April 8, 1930. J. M. POWELL 1,753,804

SHALE PLANER

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Fig. 1.

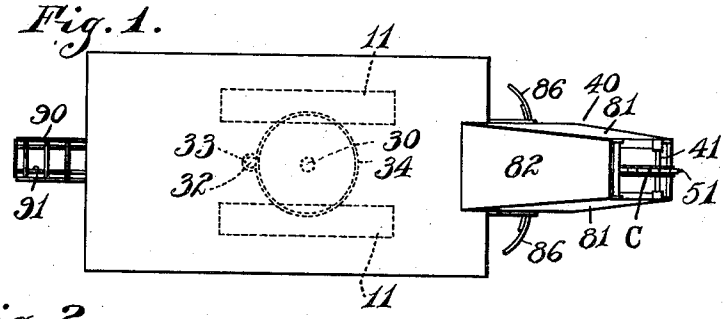


Fig. 2.

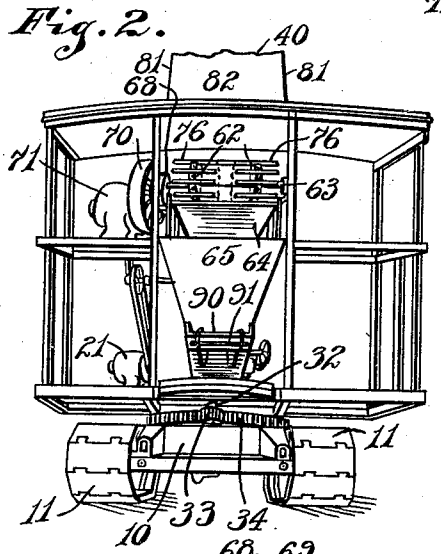
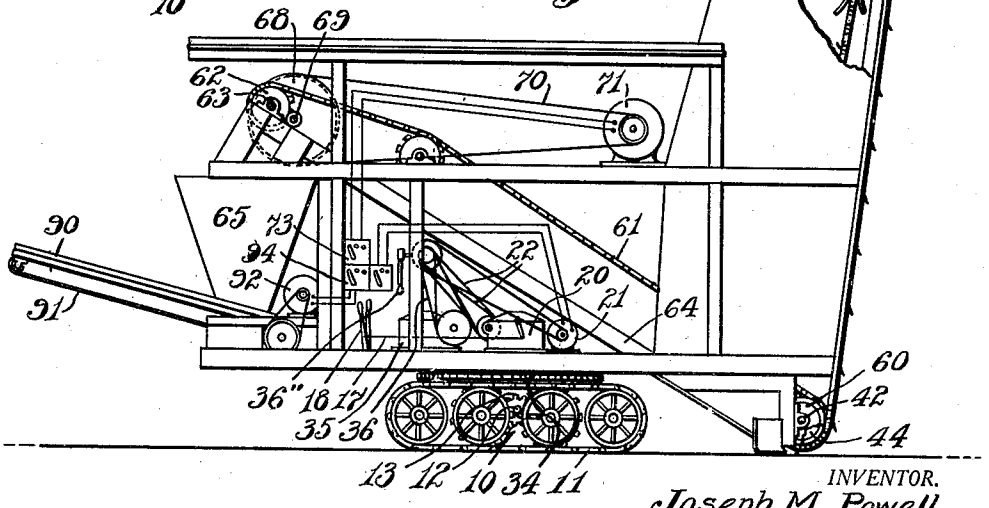
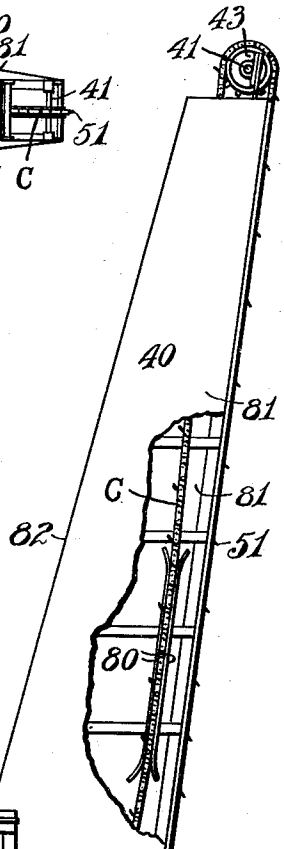


Fig. 3.





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Fig. 4.

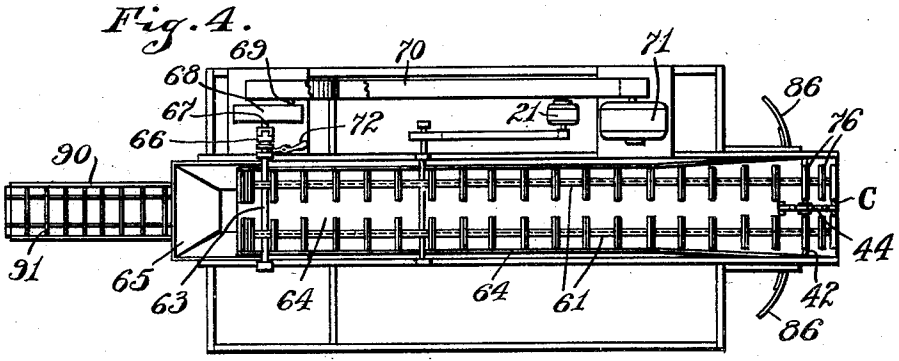


Fig. 5.

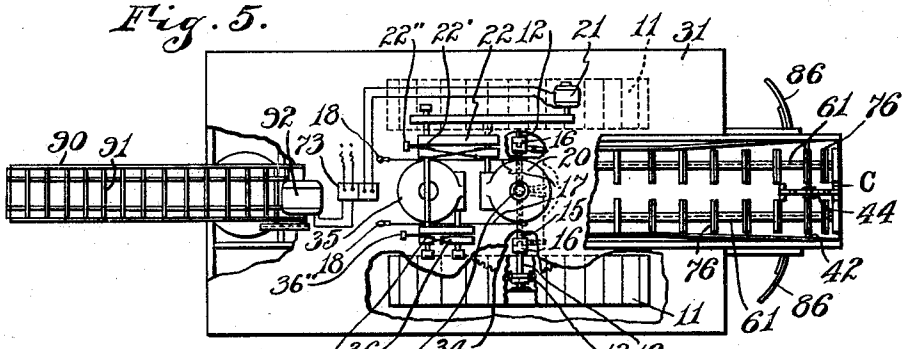


Fig. 6.

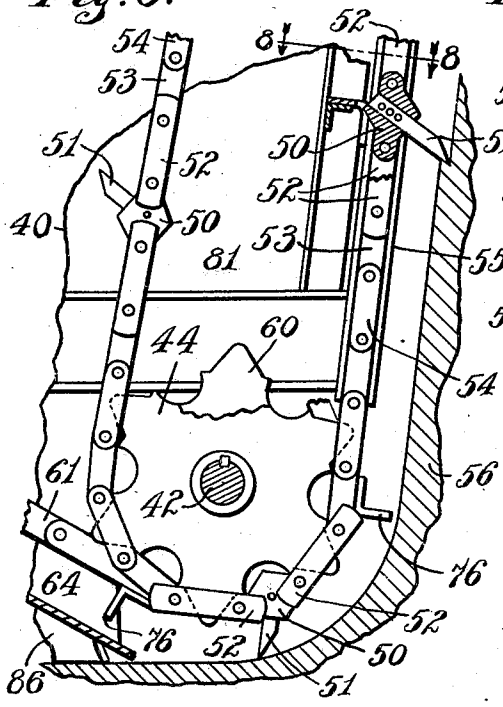


Fig. 7.

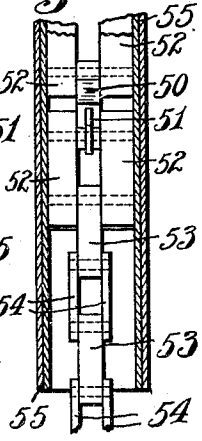


Fig. 8.

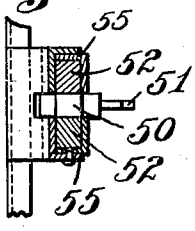
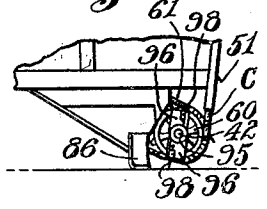


Fig. 12.



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Fig. 9.

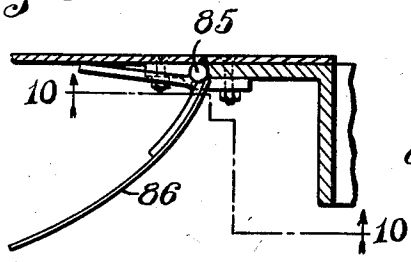


Fig. 10.

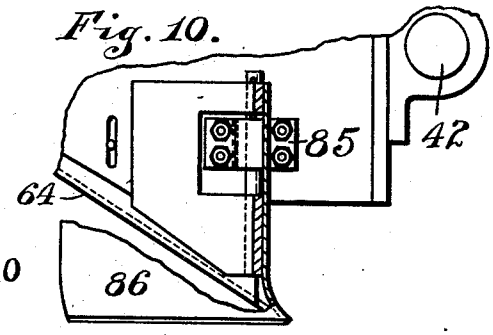


Fig. 11.

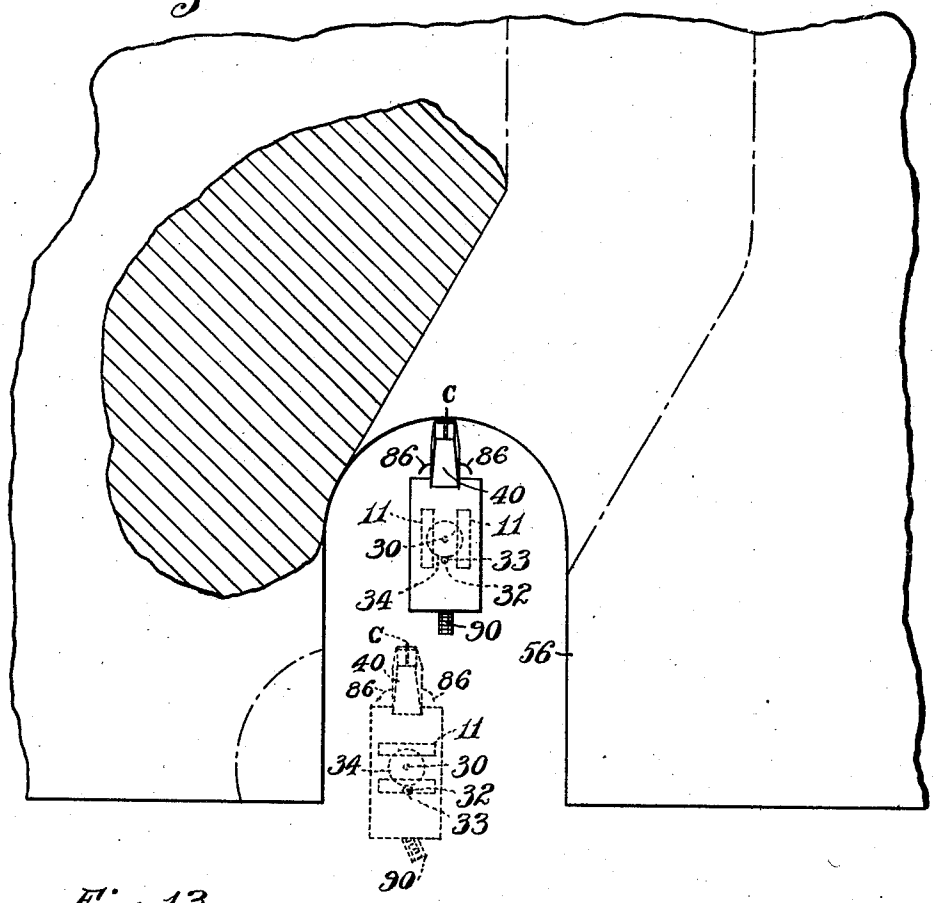


Fig. 13.

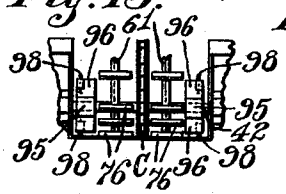
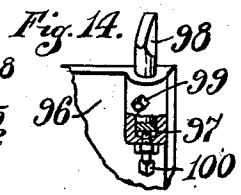


Fig. 14.



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UNITED STATES PATENT OFFICE

JOSEPH M. POWELL, OF BROOKLYN, INDIANA

SHALE PLANER

Application filed December 3, 1928. Serial No. 323,337.

Many banks of shale are of considerable thickness and area and many contain pillars of other material or unworkable quality.

The object of my present invention is to provide a readily controllable shale or clay planer by means of which the workable portions of deposit may be simultaneously removed, as small pieces, from a considerable vertical dimension of the deposit, the apparatus being of such character that it may be readily shifted to any desired position horizontally so that undesirable pillars in the deposit may be left untouched and without interfering with removal of desirable portions.

The accompanying drawings illustrate an embodiment of my invention.

Fig. 1 is a plan; Fig. 2 an elevation of the delivery end; Fig. 3 a side elevation in partial vertical section and on a scale slightly larger than the scale of Fig. 1; Fig. 4 a plan of the upper level of the apparatus; Fig. 5 a plan of the lower level of the apparatus with a part of the floor broken away; Fig. 6 an enlarged vertical sectional detail of one of the cutting elements and adjacent parts; Fig. 7 a fragmentary vertical section of parts shown in Fig. 6 and in a plane at right angles thereto; Fig. 8 a section on line 8—8 of Fig. 6; Fig. 9 a fragmentary detail of one of the scraper shoes; Fig. 10 a section on the line 10, 10 of Fig. 9, Fig. 11 a field diagram showing the flexibility of use and Figs. 12, 13 and 14 details of a slight modification.

In the drawings 10 indicates a tractor chassis comprising supporting track sections 11, 11. Each track section is driven from an independent shaft 12 by common and well known gearing 13, which is merely diagrammatically indicated, and at each shaft 12 may be clutched to a drive shaft 15 by a clutch 16 controlled through a linkage 17, by a lever 18.

Shaft 15 is driven, in either direction through a slow-speed reduction gearing 20, of well known type which is driven in either direction by a motor 21 through a reversing driving train 22 which, in the drawings is indicated as of the shiftable belt type, the arrangement being, as is well known, of such form that the track sections may be either simultaneously or independently driven in either direction. The reduction gearing is such (conveniently of the worm type) that, in the operation of the device, movement of a track can only be accomplished by application of force from motor 21 through the reduction gearing and not by application of force to the tracks due to the resistance acting upon the shale cutting elements, so that the machine is stable under its work load.

Journalled upon the chassis on a central vertical axis is a turn table structure 31 which carries the reduction gear 20 and a vertical shaft 32 carrying a pinion 33 (Fig. 2) which meshes with a large gear 34 fixed on the chassis and coaxial with the delivery shaft 30 of the reduction gearing 20.

Shaft 32 is the delivery element of a speed reduction gearing 35, similar to gearing 20 and mounted on the turn table. Gearing 35 may be driven in either direction by a reversing train 36, indicated in Fig. 5 as of the shift-belt type, said reversing train being also driven by motor 21.

Trains 22 and 36 are controlled by clutches 22′ and 36′, respectively shiftable by levers 22″ and 36″ in a well known manner, the arrangement being such that the turn table may be swung in either direction through any desired angle.

Erected at one side of the turn table is a tower 40 conveniently twenty or more feet in height. At the upper and lower ends of the tower 40 are shafts 41 and 42 carrying sprocket wheels 43 and 44, respectively, which carry a cutter-carrying chain C.

Chain C is composed of a series of cutter units and connecting link sections. Each cutter unit consists of a central link 50, carrying a removable bit 51, and four heavy guide links 52, 52, 52, 52 pivoted to the bit link and projecting, as two pairs, from opposite ends of the bit link. The intermediate chain sections comprise sprocket engaging links 53 and connecting spacer link pairs 54, the spacer links having the same length as the guide links 52 so that the bit links are sprocket-engaging elements of the chain. The guide links are made wider than the spacer links and ride in channel guides 55,

55, extending substantially the entire distance between sprocket wheels 43 and 44. By reason of the sliding engagement of the guide-links 52 with the channel guides 55 each bit link is firmly supported to resist canting of the bit link as its bit engages the material of the bank 56 (Fig. 6).

Secured to shaft 42, upon opposite sides of sprocket wheel 44, are two sprocket wheels 60, 60 upon which are mounted sprocket chains 61, 61 also mounted upon sprocket wheels 62, 62 carried by a shaft 63 journalled at the upper end of an inclined chute 64 carried by the turn table and extending from the lower end of the tower near shaft 42 to a hopper 65 also carried by the turn table. Shaft 63 is driven, through a clutch 66 from a shaft 67 driven, through reduction gearing 68 from a shaft 69 driven, conveniently by a belt 70 from a motor 71 mounted on the turn table. Clutch 66 may be manipulated by a lever 72 and motor 71 may be controlled by a controller 73.

Each chain 61 carries a series of scraper blades 76 the adjacent ends of which are spaced apart just enough to clear chain C, and these scraper blades, in the lower runs of chains 61, traverse chute 64.

The idle, or upwardly moving, run of chain C is carried through guides 80 (Fig. 3) to prevent sagging of this idle run against the active run, and the tower is boxed in, as indicated in Figs. 1 and 3, by the side walls 81, 81 and rear wall 82, thus confining the flying cut material and causing it to fall within the range of the scraper blades 76.

Arranged at each end of shaft 42 and supported on the turn table by a hinge 85 (Fig. 9) is a gathering wing 86 which serves, as the turn table is turned to scrape adjacent cuttings into the range of the scraper blades 76. The axis of each hinge 85 is substantially horizontal and at right angles to shaft 42 so that the trailing wing may swing up over débris from which the scraper blades 76 are being carried by turn-table movement but will drop down when, upon reversal of the turn-table, the wing becomes the leading wing.

Projecting from the bottom of hopper 65 is a pivoted delivery chute 90 so arranged that a truck or car may be arranged beneath its outer end and this chute is traversed by the upper run of an endless conveyor 91 driven by a motor 92 controlled by a controller 94.

The several controllers and shifting levers are conveniently grouped around a central point on the turn table where an operator may stand and readily control the various mechanisms to transport the device to any desired point; to move the cutter C toward the vertical face of a deposit to be worked; to swing the turn-table to cause the cutter C to traverse the face of the deposit, or if the tower is swung to a position at right angles to that shown in Fig. 3, to cause the cutter C to traverse a face of the deposit by actuating the chassis-tracks, all as will be readily understood from the preceding description. It will be noticed that a deposit may be attacked with the chassis tracks either at right angles to or parallel with the face of the deposit. With the chassis tracks at right angles to the deposit the turn table will be oscillated through an angle of 180 degrees or less and the chassis gradually advanced. With the chassis tracks parallel with the face of the deposit the turn table may be either held stationary or may be swung through a desired arc while the entire apparatus is advanced by driving the chassis tracks.

By reason of its great flexibility the structure may be manipulated so as to easily work around undesirable portions in a deposit and leave them stand even where they exist at irregular intervals, thus avoiding the necessity, which has heretofore existed of removing large masses of unusable material before desired material could be reached.

In order to assist in delivering the cut material to the scrapers 76 the construction shown in Figs. 12, 13 and 14 may be used. In this arrangement I mount on shaft 42, outside of sprockets 60, two hubs 95, 95, each of which carries a pair of oppositely inclined blades 96, 96, somewhat like propeller blades set angularly so as to scrape the cut material towards the adjacent scrapers. Each blade at its outer carrier is provided with a radial pocket 97 in which a cutter tooth 98 is mounted, said tooth being held in place by a set screw 99 and an adjustable abutment screw 100. The tooth 98 serves to scarify and loosen the floor, over which the work is proceeding, and the blades 96 scrape the loose material toward the scrapers 76.

I claim as my invention:

1. A shale-bank planer comprising a chassis of the double track-laying type, a turn-table mounted on a vertical axis on said chassis, a tower carried by said turn-table, a driving shaft carried by said turn-table substantially at the ground level and in position to clear the track-laying elements of the chassis, an idler shaft carried at the upper end of the tower, an endless planer belt supported by said driving shaft and idler, guideways in the tower engaging the active run of the planer belt, an upwardly and rearwardly inclined chute carried by the turn-table with its lower end closely adjacent the planer belt drive shaft, an endless scraper element traversing said chute and engaging said drive shaft, means carried by the turn-table for applying power to said drive shaft through said scraper element, means carried by the turn-table for rotating said turn-table upon the chassis, means carried by the turn-table for controlling the application of power to the track-laying elements of the chassis, an endless conveyor carried by the turn-table and arranged

to receive the discharge from the upwardly inclined chute, means for supporting said last-mentioned conveyor to swing about a vertical axis on the turn-table, and means carried by the turn-table for controlling the application of power to said conveyer.

2. A shale-bank planer comprising a tower structure, a supporting chassis for said tower structure, a drive shaft journaled at the lower end of said tower structure and carrying three sprocket wheels, an idler sprocket journaled at the upper end of the tower, an endless planer belt comprising a plurality of aligned bit carrying links and a plurality of pairs of connecting links, said planer belt engaging the middle sprocket of the lower shaft and being supported by the idler sprocket, a pair of guides carried by the tower and receiving and guiding each two pairs of links immediately adjacent each bit-carrying link, an upwardly and rearwardly inclined conveyor chute with its lower end immediately adjacent the first-mentioned sprocket shaft, two endless scraper chambers mounted upon the two outer sprockets of the first-mentioned shaft and each carrying scraper elements closely flanking the planer belt and traversing the chute, and means for applying power to the planer belt through said scraper belts.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 24th day of November, A. D. one thousand nine hundred and twenty-eight.

JOSEPH M. POWELL.