Oct. 28, 1952 H. BARRAS 2,615,263

DRAIN DIGGER AND CLEANER

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FIG. 1

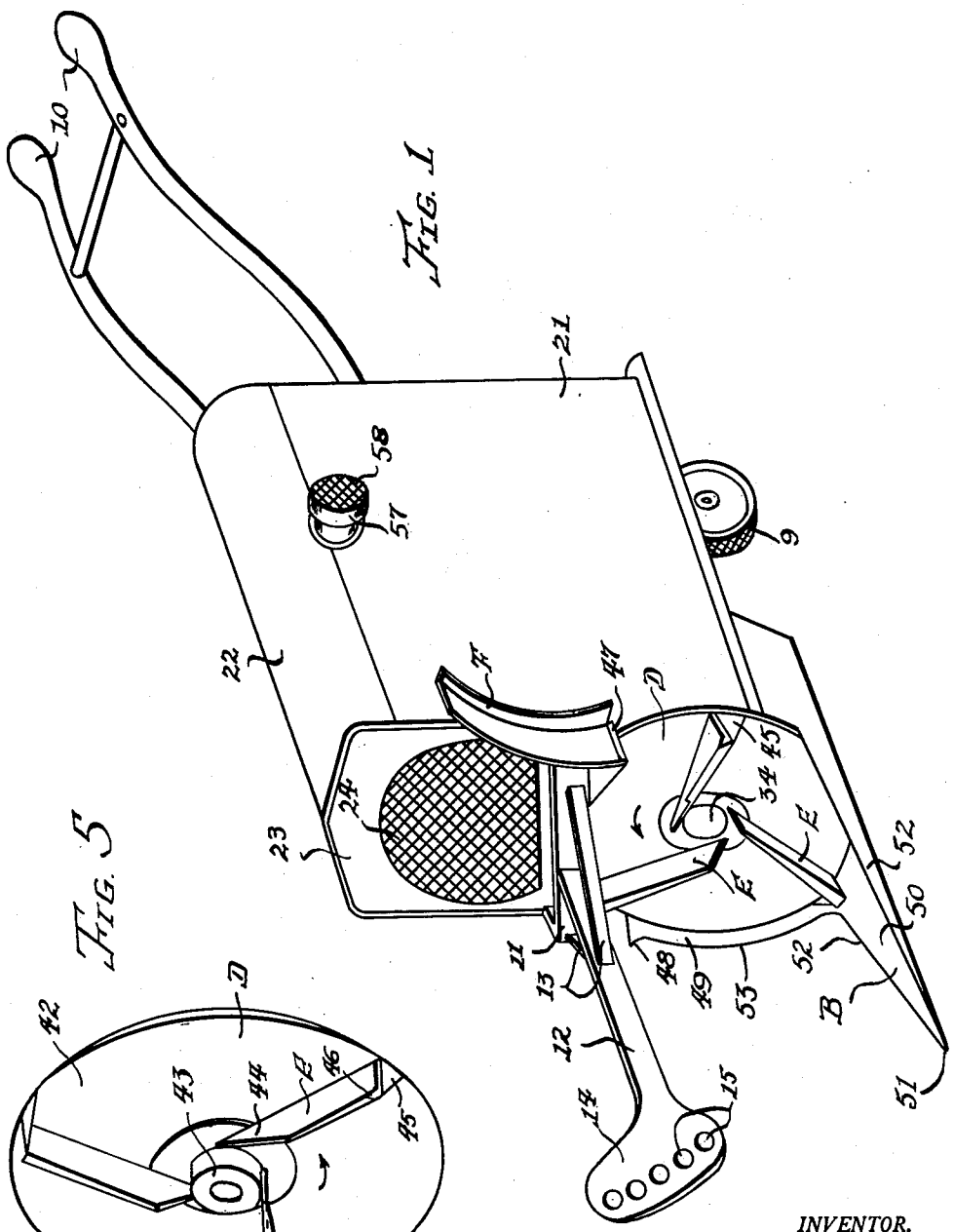


FIG. 5

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DRAIN DIGGER AND CLEANER

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FIG 3

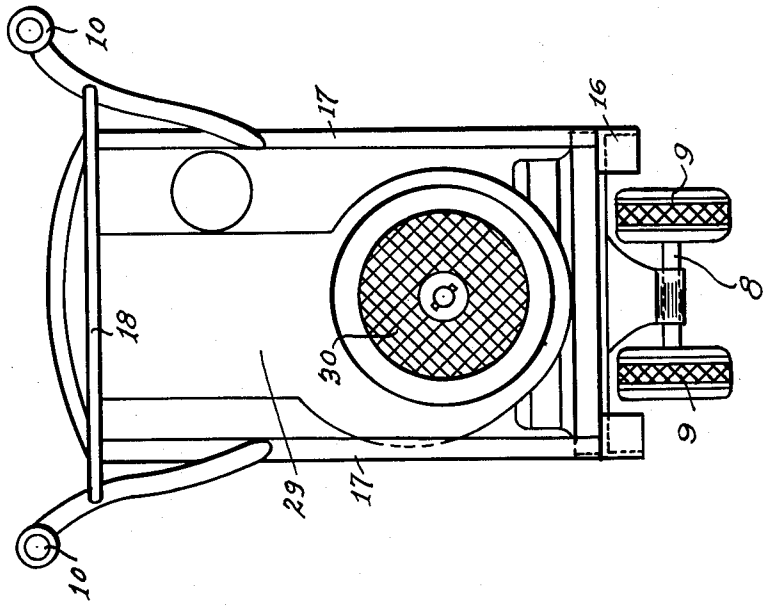
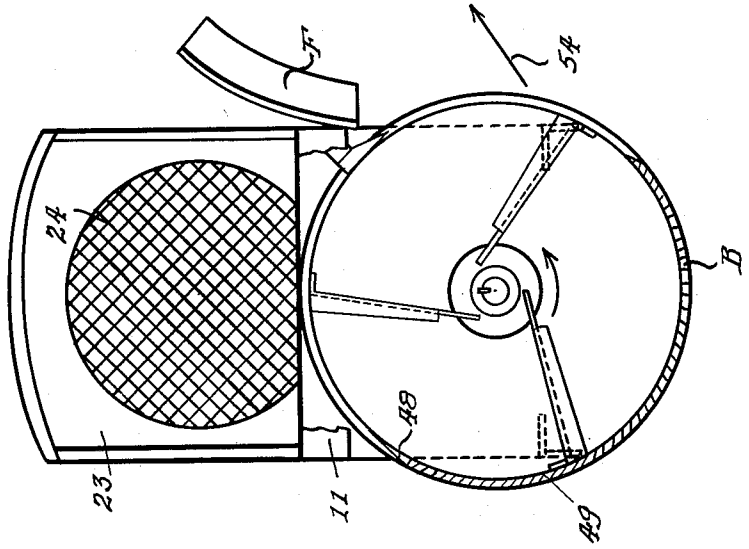


FIG 2



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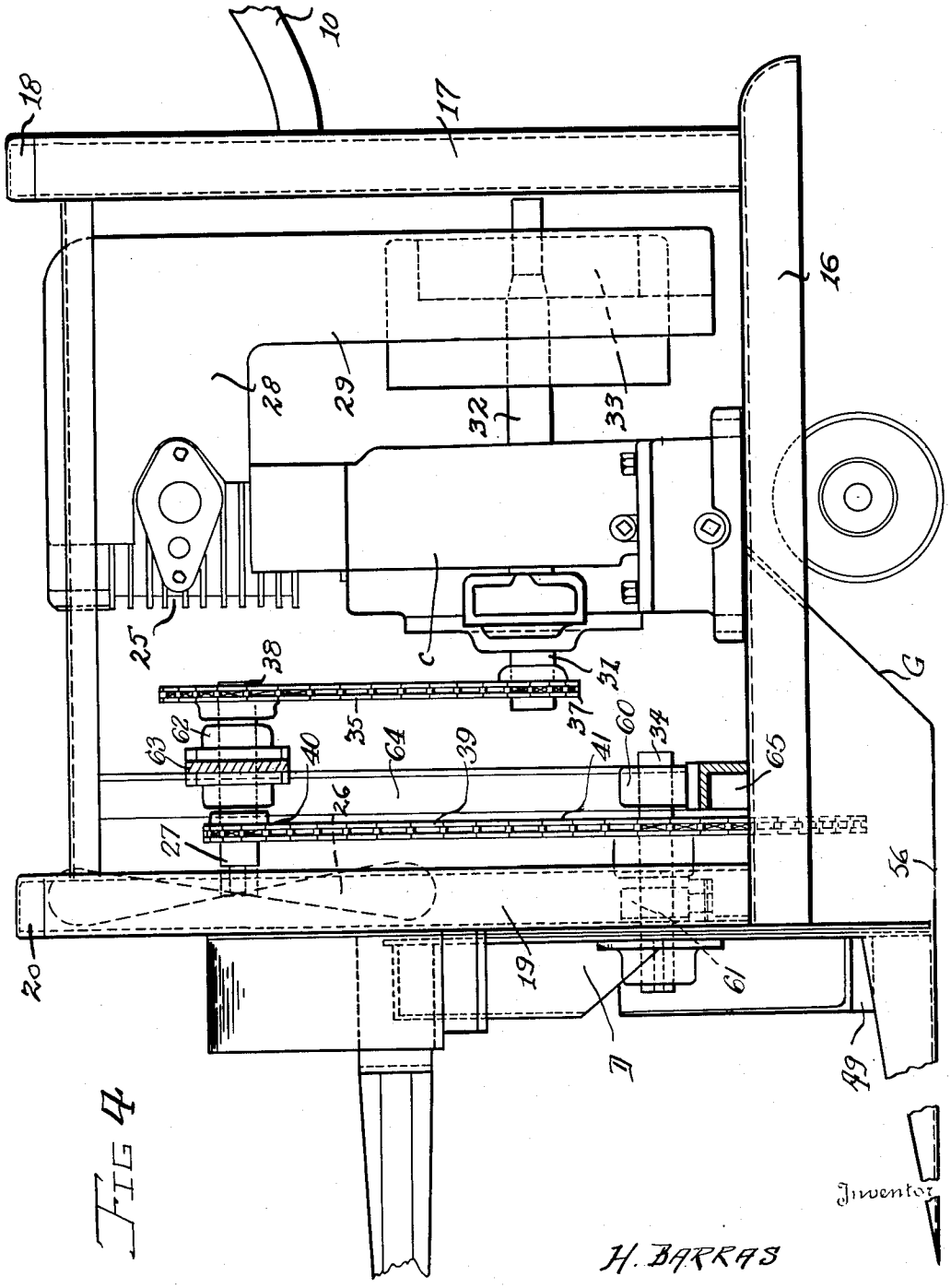


FIG 4

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DRAIN DIGGER AND CLEANER

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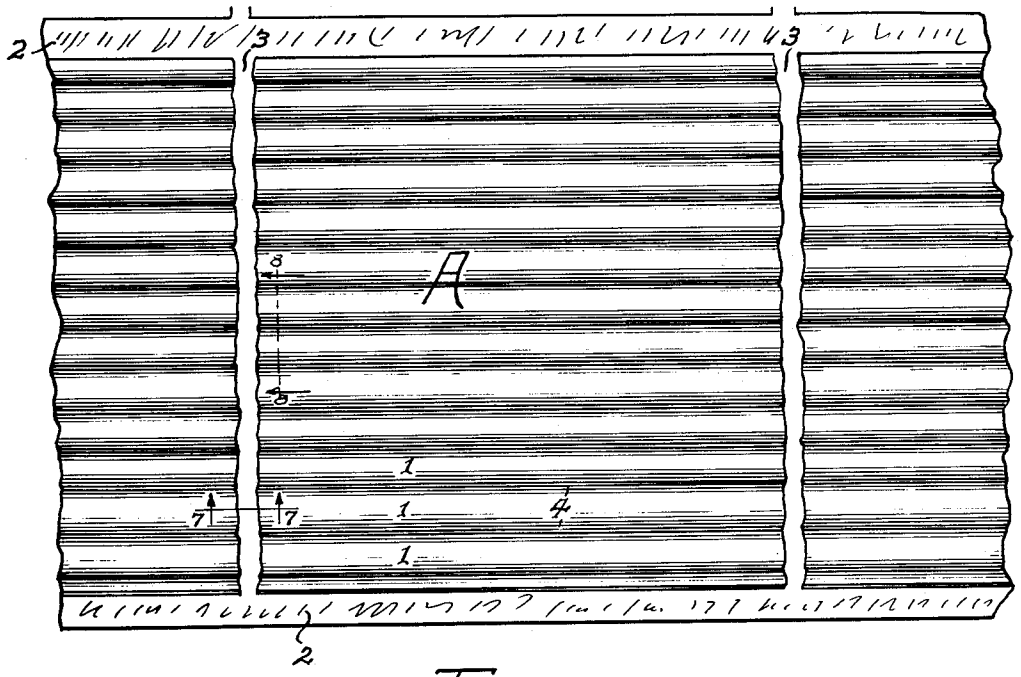


FIG 6

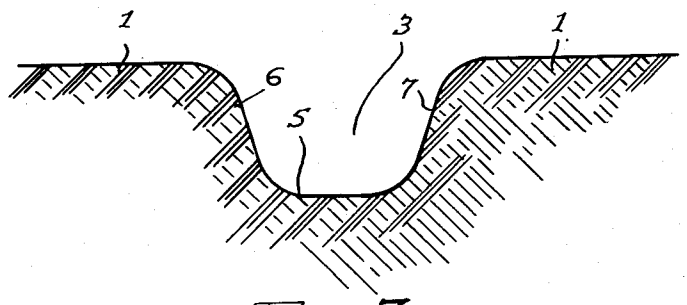


FIG 7

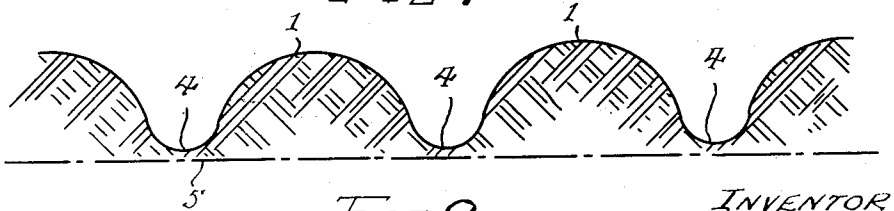


FIG 8

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Patented Oct. 28, 1952 2,615,263

UNITED STATES PATENT OFFICE

2,615,263

DRAIN DIGGER AND CLEANER

Herbert Barras, Baldwin, La.

Application May 14, 1946, Serial No. 669,656

4 Claims. (Cl. 37—92)

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The present invention pertains to a drain cleaner and has as its primary object the provision of a labor saving device so simple and efficient in operation that the farmer not only can but will use the device.

The objects, advantages and improvements of the cleaner both in its construction and use will appear in and be understood from the following description when read in the light of the accompanying drawing.

Although not limited to this specific use the cleaner is primarily designed for use in the sugar cane industry to clean the cross drains in a cane field. These drains ordinarily are from 16 to 18 inches in width and where they cross the rows of planted cane the ditches are of substantially the same depth as their width. The cleaner must accordingly be compact enough to operate in this limited space and must be power operated as the space is not sufficiently wide to make it possible to couple a sufficient number of horses or mules to the cleaner to obtain from them the power to drive the cleaner. The cleaner is accordingly power driven with the exception of the movement of the cleaner along the ditch and sufficient power for this can be obtained from a single animal for which there is sufficient space in the ditch between the rows of cane.

Broadly, the cleaner embodies a centrifugal discharge for the dirt and trash to be cleaned from the cross drain and the power to operate this centrifugal element is obtained from a motor. The device illustrated and hereafter to be described will operate satisfactorily with a motor having an output of 9 H. P. From such a motor unit the centrifugal element can be driven at the proper speed to discharge the foreign matter from the drain a distance sufficient to accomplish the desired and hereinafter more specifically described results.

Heretofore the conventional and usual method of cleaning and cutting cross drains after plowing and mechanical cultivation of the cane field has been to run a plow in the path of the desired cross drain. A crew of laborers with shovels followed the plow to finish cleaning the drain and to remove the excessive dirt deposited on the ground between the bottoms of the rows by the plow. The laborers in their shoveling action deposited this dirt only a few feet back from either side of the drain with the result that rain soon washed this dirt back into the drains because of the close proximity of the dirt to the sides of the drain. Furthermore the prior practice has resulted in building a hill near the edge of the drain and a depression further back in the field where rain water collected to form soft soggy spots detrimental to the crop.

The present invention eliminates the crew of laborers and permits the drain to be cleaned by

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a single operator. This is of great advantage because heretofore the crew of laborers spent substantially the entire cultivating season cleaning drains. Additionally, the present ditch cleaner overcomes the building up of high spots near the sides of the drain with the resultant soft soggy spots by spreading the trash and dirt cleaned from the drain back from the side edges thereof a distance as great as fifteen to twenty feet and spreads it in an uniform manner. This avoids the re-washing of the dirt into the drain and therefore maintenance of the drain in proper condition requires much less attention than has been the case heretofore.

In the consideration of the following description attention is directed to the fact that where the cross drain cuts through or crosses the rows of cane the bottom of the drain is 16 to 18 inches below the tops of the rows. At these points the cleaner must lift the dirt and trash from the bottom of the drain to a point sufficiently high to permit its discharge across the tops of the rows so that it can be distributed into the field far back from each side of the drain.

Referring now to the drawings which illustrate an embodiment of the inventive concept:

Fig. 1 is a perspective view of the ditch cleaner.

Fig. 2 is a front end view of the cleaner.

Fig. 3 is a rear end view of the cleaner.

Fig. 4 is a side view of the cleaner with the hood or covering removed.

Fig. 5 is a perspective view of the rotary cutter and discharge impeller.

Fig. 6 is a schematic illustration of a portion of a cane field illustrating the cross drains of a cane field having cross drains.

Fig. 7 is a sectional view on the line 7—7 of Fig. 6.

Fig. 8 is a sectional view on the line 8—8 of Fig. 6.

Referring first to Figs. 6 to 8 inclusive, A designates a cane field through which run a plurality of rows 1 in which the cane is planted and having at its opposite sides main drain ditches 2 and extending transverse the field a plurality of quarter or cross drains 3 which run at right angles to the rows. The rows are from 16 to 18 inches in height and are spaced from one another. Between the rows the field is at ground level but in the following description this space between the rows is referred to as the "bottom of the rows" and is designated at 4 in Fig. 8. In this figure the bottom of the quarter drain is indicated by a dot and dash line 5 and where this drain crosses the bottoms of the rows the ditch is about one inch below the row bottoms. At the points where the quarter drain passes through the rows proper its bottom 5 is substantially (16 to 18 inches) below the tops of the rows as is clearly apparent in

Fig. 8. The quarter drains have quite steeply upwardly inclined side walls 6 and 7 and when the cleaner or ditcher is operating in this part of the quarter drain the dirt and debris in the ditch must be lifted perpendicularly a considerable distance before it can be thrown or discharged into the field at the opposite sides of the quarter drain. Quarter drains are from 16 to 18 inches wide thus making a very restricted space within which to operate the drain cleaner.

Referring now to Figs. 1 to 5 of the drawings, the cleaner comprises a two-wheel vehicle supported upon its approximate center of gravity on a cross axle 8 provided at its opposite ends with rubber tired wheels 9 spaced apart the proper distance to fit in the narrow quarter drain. At its rear the vehicle is provided with a pair of spaced apart transversely braced tubular handle bars 10 by means of which an operator walking behind the vehicle may, due to the vehicle being pivotally supported on its center of gravity, with little exertion raise or lower the front end of the vehicle so as to raise and lower the blade B which projects beyond the front end of the cleaner.

A draw bar 12 has its inner end connected to a cross bar 11 disposed forwardly of the front end of the cleaner. The draw bar 12 is suitably braced as at 13 and provided at its outer end with a head 14 having therein a series of spaced apart vertically aligned single tree coupling holes 15. These holes make it possible to variably vertically connect the single tree of the draft service to the draw bar and in this manner partially regulate the depth of the cut of the blade B.

The machine includes a horizontal and substantially rectangular frame 16 having at its rear corners vertical uprights 17 the upper ends of which are connected by a cross bar 18. Substantially similar uprights 19 are at the front corners of the frame and have their upper ends connected by a cross piece 20. Side pieces 21 and a top 22 supported upon the vertical members of the frame and their cross pieces form the top and sides of a housing on the frame. The front of this housing is closed by a plate 23 having therein an outlet opening covered by a grid 24. The rear end of the housing is closed with the exception of grid covered intake opening 30.

An air-cooled motor C provided with cooling fins 25 is disposed within the housing and these fins are behind and in line with the gridded outlet opening 24. A rotary fan 26 mounted upon a horizontally disposed and rotatably supported shaft 27 is positioned behind the outlet opening 24.

Behind the cooling fins is the open forwardly extending upper end of an air duct 28 having a depending leg 29 provided in its rear and outer wall with a gridded intake opening 30 which faces toward the rear end of the machine. The engine is provided with a shaft having an extension 31 forward of the engine and an extension 32 back of the engine which extends through and beyond the intake opening 30 of the air duct and carries within the air duct a rotary fan 33 the purpose of which is to suck air through this opening and force it across the engine cooling fins 25. The air discharged from the air duct 28 is forced outward from the engine hood through the front opening 24 by the fan 26.

A horizontally disposed shaft 34 has its inner end rotatably supported in a shaft bearing 60 while its outer end extends through and is rotatably supported in a bearing 61 and carries, for rotation, an impeller D. Fan 26 is driven by a chain 35 which interconnects a gear 37 carried by the forward end of the engine shaft and a gear 38 carried by the rear end of the fan shaft. The fan shaft 27 is rotatably supported in a bearing 62 supported by the transversely extending bar 63 which is supported at its ends by side uprights, only one of which, 64, is illustrated in Fig. 4. These uprights extend upwardly from the ends of the cross bar 65. The shaft 34 is driven by the fan shaft 27 through the medium of a chain 39 interconnecting a gear 40 on the fan shaft and the gear 41 on the impeller shaft 34.

To provide for durability and the reduction of friction the respective shafts are supported in suitable roller or ball bearings which being common and well known need no specific description.

The specific construction of the impeller most clearly appears in Fig. 5 from which it will be seen that it comprises a circular disc or plate 42 provided axially with a hub 43 which is supported upon and secured to the shaft 34 for rotation therewith. The back of this plate is positioned on the shaft to a machine tolerance between its rear face and the front face 23 of the machine to prevent the collection between it and the machine of dirt which would cause excessive friction. On its front face the disc carries a plurality of impeller blades E which are positioned off center in respect to the axis of the disc and are of a length to terminate flush with the peripheral edge of the disc. At their inner ends the blades are tapered as at 44 while at their outer ends the blades have a trailing edge or lip 45. At their top edges the blades are bent at right angles and shaped to form knife edges 46 at the leading sides of the blades. The direction of rotation of the disc is counter-clockwise as indicated by arrows in Figs. 1, 2 and 5. The purpose of the knife edge of the blades is that of cutting up and reducing the size of any large clods or lumps of dirt which might be delivered to the impeller by the blade or scoop B. This preparation by the reduction in size of the dirt is necessary to prevent possibility of clogging the impeller and also to insure that the dirt is thrown by the impeller the desired distance back from the sides of the quarter drains.

The outer ends of the blades and their knife edges as well as their bracing trailing lips 45 are kept clean by a fixed knife 47 secured to the frame member 19, see Fig. 2, and which overhangs the disc D and the blades and by a second knife 48 carried on the upper end of the arcuate shaped blade portion 49 of the blade or plow-like scoop B.

The main portion 50 of the plow-like blade B is arcuate in cross sectional configuration with the circle on which the blade is struck being the same as that of the impeller disc D so that the disc can rotate in and above the rear end of the blade. The blade is of a triangular shape terminating at its forward end in a point 51. The point and side edges 52 of the blade are knife edges as is also the leading edge 53 of the upwardly extending arcuate blade portion 49. This blade is preferably made of steel and as the cleaner is pulled forwardly along the drain the blade will cut the dirt and trash in the drain and due to the forward movement of the machine this material will be guided by the scoop-like blade to the blades of the rotating impeller.

From the foregoing description it will be understood that in operation the drain cleaner is positioned in the drain and pulled along the same by a draft animal and that the depth of cut of

the scoop blade or plow B is primarily under the control of the operator through the handle bars 10. Dirt and trash is cut and scooped from the drain by the forwardly projecting plow B until it reaches the impeller which is being rotated by the power plant C. The blades of the impeller in addition to lifting this material will cut up any large pieces thereof and due to centrifugal force will tend to throw it from the drain. When the machine is opposite the bottoms of a pair of rows, at which point the drain is approximately only an inch deep, the material will be thrown to the right, viewing the machine from the front, at approximately the angle indicated by arrow 54 in Fig. 2. A shield F acts as a deflector to guard the operator from discharged dirt and trash. A housing G depends below the front end of the machine to protect the drive gear 41 and the chain trained thereover and the bottom 56 of this housing is in the same plane with the bottom of the scoop plow B and I have termed this bottom a "landslide." The speed of rotation and the power of the motor is such that the dirt and trash is discharged as much as 15 to 20 feet back from each side of the drain. Inasmuch as the discharge of the material from the drain is mechanically powered the machine can be easily drawn by a single draft animal, which is of material importance in view of the limited space in the drain and between the stalks of planted cane.

By reason of drawing the cooling air in through the rear of the machine and forcing the same out through the gridded opening 24 at the front of the machine not only is a proper flow of air insured over the cooling areas of the motor but dirt and dust are prevented from entering the front of the machine at which point the dirt digging and conveying operation is taking place. A breather pipe 57 has its screened outer end 58 external of the motor hood.

Due to the cutting edges of the impeller blades large clods or lumps of earth are cut and properly conditioned before the dirt reaches the discharging impeller blades with the result that there is no clogging of the machine and it will progress smoothly and efficiently along a ditch.

It is to be understood that in addition to cleaning a drain ditch the machine can be used for digging a new drain ditch and that departures can be made from the specific construction illustrated and described without departing from the spirit of the invention, and accordingly the invention is not to be limited by the drawings and description but only by the scope of the hereinafter following and appended claims.

I claim:

1. In a ditching machine adapted to be disposed in and progressed longitudinally of a narrow drain ditch or the like, a frame having an engine mounted thereon, ground engaging wheels supporting said frame, an engine driven shaft extending longitudinally of the machine and carrying on its outer end at the front of the machine a disc, a scoop-like plow extending from the bottom of said disc forwardly and terminating in a point, said plow being U-shaped in cross sectional configuration and of substantially a triangular shape with the point of the plow being the apex of the triangle, the longitudinal edges of said plow being knife edges, said disc provided with substantially radially extending blades the outer ends of which rotate across the inner end of the plow to engage and lift dirt from said plow end, said blades provided with a knife edge for cutting dirt engaged by the blades, and said blades acting to discharge the cut dirt from the ditch at one side thereof.

2. In a machine for traveling in and along and cleaning a narrow and comparatively deep ditch, an engine and a horizontally disposed shaft extending longitudinally of the ditch having rotative driving connection with the engine, a circular vertically disposed discs carried by the shaft, a plurality of impeller blades extending substantially radially across the front face of the disc but disposed eccentrically to the rotative axis of the disc, the outer longitudinal edges of said blades being bent at right angles and terminating in a knife edge, the outer vertical ends of said blades terminating at the periphery of the disc, a scoop-like plow horizontally disposed and extending forward of the disc and having its rear end terminating at the bottom peripheral edge of the disc, said plow transversely having an arc of curvature similar to the curvature of the disc, the outer ends of said impeller blade upon rotation of the disc rotating across the rear end of the plow, and a plurality of fixed knives disposed to engage and clean the outer ends of the impeller blades as the disc is rotated.

3. In a machine for traveling in and along and cleaning a narrow and comparatively deep ditch, an engine and a horizontally disposed shaft extending longitudinally of the ditch having rotative driving connection with the engine, a plow extending forwardly of said machine and adapted to engage the bottom of the ditch, said plow being of arcuate concave shape in cross sectional configuration and having a front pointed end and having outwardly divergent side edges, a vertically disposed circular disc carried by said shaft and rotatable across the rear end of said plow, impeller blades carried by the front face of said disc and extending substantially radially across the face of the disc, said blades having faces disposed at right angles to the disc and having knife edges paralleling but in spaced relationship to the face of the disc, the outer ends of said blades and their knife edges rotating across the plow but cutting and lifting dirt therein and discharging the same from a side of the ditch, and the radial arrangement of said blades being eccentric to the axis of rotation of the disc.

4. A construction as defined in claim 3 wherein, at one side of the machine the plow is provided with an upwardly extending arcuate shaped portion paralleling the peripheral edge of the disc but disposed at right angles to the face of the disc, and the forward edge of said plow portion being a knife edge adapted to engage and cut the dirt from one side of the ditch.

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