

Nov. 18, 1930.

K. DAVIS

1,781,978

MACHINE FOR HANDLING LOOSE MATERIALS

Filed June 22, 1926

8 Sheets-Sheet 1

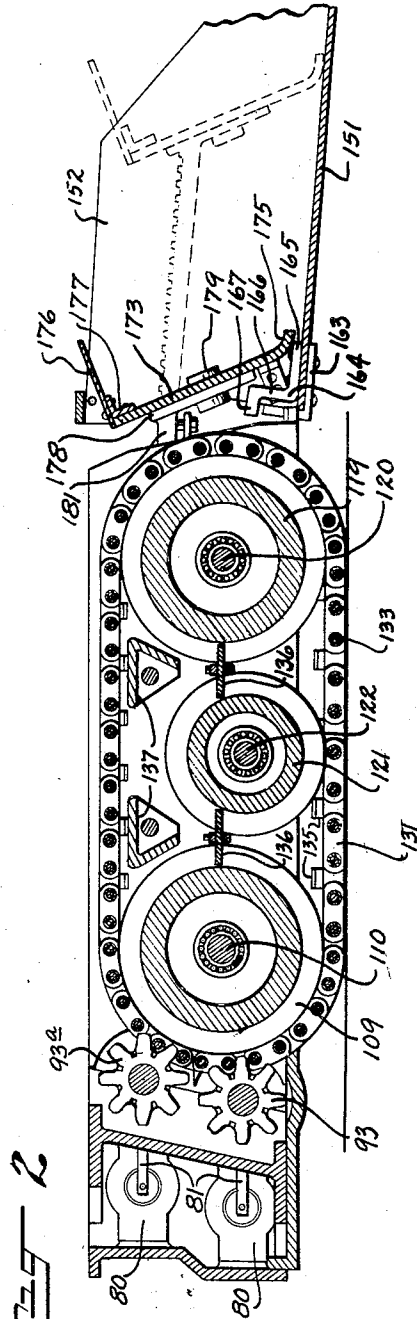
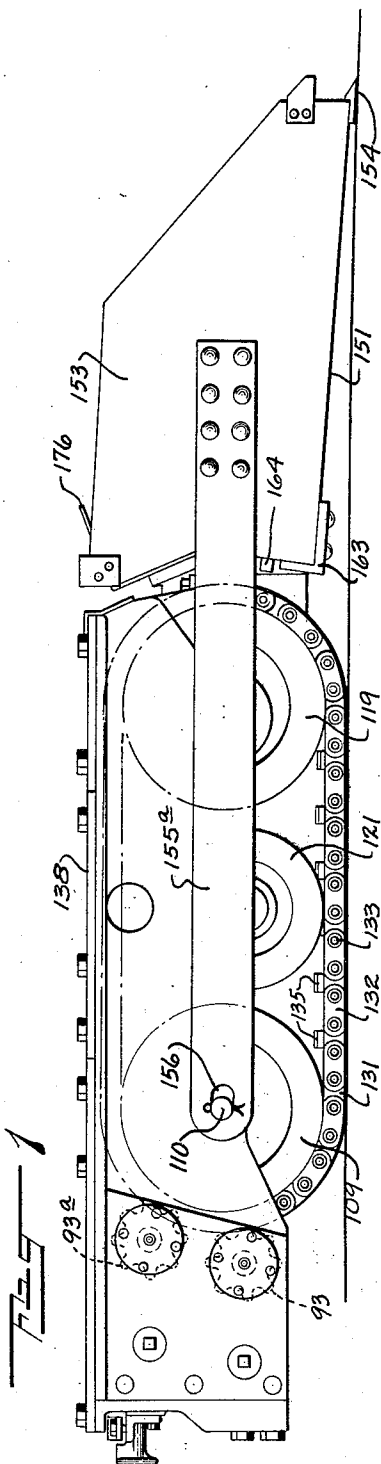


Fig. 2

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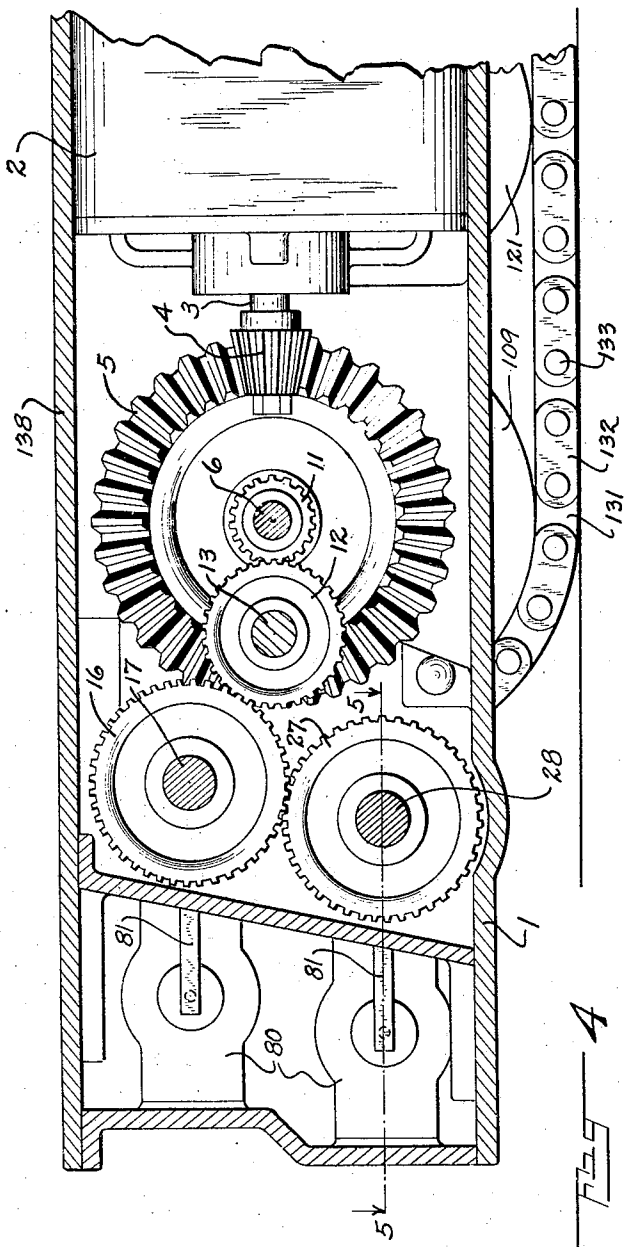
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8 Sheets-Sheet 3



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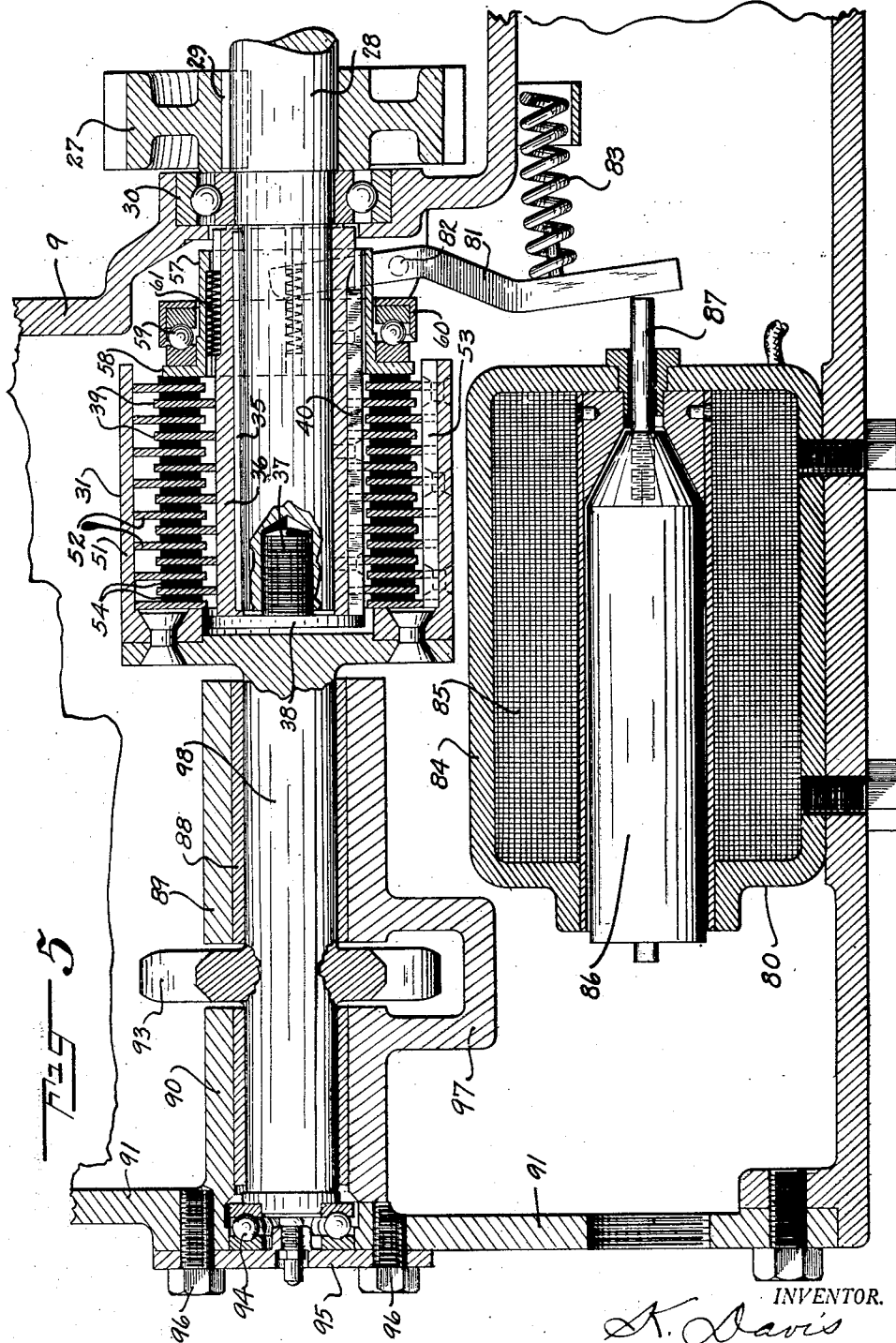
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8 Sheets-Sheet 4



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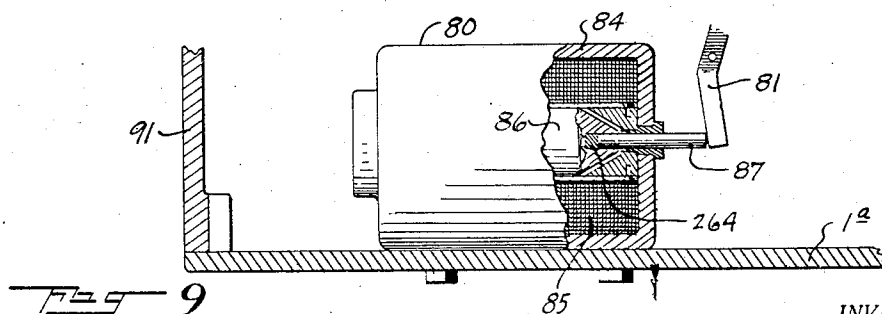
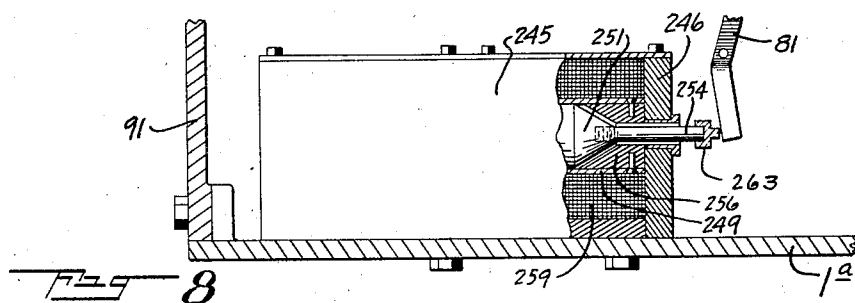
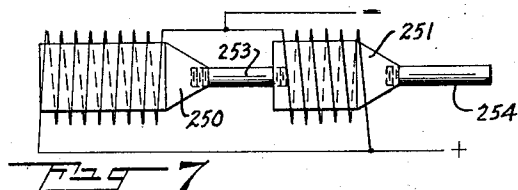
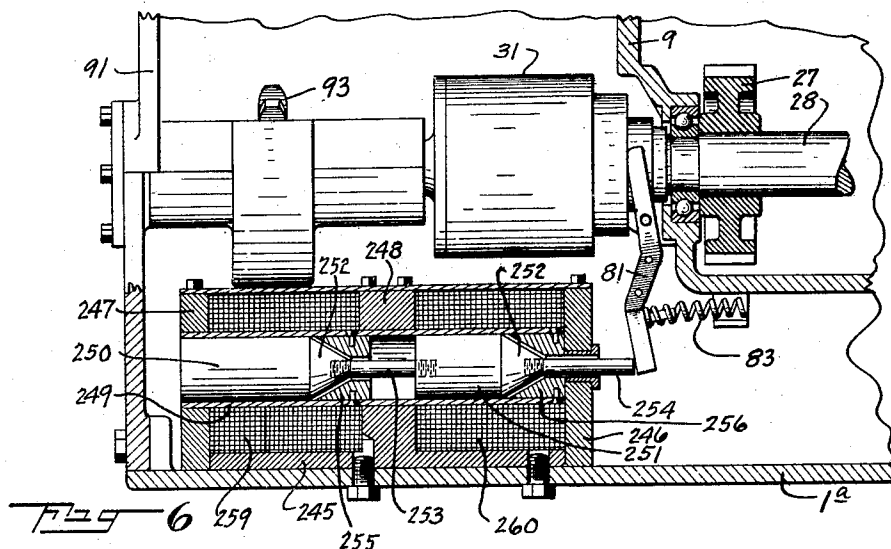
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MACHINE FOR HANDLING LOOSE MATERIALS

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8 Sheets-Sheet 5



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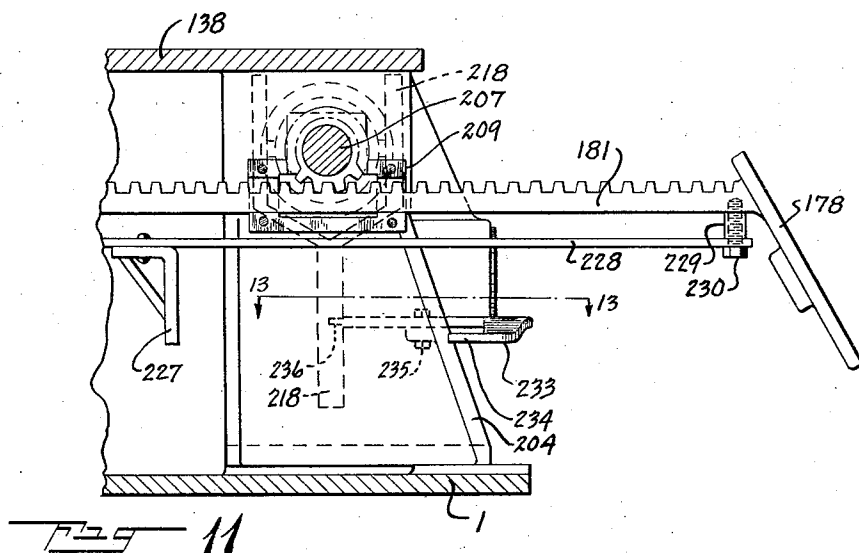
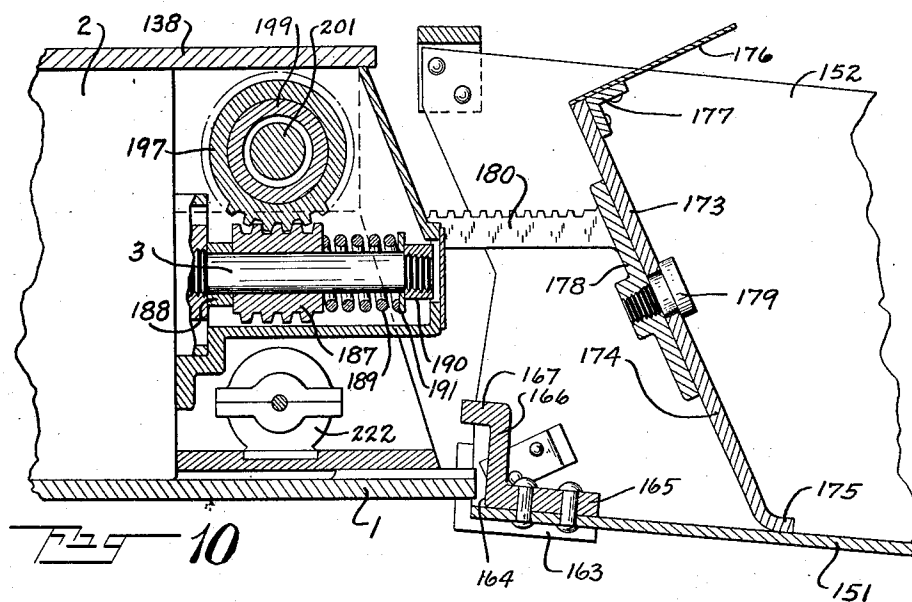
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MACHINE FOR HANDLING LOOSE MATERIALS

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8 Sheets-Sheet 6



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MACHINE FOR HANDLING LOOSE MATERIALS

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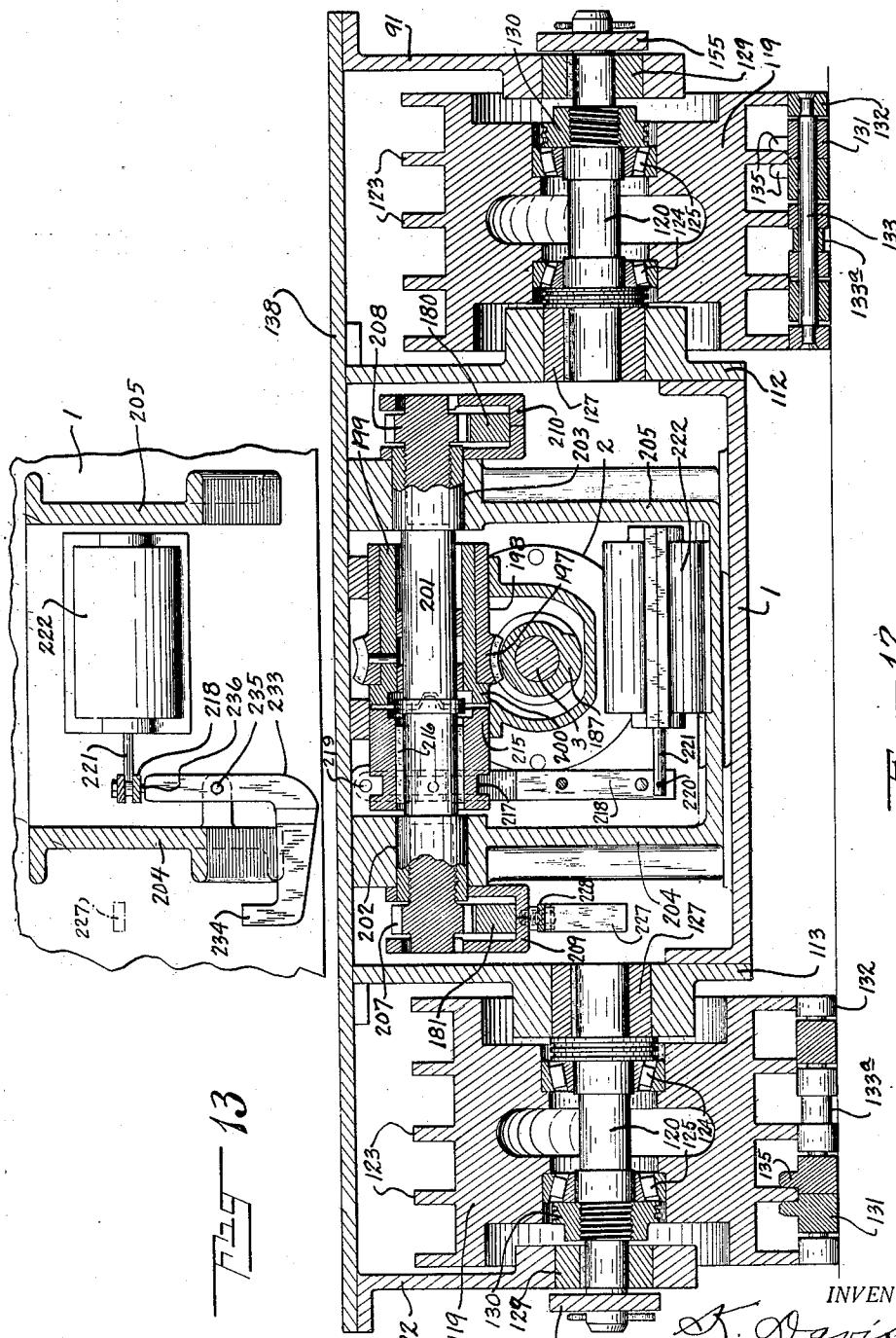


FIG-13

FIG-12

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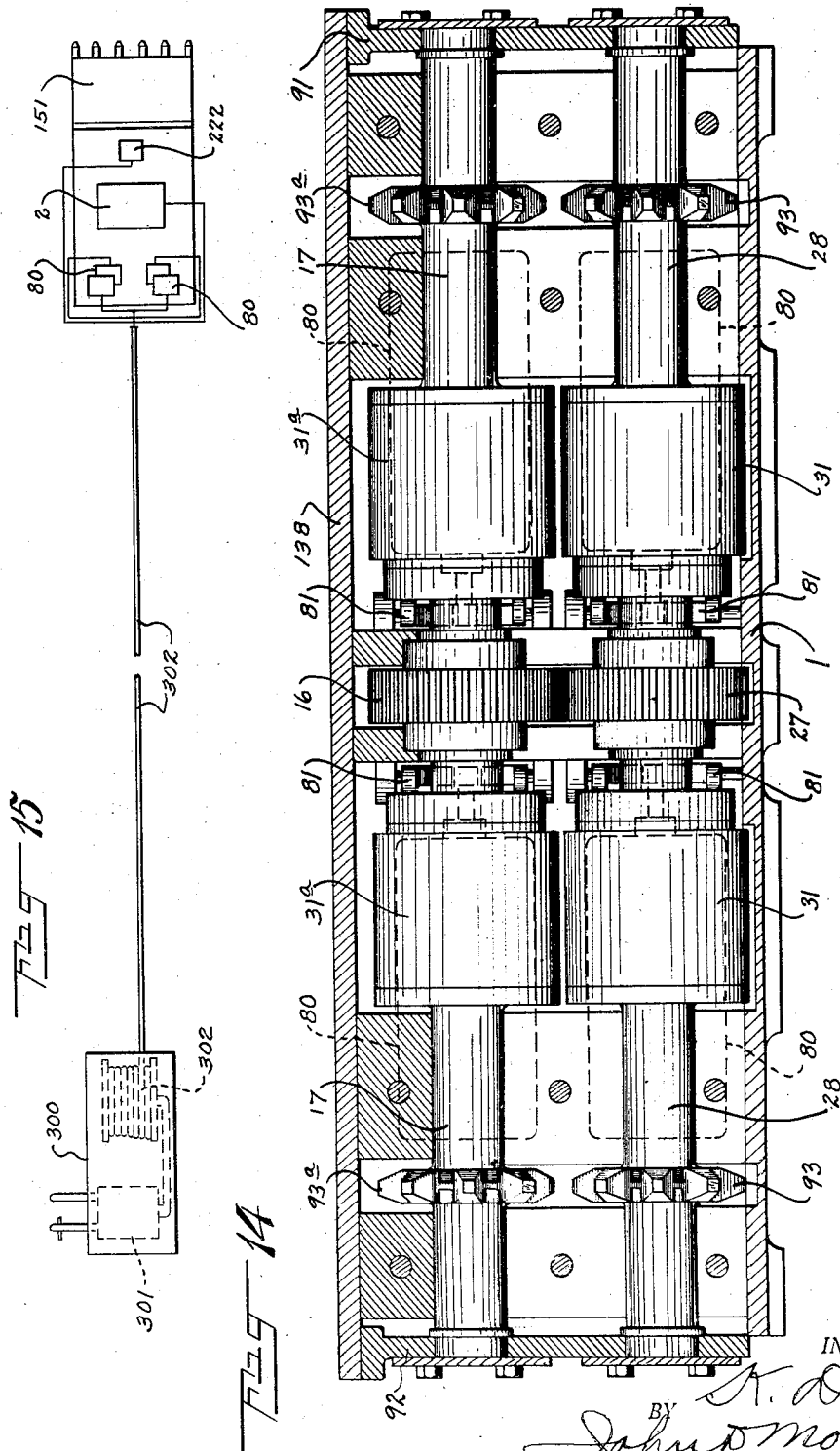
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MACHINE FOR HANDLING LOOSE MATERIALS

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UNITED STATES PATENT OFFICE

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MACHINE FOR HANDLING LOOSE MATERIALS

Application filed June 22, 1926. Serial No. 117,673.

The invention relates to automotive means for loading, transporting and discharging loose material, and more particularly to such means adapted to operate in thin-seam mines and other vertically restricted spaces; and also to operate under such, and also other diverse, conditions, by means of a distant control.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a side elevation of a machine embodying the invention;

Fig. 2 is a vertical, longitudinal section, corresponding to Fig. 1, and taken just within the external side frame plate of the machine, substantially on line 2—2 of Fig. 3;

Fig. 3 is a horizontal full sectional view taken just beneath the top cover plate, substantially on line 3—3 of Fig. 1;

Fig. 4 is an enlarged, fragmentary, vertical section, taken substantially on the line 4—4 of Fig. 3, showing the drive for the traction treads;

Fig. 5 is an enlarged, fragmentary, horizontal section taken substantially on the line 5—5 of Fig. 4.

Fig. 6 is a view corresponding to Fig. 5, but showing a different form of actuating solenoid;

Fig. 7 is a diagrammatic elevation showing the wiring of the form of solenoid shown in Fig. 6;

Fig. 8 is a detached detail elevation of the solenoid in Fig. 6 with a wear compensating device applied;

Fig. 9 is a detached detail view of the solenoid mechanism shown in Fig. 5 with a different wear compensating device applied;

Fig. 10 is an enlarged fragmentary vertical section on the line 10—10 of Fig. 3, showing the operating mechanism for the shovel discharging plate;

Fig. 11 is a fragmentary elevation showing the rack-bar and pinion for actuating the discharge plate for the shovel;

Fig. 12 is a transverse, vertical section, on an enlarged scale, taken on the line 12—12 of Fig. 3;

Fig. 13 is a fragmentary plan of the clutch releasing mechanism;

Fig. 14 is a transverse, vertical section on line 14—14 of Fig. 3;

Fig. 15 is a diagrammatic plan of the machine and electrical control and intervening connections.

The invention of this application is in certain of its aspects an improvement on my Patents No. 1,562,872, dated November 24, 1925, and No. 1,567,320, dated December 29, 1925; while with respect to other features the present application represents an independent invention.

The invention is directed primarily to the production of an automotive, and preferably distantly controlled, material loading, conveying and discharging machine, which is compact and sturdy, and especially is very low in structure, readily mobile and dirigible, and is adapted by its own motive power and its dirigible means, through the distant control, to take up a large mass of loose material, weighing many hundreds of pounds, to separate it from the pile, and without tracks or external guiding means, convey it to a place of discharge, and there to eject it, usually to some other means of conveyance. In thin seam mining, one of the most valuable applications of the invention is in taking up large masses or quantities of shot-down coal at the room face, conveying such masses, under the guidance of a distant control to the route of a skip conveyor, or other conveyor, and there automatically discharging the conveyed coal to such conveyor.

In the improvement aspects of the present

invention, it represents very largely a great simplification, compacting and at the same time strengthening, of the mechanism, as well as effecting other advantages, as will be in part set out hereinafter, and in part will be clear to those skilled in the art.

The invention comprises in its main features, as embodied, a frame on which a single motor (usually a D. C. motor) is mounted, with an endless traction tread disposed longitudinally at either side thereof, and with a large shovel close to the floor, and extending forwardly from the front of the machine and preferably entirely across the front, including the traction treads. The shovel may be practically in fixed position relative to the machine, and a discharge plate is mounted within the shovel to push the coal or other material out at the place of discharge. There is an exceedingly simple and compact drive, with reversing means, independently from the motor to each of the traction treads, and from the motor to the reciprocable discharge plate of the shovel. These drives and reversing means are preferably controlled by solenoids, so that the machine may be guided and operated by an operator at a distant station through control mechanism and an electric cable.

The foregoing general description, and the following detailed description as well, are explanatory and exemplary of the invention but are not restrictive thereof.

Referring now in detail to the embodiment of the invention, illustrated by way of example in the accompanying drawings, the machine is provided with a bed plate 1, upon which the motor and the drives therefrom for the traction treads and the shovel discharging plate are mounted. The motor 2, which drives both traction treads in either direction, and also operates the shovel discharging plate is mounted on the bed plate 1.

The reversible and independently operable drive for the traction treads, as embodied, comprise a bevel pinion 4 fixed on the rear end of the motor spindle 3, which pinion meshes with a bevel gear 5, fixed on a shaft 6, journaled at 7 and 8 in vertically-disposed, side-by-side frame members 9 and 10 mounted on the bed plate 1.

Fixed also on the shaft 6 (Fig. 4) is a pinion 11, which meshes with an intermediate gear 12, fixed on a stub shaft 13, which shaft is supported in the frame member 10. The idle gear 12 meshes with a gear 16, fixed on a shaft 17, journaled at 18 and 19 in a rearward extension of the vertically-disposed frame plates 9 and 10. The shaft 17 has solenoid-controlled clutch connections to both endless traction treads, at either side of the machine, to drive these treads in a given direction, either forwardly or backwardly. The clutches could be worked by hand, if desired.

For the purpose of driving the endless treads in the opposite direction, as embodied, a gear wheel 27 is in mesh with the gear wheel 16 (thereby rotating in the opposite direction), and gear 27 is fixed on a shaft 28, likewise journaled in the rearward extension of the vertically-disposed frame plates 9 and 10. This shaft 28 likewise has solenoid-controlled clutch connections with driving means for both of the endless traction treads at either side of the machine.

There is thus provided connections from the motor whereby the endless traction treads may be driven either together or separately, and also independently of each other, in either direction, thereby providing means for driving the machine either forwardly or backwardly, or in a straight or irregular paths, and enabling it to wheel or turn about an internal center or axis.

Referring now to the drive from each of the gears 16 and 27, respectively, to both endless traction treads, a detail description of one of these will be sufficient for all (see Figs. 2, 3, 4, 5 and 14). Taking for example gear wheel 27, it is fixed on shaft 28 by key 29. Shaft 28 has preferably a ball-bearing journal 30 in the rearward extension of the side frame member 9, the shaft extending outwardly therefrom (as best shown in Figs. 3 and 5). At this outward extension of the shaft 28, is a multiple-disc clutch mechanism 31, and a solenoid control therefor. Keyed on this external extension of shaft 28, by a key 35, is a sleeve 36, having a flange at its outer end abutting on the outer end of the shaft 28, a screw 37 with a flat circular plate head 38 fastening the sleeve longitudinally in position. A plurality of clutch plates 39 encircle the sleeve 36 and are rotated therewith by a spline connection 40, there being a plurality of these splines if desired.

A cylindrical housing 51, fixed on sprocket shaft 98, surrounds the mechanism just described, and this housing encloses a cooperating series of clutch plates 52, which have one or more spline connections 53 with the housing to cause it to rotate with the clutch plates. A plurality of friction rings 54 are interposed between the clutch plates in a well-known manner. A flanged sleeve 57 loosely encircles the sleeve 36, and a ball-bearing 59 is interposed between the outer face of the flange portion 58 of sleeve 57 and a longitudinally-slidable, crown-flanged, circular plate 60, loosely encircling the exterior of the sleeve 57. Springs 61 are preferably employed to impel the sleeve 57 to the right in Fig. 5, that is, the non-driving position of the clutch. These springs are in compression and lie in clearances in sleeve 36 and sleeve 57, the inner ends abutting on a shoulder on sleeve 36 and the outer ends thereof on a shoulder on sleeve 57.

The solenoid control for the foregoing

clutch mechanism comprises a yoked lever 81, pivoted on a support at 82, the forked end thereof bearing against the external circular face of the member 60. A compression coil spring 83 impels the lever 81 to the non-clutching position. The solenoid-actuating means may be of any desired or suitable kind, so far as concerns the main features of the invention. In Fig. 5 a solenoid 80 of usual type is shown, having a casing 84, a winding 85, a core 86, and an actuating rod 87, connected to the core and adapted to engage the lever 81 and to throw the clutch mechanism into driving position, the spring 83, as already stated, disconnecting the clutch when the solenoid 84 is not energized, and restoring the solenoid plunger.

The driving connections from the clutch to the corresponding endless traction tread, as embodied, comprises a shaft 98, fixed to or integral with the housing 51, and journaled in a friction sleeve or sleeves 88, mounted in a long bearing 89 and 90, integral with or supported by the bed plate 1. There are vertically-disposed, longitudinally-extending side frames 91 and 92, respectively, at either side of the machine. Fixed on shaft 98 is a sprocket wheel 93, which engages with the traction tread to drive it. At the external end of the shaft 98 a ball thrust bearing 94 is provided in the respective side plate 91 or 92, having an external cap plate 95 fastened to the vertical frame member by bolts 96. The sprocket has preferably a partial housing 97.

As already explained, for the purpose of reversely driving one traction tread, there are on one side of the machine, two clutch mechanisms 31 and 31^a, driven respectively from pinions 16 and 27 through the corresponding shaft 28. There are likewise, at the opposite side of the machine, two corresponding clutch mechanisms 31 and 31^a, similarly driven, for reversely driving the other traction tread. Each of these clutch mechanisms drives its own sprocket-driving pinion 93 or 93^a, which meshes with a particular endless traction tread. Thereby, by throwing in either clutch 31 or 31^a, at one side of the machine, driving sprocket 93 or 93^a will drive the particular traction tread either forwardly or backwardly as desired.

By simultaneously and selectively throwing in either of the clutch mechanisms 31 or 31^a, at either side of the driving gears 16 and 27, it will be obvious that the machine may be advanced in a straight line either forwardly or backwardly, or one traction tread can be driven either forwardly or backwardly while the other is at rest, or one traction tread can be driven forwardly while the other traction tread is driven backwardly. This it will be seen provides, through the solenoids, an entirely flexible and mobile distant control for the operation of the machine in taking

a load of coal or other material at one point, transporting it to another point and discharging it there.

Referring now to the embodied form of the endless traction tread mechanism, each tread runs over a rear supporting and guiding wheel 109, mounted loosely on an axle or shaft 110, which shaft is mounted at its external end either in the vertical side plate 91 or 92. The inner ends of the respective axles 110 are mounted in the inner vertically-extending and longitudinally-disposed corresponding frame plate 112 or 113, which are fixed to and extend upwardly from the bed plate 1 at either side. The forward supporting and guiding wheels 119, at either side of the machine, are likewise loosely journaled on corresponding shafts 120, supported on one side by the side plates 91, 112 and on the other side by the side plates 92 and 113. A pair of wheels 121 is provided at either side for the respective traction treads, located immediately of the wheels 109 and 119, primarily for the purpose of holding the bottom reach of the traction tread firmly to the ground. These wheels are loosely mounted respectively on shafts 122, supported in the respective side frames, similarly to the wheels already described.

The preferred specific structure of the endless traction treads and their supporting wheels is shown in Figs. 1, 2, 3 and 12. The wheels are preferably very broad with a plurality of spaced-apart, circular, medial flanges 123. The wheels have double, conical roller bearings 124 and 125 on their shafts 110. The shafts 120 are keyed into an eccentric bushing 127 in the inner vertical frame plate, the roller bearing being retained by a screw plate 128. On the opposite side, that is, the outer end, the shaft is journaled in a similar eccentric bushing 129 in the outer frame plate, the outer roller bearing being held in place by a screw plate 130. This provides a take-up to regulate the tension of the traction tread as may be desired.

The endless traction treads themselves consist of links flexibly joined together, having relatively flat tread members 131, and pivotally connected side members 132, pivot pins 133 extending transversely entirely through a set of the pivoted members of the tread (Fig. 12). Some of the flat tread members 131 are provided with inwardly-projecting alining members 135, which cooperate with the circular medial flanges 123 of the wheel, to keep the treads in alinement upon the wheel. If desired, cleaning plates 136 may be provided between the various wheels to strip off all mud or other obstructing matter which may gather thereon when operating in wet places or on soft bottom. Supports 137 may also be provided for the top reach of the respective treads, and constitute braces between the inner and outer side frames.

The double sprocket drive for each of the treads is best shown in Fig. 2, one sprocket being driven, through its clutch, from gear 16 and the other sprocket, through its clutch, being driven from gear 27, as already described. The teeth of the sprocket wheel engage with the bare places 133^a on the pivot pins 133, located intermediately the inner and outer traction-engaging surfaces of the treads, as best shown in Fig. 3. The gearing and drives are connected so that either sprocket for a traction tread in driving draws the tread through or from the other sprocket. That is, for example, in Fig. 2, the sprocket 93 drives in the clockwise direction, at which time the sprocket 93^a rotates idly, and the tread will move its side of the machine in a backwardly direction. The sprocket wheel 93^a in Fig. 2 drives in counter clock-wise direction, at which time the sprocket wheel 93 rotates idly, and the tread drives the machine in the forward direction. In either case, the driving sprocket draws the tread through the other sprocket and thereby avoids any tendency there might be of jamming the tread between the sprockets, thereby impeding or preventing the progress of the machine. The sprocket wheels are beveled inwardly and outwardly from the center of the roots of the sprocket teeth toward the sides and center of the wheel, as best shown in Figs. 5 and 14, which renders the wheels self-cleaning as they drive, all mud and dirt being pressed outwardly and away from the wheel.

A flat cover plate 138 is preferably fastened on over the entire machine. Thus all the simple, compact and powerful mechanism is in a closed housing, very close to the floor, and the top hardly higher than the traction treads at either side. The material carrier, or "shovel", projects forwardly from, and extends entirely across the front of the machine, including the treads, and the entire machine moves as a unit or entirety during the pushing into the pile of material to load, the wheeling out of the pile with the load, and the discharge of the load is effected by a pusher blade within the shovel.

The material carrying device, which may conveniently be styled the shovel, comprises a bottom plate 151 and side plates 152 and 153, and the structure may be open at the rear. The shovel is nearly horizontally disposed, and just clears the ground, the front edge touching the ground. It is preferably provided at its forward end with a plurality of hardened points 154 adapted to dig into the material, and to support the shovel upon the ground. These points may be also carried upon the forward side edges of the shovel.

The shovel has no essential movement relatively to the machine so far as the actual work of loading, carrying and discharging the material is concerned, but it is deemed preferable to mount the shovel to have a

slight relative motion, whereby it can absorb sudden shocks, such as striking heavy lumps of material, can better accommodate itself to unevennesses in the ground covered, and for other purposes. Accordingly, there is fixed to the respective side plates 152 and 153 rearwardly-extending arms 155, 155^a, which arms at their rear ends are pivotally mounted on the external extensions of the shafts 110 of the rear wheels 109, by means of somewhat elongated slots 156, which permit very slight longitudinal movement of the shovel and eases the brunt of endwise shocks.

The direct thrust and also any tendency to create side twist, incident to driving the shovel into the coal or other material by the forward travel of the machine is transmitted directly from the body of the shovel to the frame of the machine, and is kept away from the arms 155 and 155^a upon which the shovel is mounted. In the embodied form of this means, angle pieces 163 are riveted to the outside, rear bottom edges of the shovel, and play freely in slots formed in the forward edge of the bed plate 1 of the frame (Figs. 1, 2 and 10). Thus any shock of the shovel is transmitted directly to the main machine frame, and is kept away from the mechanism.

Means are also provided participating in the thrust-absorbing function, and also for preventing buckling or climbing of the machine as the shovel is being driven into the pile of material in the loading operation. For this purpose Figs. 2 and 10), one of more doubly angled pieces 164 are provided, having the bottom reach 165 of each pivoted to the top surface of the inner or rear end of the shovel, and having a vertical reach 166 and an inwardly bent or angled portion 167 at the top, which overhangs the front edge of the bed plate 1 of the machine. In case the front edge of the shovel encounters too great an obstacle for ready removal, and the treads continue to drive the machine forward, the reach 166 will engage the front edge of bed 1 and transmit the shock directly thereto, and the buckling action will begin between the shovel and the machine proper due to the pivotal mounting of the shovel. The front of the machine proper will rise until the front edge of the plate 1 engages beneath the angled portions 167 of the detents, at practically the inception of the buckling action, and any further tractive effort of the treads will drive the shovel into the work. This permits a somewhat yielding action and still transmits all of the tractive force into driving the shovel forwardly and loading it.

The embodied form of unloading means for the shovel comprises a pusher plate 173, movable to and fro within the shovel, at its retracted position providing a back wall to support the load of material in the shovel, and being movable forwardly to eject the

load from the shovel. As embodied, a vertically-disposed and preferably backwardly-slanting plate 173 extends substantially entirely across the shovel but with free clearance therewithin. The bottom end 175 of this plate is preferably curved forwardly to form a bearing or riding surface on the bottom of the shovel. At the top edge of the discharge plate there is preferably an upwardly and forwardly inclined plate 176, fastened to the discharge plate by angle irons 177, this plate preventing the coal or other material from rising and climbing backwardly and falling over behind the discharge plate.

The actuating means for the discharge plate comprises a cross plate 178, extending horizontally across the central rear part of the discharge plate, and fastened thereto by suitable means such as screw bolts 179. Fixed to or integral with plate 178 are two geared rack bars 180 and 181, extending backwardly and substantially horizontally into the machine, alongside the vertically-disposed inner frame members 112 and 113, and are supported thereon by suitable guiding means.

The means for actuating these geared rack bars 180 and 181, to drive the pusher plate 173, comprise a worm 187, frictionally mounted upon the forwardly-projecting end of the armature shaft 3, so as to turn with the shaft during the usual driving effort, but capable of slipping on the shaft under any sudden or heavy strain. The frictional mounting of this worm on the shaft will, therefore, prevent any stripping of gear or other violent or destructive action in case the discharge plate meets with some heavy obstruction.

As embodied, the worm 187 has an end bearing on a collar 188, loosely encircling the armature shaft 3 between the end of the worm and a shoulder on the shaft.

At the other end of the worm 187, a relatively heavy helical spring 189 is coiled about the shaft 3, and is in compression between the end of the worm, and a nut 190, screw-threaded on the end of the shaft 3, preferably with an intervening washer 191. By regulating the pressure of the spring 189, the worm through the intervening connections will drive the shovel discharging plate 174 against any ordinary load, but will prevent damage from overload in the manner already described.

In the embodied form of driving connections from the worm 187 to the shovel discharging plate 174 (Figs. 3, 10, 11 and 12), a worm wheel 197 with its hub 198 encircles a sleeve 199. Sleeve 199 is fixed to a clutch member or jaw 200, and the clutch and sleeve are mounted for free rotation on a shaft 201. Shaft 201 is journaled in bearings 202 and 203 in frame members 204 and 205 mounted upon the bed plate 1. Two pinions 207

and 208 are fixed on and rotate with shaft 201, and these pinions mesh, respectively, with the rack bars 180 and 181, fixed to the shovel discharging blade 174. The rack bars at this point move in supporting and guiding members 209 and 210, which serve to hold them to the pinions 207 and 208, as well as to guide them in their reciprocatory movement. The rack bars have a slight rocking movement about their pinions, so that the pusher blade 174 may ride downwardly on the slanting bottom of the shovel. In this structure, worm wheel 197 rotates freely with the worm 187, the shaft 201 is normally at rest.

The further embodied means for connecting and disconnecting driving worm wheel 197, and driven shaft 201 is preferably adapted for distant control by a solenoid and electric cable and controls, as already indicated. For this purpose, a sleeved clutch member or jaw 215 (which cooperates with clutch jaw 200) is mounted on shaft 201, by means of a key 216, to rotate with while having movement along the shaft. To slide clutch sleeve 215 it is provided with a circular groove 217, into which groove project pins upon the upper yoked portion of a lever 218, which lever is pivoted at 219 upon the frame. Pivotaly connected to the lower end of lever 218 at 220 is a rod 221, connected to the core of a solenoid 222, which solenoid is in circuit with the distant control switch mechanism (not shown).

Thus, when the solenoid is energized, the clutch members 200 and 215 are thrown in, and the motor, through worm 187 and worm wheel 197, pinions 207 and 208, and gear rack bars 180 and 181 will drive the discharge plate 174 forwardly within the shovel and eject the load of coal or other material therefrom. It is not necessary to mechanically retract the discharge plate 174, as when the shovel is again driven into the pile of coal or other material at the place of supply, clutch 199-215 has been previously disconnected, and the rush of material into the shovel will drive the discharge plate back to a position where it serves as a back wall to the pile of material within the shovel, resting against stop 227.

Means are provided for mechanically throwing out the clutch 200, 215 at the forward end of the stroke of the shovel discharging plate 174. In the embodied form thereof, a stop 227 is fixed on a bar 228, fastened at both of its ends to the underside of the corresponding geared rack bar 181, by means of spacing blocks 229 and screw bolts 230. In the path of the stop 227 (Figs. 11 and 13) at the forward end of its travel, is a bent lever 233, having the end 234 of one arm thereof in position to be moved by the stop 227, and having a pivotal mounting at 235. The other end 236 of the lever abuts on the lever

218 of the clutch mechanism 200, 215. Thus, just as the discharge plate 174 reaches the front end of the shovel, lever 233 is actuated, as described, by stop 227 which is traveling with the discharge plate, and lever 218 is rocked, and the driving clutch 200, 215 is thrown out. The pusher plate is thus disconnected from its forward drive, and is free to be pushed back to the rear end of the shovel by the incoming of the material at the next loading operation as already described.

No particular form of electrical distant control mechanism for the machine is described in so far as concerns the cable control and the circuit control for energizing and de-energizing the solenoid, and it will be understood that so far as concerns many features of the invention these may be of any desired or suitable form. This mechanism, however, may be of the form shown in my Patent No. 1,562,872, dated November 24, 1925.

In Figs. 6 and 7, a form of double solenoid is shown, which has been found highly efficient in commercial operation of the machine. In this form the solenoid is provided with an external sheath 245, with heads 246 and 247 at either end, and with an intermediate head 248. Within the solenoid is a cylinder 249 of brass or other non-magnetic metal, which tube may conveniently extend entirely through the solenoid. Within the tube 249 is a double core, comprising two core members 250 and 251, each of which may have a conoidal head 252. The core members are connected together by a rod 253, of non-magnetic metal, having its ends screw-threaded and screwed into the adjacent ends of the two core members.

An actuating rod 254 is screwed into the forward end of the core member. Conoidal stops or abutting members 255 and 256 are provided for the core members, and these may be of any suitable form. The solenoid is provided with windings 259 and 260, about the tube 249 and the cores 250 and 251. These windings are in series, but in reverse directions, so far as concerns the polarity of the coils, as best shown in Fig. 7 of the drawings.

In Fig. 8 is shown an embodiment of means for taking up wear between the actuating rod of the solenoid core, and the clutch yoke rod 81 operated thereby. Said embodied means comprise a cap 263, which is driven or pressed friction tight on the external end of the rod, or may be screw-threaded thereonto if desired.

In Fig. 9 a different form of wear take-up is provided. In this form a plug 264 is dropped into the hole in the forward end of the solenoid core, and the rod 254 is then re-screwed into place, but will project outwardly beyond its former position by the same distance as the length of the plug 264. The

relation of the outer or actuating end of the rod 254 to the clutch yoke lever 81 is thus maintained.

The manner of operation of the herein-before described mechanism will be clear from the foregoing description, but may be conveniently summarized as follows:

The machine will be assumed as operating under the distant control, whereby the operator can remain stationary at a more or less distant station 300, and through the electrical switches 301 and cable 302, both drive and steer the machine, and control the loading and unloading. The machine may be assumed to be engaged in loading shot-down coal at a room face and conveying it to and delivering it into the path of a "skip conveyor", such as is shown in my copending application Serial Number 41,889 filed July 6, 1925.

The shot-down coal may be assumed to be piled at the room face, and the operator will selectively energize two of the clutches: controlling the pairs of sprocket wheels 93 and 93^a, and will drive the machine directly into the pile of coal resting on the mine floor. The discharge plate 174 will be pushed rearwardly in the shovel as it passes into the coal, and will come to rest at the rear of the shovel against the stops 226. The simplest way to break the coal in the shovel away from the pile is to wheel the machine sharply, preferably about its own axis, either to the right or left, depending on whichever side is free. This will be done by selectively controlling the solenoids for the clutches for the respective sprocket drives and traction treads, so that one traction tread will travel forwardly and the other one backwardly. If desired one tread might be operated while the other is at rest.

When the machine is clear of the pile, it is driven forwardly to the inner end of the path of travel of the skip conveyor of my said copending application. Here the machine is brought to rest, and clutch 198, 215 is thrown in, by energizing the solenoid 222, and pusher plate 174 ejects the load from the shovel into the path of the conveyor. When discharge plate 174 reaches the front of the shovel, and the entire load is ejected, clutch 198, 215 is thrown out by trip 227, and the plate 174 is thereby disconnected and can be pushed back when the shovel next goes into the coal. The machine can then be returned to the shot-down coal pile for another load. It will be understood that in thicker veins the operator can ride the machine, if desired, and the clutches may be directly hand-controlled, although even in these circumstances it will probably be found advantageous to employ the distant control.

From all the foregoing it will be understood that a mechanism has been provided constituting an exemplary embodiment of

the invention, and realizing the objects and advantages herein set forth, together with other objects and advantages. It will be understood further that departures may be made from the exact mechanism as shown and described, within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

10 What I claim is:—

1. An automotive machine for handling loose materials, including in combination a motor on the machine, an endless traction tread at either side of the machine, and two reversely operating sprocket wheels meshing with either traction tread, continuously driven driving connections from the motor to the sprocket wheels, and clutches for connecting and disconnecting the various sprocket wheels and their driving connections.

2. An automotive machine for handling loose materials, including in combination a motor on the machine, an endless traction tread at either side of the machine, and two reversely operating sprocket wheels meshing with either traction tread, continuously driven driving connections from the motor to the sprocket wheels, and clutches for connecting and disconnecting the various sprocket wheels and their driving connections and solenoids for operating the clutches.

3. An automotive machine for handling loose materials, including in combination a motor on the machine, an endless traction tread at either side of the machine, and two reversely operating sprocket wheels meshing with either traction tread, continuously driven driving connections from the motor to the sprocket wheels, and clutches for connecting and disconnecting the various sprocket wheels and their driving connections and solenoids for operating the clutches and a distant control apart from the automotive machine including switches and an electric cable to the solenoids on the automotive machine.

4. An automotive machine for handling loose materials including in combination a motor on the machine, an endless traction tread at either side of the machine, and traction tread driving means comprising two intermeshing gears continuously driven from the motor, two driving sprockets meshing with a traction tread, one driven from one of said gears and the other driven from the other of said gears, and a single clutch between each sprocket and its respective driving gear.

5. An automotive machine for handling loose materials including in combination a motor on the machine, an endless traction tread at either side of the machine, and traction tread driving means comprising two intermeshing gears driven from the motor,

two driving sprockets meshing with a traction tread, one driven from one of said gears and the other driven from the other of said gears, an independently operable clutch between each sprocket and its respective driving gear and solenoids for controlling said respective clutches.

In testimony whereof, I have signed my name to this specification.

KENNETH DAVIS.