
778 . . . By extensible link between load engager and swinging support
779 . . . Holdable in different pitch positions during loading
780 . . . On unlatching from swinging support
141 . . Extensible support
142 . . Return, buffer, or counterweight feature
143 . . . Spring
144 . . Hay retainers
145 . . Shovel and handle structure
146R . . . Dumping mechanism
146E . . . . . Bucket ejectors
146.5 . With rectilinear translation
147R . Grab
147AS . . . With auxiliary support
147T . . . Transfer devices
147G . . . Opposed movable jaw grippers
148 . Non-fixed pivot
149 . Tilting carrier
151 HORIZONTALLY SWINGING LOAD SUPPORT
152 PROCESSES

DIGESTS
DIG. 1 Perforated article handling
DIG. 2 Remote control handlers
DIG. 3 Hollow cylinder handlers
DIG. 4 Roll handlers
DIG. 5 Combined or convertible implements
DIG. 6 Handlers with spring devices
DIG. 7 Handling vehicles with overhead guard for operator
DIG. 8 Handler type toys
DIG. 9 Shaft mucking machines
DIG. 10 Handlers utilizing parallel links
DIG. 11 Transmission line guide for a shiftable handler

CLASS 241, SOLID MATERIAL COMMINUTION OR DISINTEGRATION

Original Classification 1944

PROCESSES

1 . By operations other than force of contact with solid surface
2 . With cell rupturing or liberation of contained liquids
3 . With solidifying, consolidating or shaping
4 . Laminated or fibrous mineral material
5 . By utilizing kinetic energy of projected or suspended material
6 . Cereal and other seeds or seed parts
7 . . With operation to detach or loosen adhering hull portion
8 . . With application of fluid to, or heating cooling of, whole seed
9 . . With separation or classification
10 . . . With recombination or recirculation of separated parts
11 . . . Successive alternate separation and comminution steps
12 . . With application of fluid
13 . . Plural successive comminuting operations
14 . Selective or differential comminution of mixed or bonded solids
15 . With application of fluid or lubricant material
16 . . To aid dispersion or prevent chemical reaction, deliquescence, agglomeration or frothing
17 . . With additional heating or cooling
18 . . Gas or vapor
19 . . . To classify or separate material
20 . . Liquids added to classify or separate material
21 . . Liquids added to make pulp or suspension
22 . Application of solids to material
23 . With heating or cooling of material
24 . With classification or separation of material
25 . Combined
26 . By contact between relatively moving portions of material
27 . Subjecting material to impact by moving comminuting surface
28 . Wood and similar natural fibrous vegetable material
29 . Plural successive comminuting operations
30 . Miscellaneous

APPARATUS

31 . With explosion preventing or relieving means
32 . With overload release means
32.5 . With sink drain stopper interlock
33 . With automatic control
34 . . Of feed of material
35 . . . By speed or torque of comminutor drive
36 . . Of comminutor drive
37 . . Of comminuting surface contiguity
37.5 . With means to protect operator from injury
38 . Including means applying fluid to material
39 . . Fluid comminutor type
40 . . . Stationary abutment impact only
41 . . Plural fluid applying means on same material
42 . . . With plural comminuting zones
43 . . With plural comminuting zones
44 . . . Parallel material flow type
45 . . . Horizontal fluid current past successive comminuting zone
46R . . Liquid submerged comminuting zone
46A . . . . Garbage disposers
46B . . . . Vertical axis
46.02 . . . With material feed means
46.04 . . . Including adjustable component
46.06 . . . By cooperating members
46.08 . . . . Including centrifugally driven striking member (i.e., hammer mill)
46.11 . . . . Including impeller-type agitating means
46.13 . . . . Reciprocating or oscillating
46.15 . . . . Including roller or roller-like member (e.g., ball, cylinder, etc.)
46.17 . . . By rotating impeller-type agitating means
47 . . Gas swept comminuting zone
48 . . . With recirculation of gas to comminuting zone
49 . . . Gas borne material applied to screen
50 . . . . Elevating fan on comminutor shaft
51 . . . . Screen forms part of comminuting surface
52 . . . With return of removed oversize material to comminuting zone
53 . . . . Suction applied above and coaxially of comminuting member or members
54 . . . Horizontal gas current though rotary drum
55 . . . Comminuting element or comminuting element attached, gas moving means
56 . . . Gas moving means and rotary comminuting element on same shaft
57 . . . Local application within comminuting zone
58 . . . Suction applied above and coaxially of comminuting member or members
59 . . . With non-automatic gas flow control means
60 . . Applied subsequently to comminuting
61 . . . With recirculation of material to comminuting zone
62 . . Applied prior to communuting
63 . With simultaneous control of inter-related feed, drive and/or surface positioning means
64 . . Control of feed and surface positioning means only
65 . With temperature modification of material
66 . . Temperature modification of communiting member
67 . . . Thermal fluid within or carried by moving comminuting member
68 . With separation or classification of material
69 . . Comminuted material discharge permitting screen
70 . . . Screen partition or end wall in rotary drum
71 . . . . Plural partitions or end walls
72 . . . . . Series flow of material
73 . . . Arcuate screen concentric with rotary comminuting member
74 . . . Annular screen above or surrounding comminuting zone
75 . . Parallel material flow through plural comminuting zones and/or separators
76 . . Series material flow only through plural alternate comminuting zones and separators
77 . . Comminuting zone interposed between plural separators
78 . . Separator interposed between plural comminuting zones

APPARATUS

. With separation or classification of material
79 . . Separator in discharge from comminuting zone
79.1 . . . By adhesion, electric field force, specific gravity, or chemical change
79.2 . . . Rotating comminutor combined with a sifting device
79.3 . . . . Sifting device rotates
80 . . . Oversize return to comminuting zone
81 . . Separator in feed to comminuting zone
82 . Projected material trap chamber
82.1 . Helical pusher inside tube moves material toward perforated member
82.2 . . With means to vary particle coarseness
82.3 . . Wherein the perforated member is other than flat
82.4 . . With series of axially alined rotary knife blades
82.5 . . With rotary knife before member
82.6 . . . Tube having configured interior surface
82.7 . . With rotary knife after member
83 . Comminuting surface provided with openings to permit discharge of material
84 . . Cooperates with moving comminuting surface or member
84.1 . . . Loose cylinder or sphere
84.2 . . . Travelling roll surface or member
84.3 . . . Oscillating surface or member
84.4 . . . Rectilinearly reciprocating surface or member cooperates with rotary comminuting member
85 . . . Rotary commininuting surface having openings cooperates with moving surface
86 . . . Cooperates with rotary member comminuting
86.1 . . . . Material thrown against perforated surface by centrifugal force
86.2 . . . . Comminutor mounted for movement relative to rotating support member
87 . . . . Screen or screen elements move during comminution
87.1 . . . . Offset fingers on stationary surface and on rotary member
88 . . . . Provided with special comminuting surfaces or characteristics
88.1 . . . . . Perforation bounded by sharp edge
88.2 . . . . . And auxiliary imperforate surface (e.g., breakerplate)
88.3 . . . . . Three or more serially acting alternate perforate and imperforate surfaces
88.4 . . . . . Spaced parallel bars (e.g., "grate")
89 . . . . Hinged or dumping type screen or support
89.1 . . . . With means to change or adjust comminuting position of screen or screen element
89.2 . . . . Removable or interchangeable screen or screen portion
89.3 . . . . Stationary concave surface
89.4 . . . . Stationary flat circular surface
91 . . Rotating comminuting surface having openings
92 . . . Radial comminuting face
93 . . . Outer peripheral comminuting face
94 . . Reciprocal comminuting surface having openings
95 . . Stationary comminuting surface having openings
96 . Oversize rejection by comminuting surface
97 . With recirculation of material to comminuting zone
98 . With agitator
99 . Bottle breakers
100 . With independent removable or detachable material receiver or receiver engaging means
100.5 . Combined with sink drain
101R . Combined or convertible
101A . . . Unbalers with fluffer and blower
101B . . . Mill and mixer
101C . . . Animal powered mill
101D . . . Plural materials
101M . . . Mobile crusher
101.1 . . Convertible to non-comminuting apparauts
101.2 . . Combined with non-comminuting means
101.3 . . . With means to indicate condition of apparatus, work or product
101.4 . . . Prior shaping means (e.g., quartering)
101.5 . . . With material handling other than to or from comminuting zone
101.6 . . . . And means to mix plural materials
101.7 . . . Ambulent supporting means
102 . Comminuting surface deformable by contact with material
103 . Rolls frictionally driven and supported by relatively moving surfaces (e.g., ball chasers)
104 . . With additional diverse type of comminutor
105 . . Plural comminuting zones
106 . . Frictional drive surface on horizontal axis
107 . Plural rotary or oscillatory surfaces cooperate with common surface (e.g., chasing mills)
108 . . With additional diverse type of comminutor
109 . . With material feeding mechanism or control
110 . . Plural surfaces move across common surface
111 . . Outer peripheral contact of common surface by plural surfaces
112 . . . With surface cleaner or scraper
113 . . Plural surface cooperate with each other
114 . . Radial faces of plural rotary surfaces cooperate with common surface
115 . . Plural sets of plural surfaces cooperating with plural common surfaces
116 . . . Coaxial rotors radially arranges on same side or common surface axis
117 . . Common surface moves during comminution
118 . . . With planetary movement of plural surfaces
119 . . . With material moving or discharge means
120 . . . Positively driven plural surfaces
121 . . . Plural surfaces forcible away from common surface
122 . . . . Common surface rotates on horizontal axis
123 . . Planetary movement of plural surfaces
124 . . . With material moving or discharge means
125 . . . Compounded planetary movement
126 . . . Positively driven plural surfaces
127 . . . Forcible away from common surface
128 . . . . Pivotally mounted for forced movement

APPARATUS

. Plural rotary or oscillatory surfaces cooperate with common surface (e.g., chasing mills)
. . Planetary movement of plural surfaces
. . . Forcible away from common surface
. . . . Pivotally mounted for forced movement
129 . . . . . Centrifugally urged toward contact
130 . . . . . With centrifugal force modifying means
131 . . . . Centrifugally urged toward contact
132 . . . . With means in addition to weight of plural surfaces for urging surfaces toward contact
133 . . . . Rotors independently forcible away from common surface
134 . Parallel material flow through plural comminuting zones
135 . . With unitary or interconnected feed mechanisms or controls for plural zones
136 . . . Interconnected means forcing material against moving comminuting surface or surfaces
137 . . All comminuting zones of loose grinding body type
138 . . All comminuting zones of rotary striking member type
139 . . All comminuting zones of cooperating surface type
140 . . . All comminuting zones of compound movement type
141 . . . All comminuting zones of rotary surface type
142 . . . . Circumferential or tangential material flow only
143 . . . . . All cooperating surfaces rotate
144 . . . . . Rotary surfaces of separate zones coaxial
145 . . . . . Simultaneous adjusting or positioning of separate surfaces
146 . . . . Axial or radial material flow only
147 . . . All comminuting zones of reciprocating surface type
148 . . . . Oscillating surface
149 . . . . Vertical rectilinear movement
150 . . . . . Annularly mounted moving surfaces
151 . . All comminuting zones of single surface zones
152R . Series material flow only through plural comminuting zones
152A . . . Various types of comminuting zones
153 . . All comminuting zones of loose grinding body type
154 . . All comminuting zones of rotary striking member type
155 . . All comminuting zones of cooperating surface type
156 . . . All comminuting zones of compound movement type
157 . . . All comminuting zones of rotary surface type
158 . . . . Circumferential or tangential material flow only
159 . . . . . All cooperating surfaces rotate
160 . . . . . One surface of each couple non-rotary
161 . . . . Axial or radial material flow only
162 . . . . . Common axis of rotation
163 . . . . . Horizontal axis
164 . . . All comminuting zones of reciprocating surface type
165 . . . . Vertical rectilinear movement
166 . With comminuting member cleaner or scraper
167 . . Contacting working surface of rotary comminuting member
168 . Hand support comminutor
169 . . Reciprocating cooperating comminuting surfaces
169.1 . . Rotary tool
169.2 . . Masher or pestle
170 . Loose grinding body comminutor (e.g., ball or rod mills)
171 . . With feed and/or discharge
172 . . With independent means moving or guiding the material and/or grinding bodies in receptacle
173 . . . Rotary grinding body pusher (e.g., ball chasers)
174 . . . . Horizontal axis
175 . . Compound movement receptacle
176 . . Rotating receptacle
177 . . . Tiltable axis of rotation
178 . . . Roller supported receptacle
179 . . Receptacle structure
180 . . . With non-axial opening
181 . . . With lifting or distributing at extremity of receptacle
182 . . . With lining
183 . . . . With lifting or distributing characteristics
184 . . Grinding bodies
185R . Rotary striking member (e.g., hammer mills)
185A . . . Pump and rotary disintegrator
186R . . With feed and/or discharge mechanism or control
186A . . . . Screw feed
186.1 . . . With distinct plural paths to striking member
186.2 . . . With means to regulate feed or discharge
186.3 . . . . Including means to alter direction of flow
186.4 . . . Rotating or oscillating feeder
187 . . With moving cooperating surface or member
188R . . Axial and/or radial flow of material
188A . . . . Pin disc comminutor
189R . . Circumferential or tangential flow
189A . . . . Reversible rotary mills
190 . . . With intermeshing impact members
191 . . Rotor structure
192 . . . With striking member adjusting means
193 . . . With loosely mounted striking member
194 . . . Striking member pivoted to rotor
195 . . Striking members or hammers
196 . . . Loose ring type
197 . . . With attached wear member
198R . Cooperating comminuting surfaces (e.g., jaw crushers)
198A . . . Single roll jaw crushers
199 . . Batch type (e.g., mortar and pestle)
199.1 . . . With means to move batch container or support
199.2 . . . . Intermittent movement of support interrelated with movement of cutter or knife
199.3 . . . . . Rectilinearly reciprocating knife
199.4 . . . . . Rocking knife
199.5 . . . . Uni-directional movement of support
199.6 . . . . . With means to feed or discharge batch

APPARATUS

. Cooperating comminuting surfaces (e.g., jaw crushers)
. . Batch type (e.g., mortar and pestle)
. . . With means to move batch container or support
. . . . Uni-directional movement of support
199.7 . . . . . With revolving tool
199.8 . . . . . With rectilinear reciprocating tool
199.9 . . . Stationary container or support
199.11 . . . . With rectilinear reciprocating tool
199.12 . . . . With rotary tool
200 . . Endless belt type comminuting surface or surfaces
201 . . Compound movement comminuting surface or surfaces
202 . . . With feeding and/or discharging mechanism or control
203 . . . Rotary component
204 . . . . Circumferential or tangential flow of material
205 . . . . Rotating and reciprocating surface
206 . . . . With moving cooperating surface
207 . . . . Gyratory or planetary movement
208 . . . . . Eccentric drive sleeve within gyratory member
209 . . . . . With upper guide or support for gyratory member
210 . . . . . . Unbalanced weight drive
211 . . . . . . Gyratory member yieldingly mounted
212 . . . . . . Upper gyratory drive
213 . . . . . . Bottom shaft adjusting means
214 . . . . . Eccentric shaft gyratory drive
215 . . . . . Eccentric gyratory sleeve below gyratory member
216 . . . . . With gyratory member sealing means
217 . . . Unitary comminuting member and eccentric strap
218 . . . . With moving cooperating surface
219 . . . Comminuting member pivoted to oscillating supporting link
220 . . Rotary surface or surfaces
221 . . . Circumferential or tangential flow of material (e.g., roll mills or roll and concave mills)
222 . . . . With material feed and/or discharge mechanism or control
223 . . . . . Endless belt conveyer
224 . . . . . Hopper
225 . . . . . . With roll or rotary material agitator
226 . . . . With material retaining means at axial end of rotary surface
227 . . . . Both cooperating surfaces rotate (e.g., roll mills)
228 . . . . . Internal comminuting surface
229 . . . . . Surfaces rotate in same direction and/or mounted on non-horizontal axis
230 . . . . . Adjustably or yieldably mounted rotary surface
231 . . . . . . Hydraulic or pneumatic mounting and/or axially yieldable or adjustable
232 . . . . . . Pivoted roll support
233 . . . . Adjustable pivot
234 . . . . . . Both rotating surfaces adjustable or yieldable
235 . . . . . Cooperating non-smooth surface characteristic
236 . . . . . . Intermeshing
237 . . . . With non-rotary surface moving means
238 . . . . With plural alternatively usable non-rotary surfaces and/or retractable rotor projections and/or adjustably or yieldably mounted rotary surface
239 . . . . Non-rotary surface adjustable or yieldable relative to rotary surface
240 . . . . . Sectional non-rotary surface having independently adjustable or yieldable parts
241 . . . . . Radially of rotary surface
242 . . . . Cooperating non-smooth surface characteristics
243 . . . . . Intermeshing
244 . . . Axial and/or radial flow of material (e.g., disk mill or cone and shell mills)
245 . . . . With feed and/or discharge mechanism or control
246 . . . . . Axially mounted rotary propeller or screw
247 . . . . . . Horizontal axis
248 . . . . . Hopper supply
249 . . . . . . Subjacent shaking shoe or receptacle
250 . . . . With moving cooperating surface
251 . . . . . Both cooperating surfaces rotate
252 . . . . . Non-coaxial or eccentric
253 . . . . . . Vertical axis
254 . . . . With rotary surface axis non-coaxial or eccentric relative to non-rotary surface axis
257R . . . . Vertical axis
257G . . . . . Garbage disposer
258 . . . . . Rotary shaft supported above rotary comminuting member
259 . . . . . Adjustable rotary member
259.1 . . . . With means vary space between surfaces
259.2 . . . . . By fluid
259.3 . . . . . Surface yieldably held in position
260 . . . . Cooperating non-smooth surface characteristics
260.1 . . . . . Worm or screw comminutor
261 . . . . . Intermeshing
261.1 . . . . . Conoidal surface
261.2 . . . . . Opposed, flat coaxial surfaces (e.g., disk mill)
261.3 . . . . . Having plural angularly related land and groove
262 . . Reciprocating surface or surfaces
263 . . . Parallel motion
264 . . . Oscillating comminuting surface
265 . . . . With feed and/or discharge mechanism or control
266 . . . . With moving cooperating surface
267 . . . . Link and eccentric type actuator
268 . . . . Serial pivoted links type actuator or link with lever type actuator (e.g., toggle type)
269 . . . . . Means actuating pivot of serial links
270 . . . . Vertical rectilinear movement (e.g., stamp mills)
271 . . . . . With feeding and/or discharging mechanism or control
272 . . . . . With means to rotate moving surface on non-comminuting stroke
273 . . . . . Gravity projected surface only

APPARATUS

273.1 . Multi-barbed comminuting face (e.g., grater)
273.2 . . On radial face
273.3 . . Cylindrical
273.4 . . Stationary curved face
274 . Stationary comminuting surface or material bed
275 . . Centrifugal projection of material
276 . . Conveyer material forcing means (e.g., scroll type or locomotive stroker type)
277 . Rotating comminuting surface
278R . . Internal or radial comminuting face
278A . . . . Internal comminuting face
279 . . With means to support material for rotation during comminution
280 . . With means to force material toward periphery of comminuting surface
281 . . . Means engaging sides of column of material
282 . . . Radially arranged rectilinearly reciprocating follower
282.1 . . Elongated edged member
282.2 . . . Detachably secured to a rotary element
283 . Reciprocating comminuting surface
284 . Mutual attrition or compression comminutors
285R . Comminutor mounting means, frames or other normally stationary structure
285A . . . Removable or displaceable housing section
285B . . . Rotor type; pivoted housing section
286 . . With means to adjustably or yieldably mount normally stationary comminuting element
287 . . . Pivotally mounted
288 . . . . Self adjusting (e.g., universal mounting)
289 . . . . Yielding
290 . . . Yieldingly mounted
291 . Comminuting elements
292 . . With balancing means
292.1 . . Edged blades extending radially
293 . . Cylindrical or frusto-conical (i.e., peripheral comminuting face)
294 . . . Sectional or separable surface element
295 . . . . Annular sections
296 . . Disk-like comminuting surface (i.e., radial comminuting face)
297 . . . Plural comminuting faces
298 . . . Prefabricated assembled surface sections or parts
299 . . Annular internal comminuting face
300 . . Wear face to backing connections
300.1 . . Plural stationary edged blades
301 . Miscellaneous

CROSS REFERENCE "ART" COLLECTIONS

600 Furnace stokers
601 Sand mullers
602 Soap dispensers

DIGESTS

DIG. 1 Automatic moistening
DIG. 2 Ball mills
DIG. 3 Chemical treatment of grain
DIG. 4 With cooking and drying
DIG. 5 Disc mills
DIG. 6 Dispenser with disintegrator
DIG. 7 Dispersion mills
DIG. 8 Grinder with dryer
DIG. 9 Explosion disintegrating
DIG. 10 Foundry sand treatment
DIG. 11 Grain preparation
DIG. 12 Grinding aids
DIG. 13 Grinding with heating and cooling
DIG. 14 Grinding in inert, controlled atmosphere
DIG. 15 Hydraulic drives
DIG. 16 Impact mills-plural stage
DIG. 17 Ice crushers
DIG. 18 Leather grinding
DIG. 19 Material flow circuits and controls
DIG. 20 Mill lubrication means
DIG. 21 Metal slag disintegrating
DIG. 22 Metal crushing
DIG. 24 Molasses mixers
DIG. 25 Paint processing
DIG. 26 Mill and furnace combined
DIG. 27 Pill or tablet crushers
DIG. 28 Plastic
DIG. 29 Pulverizers with feeder
DIG. 30 Rubber elements in mills
DIG. 31 Rubber preparation
DIG. 32 Seals
DIG. 33 Vacuum treatment
DIG. 34 Washing of grain
DIG. 35 Wet impacting
DIG. 36 Ray control