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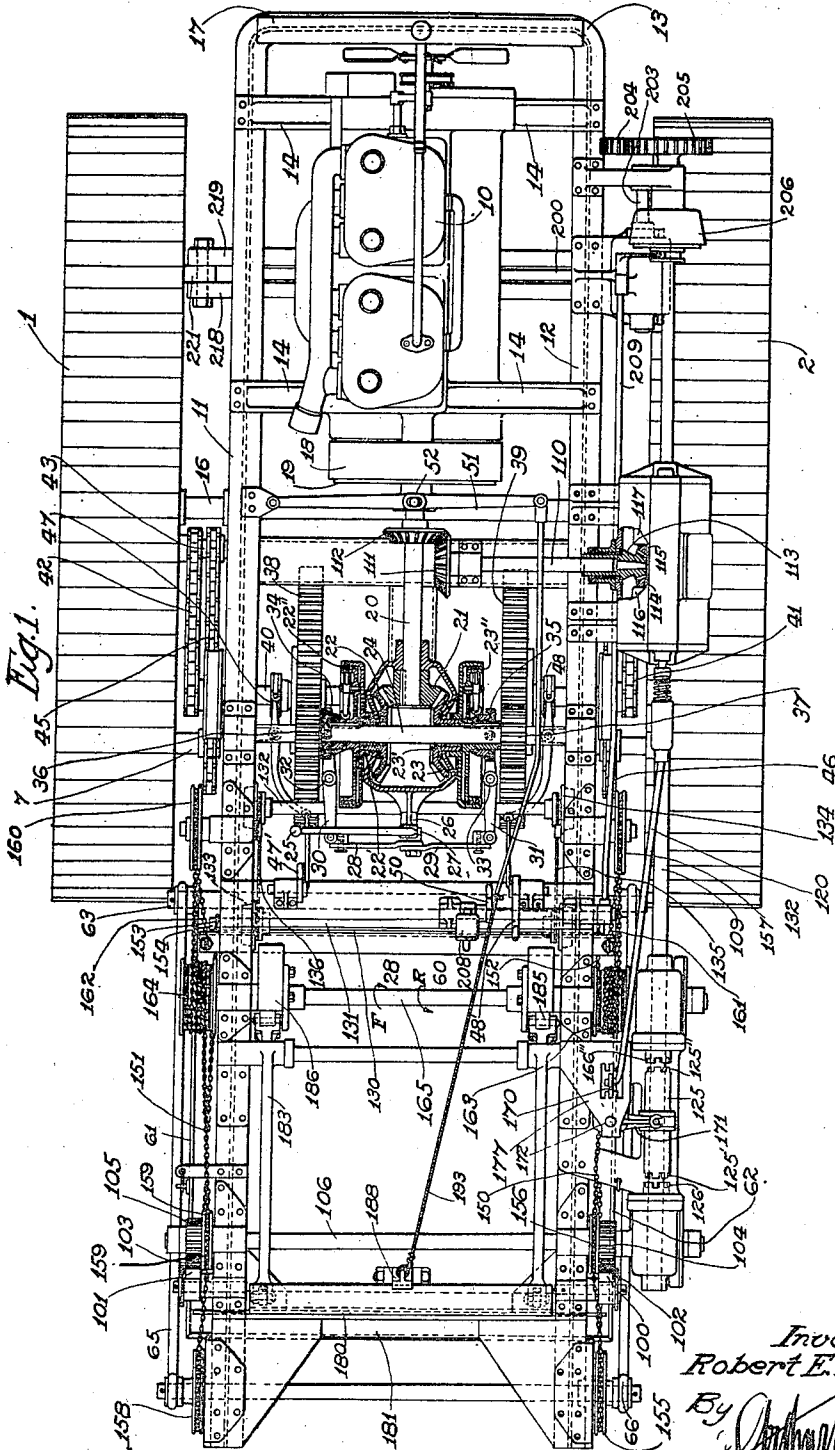
R. E. BRESSLER

1,472,580

AUTOMOTIVE MATERIAL EXCAVATING, MOVING, AND SURFACING MACHINE

Filed Feb. 6, 1920

4 Sheets-Sheet 1



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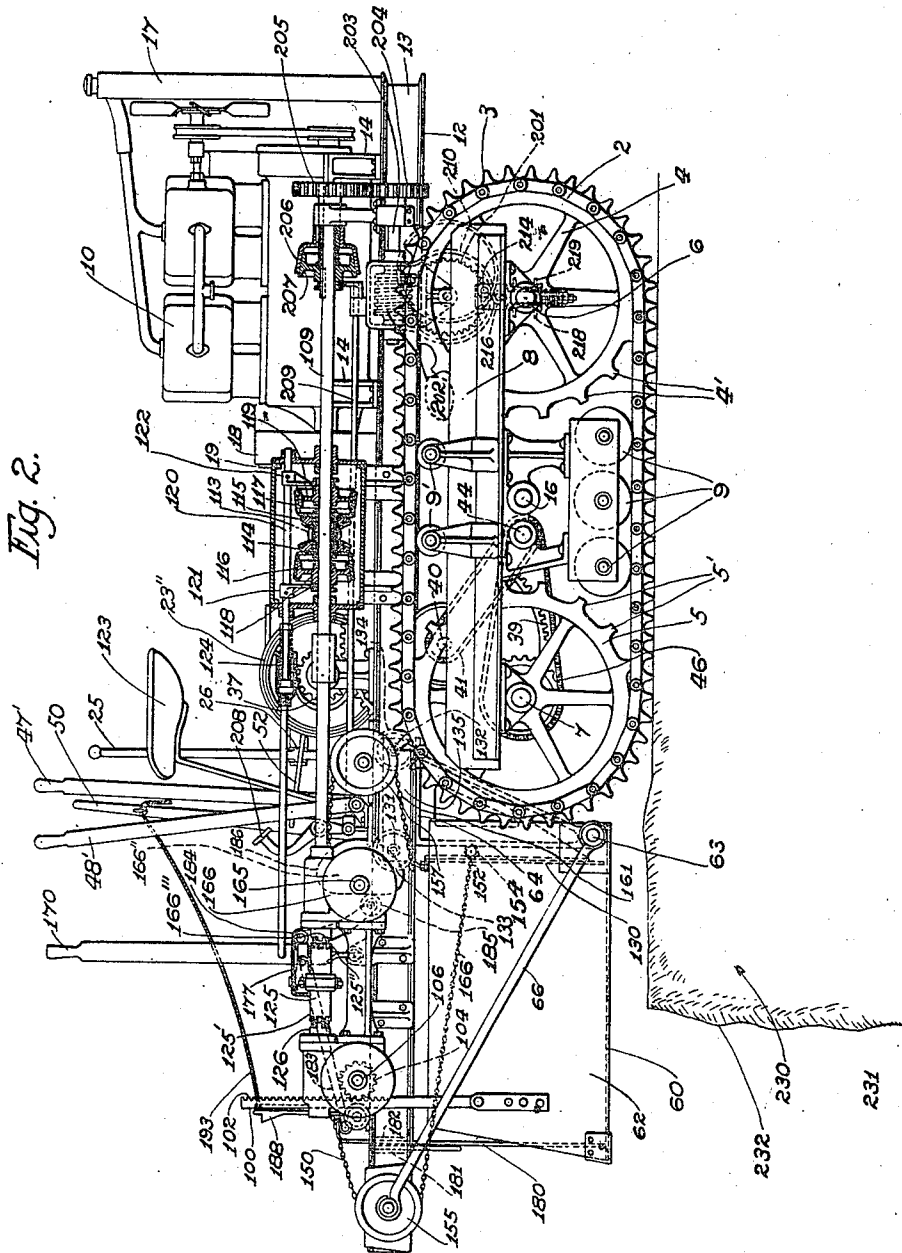
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4 Sheets-Sheet 2



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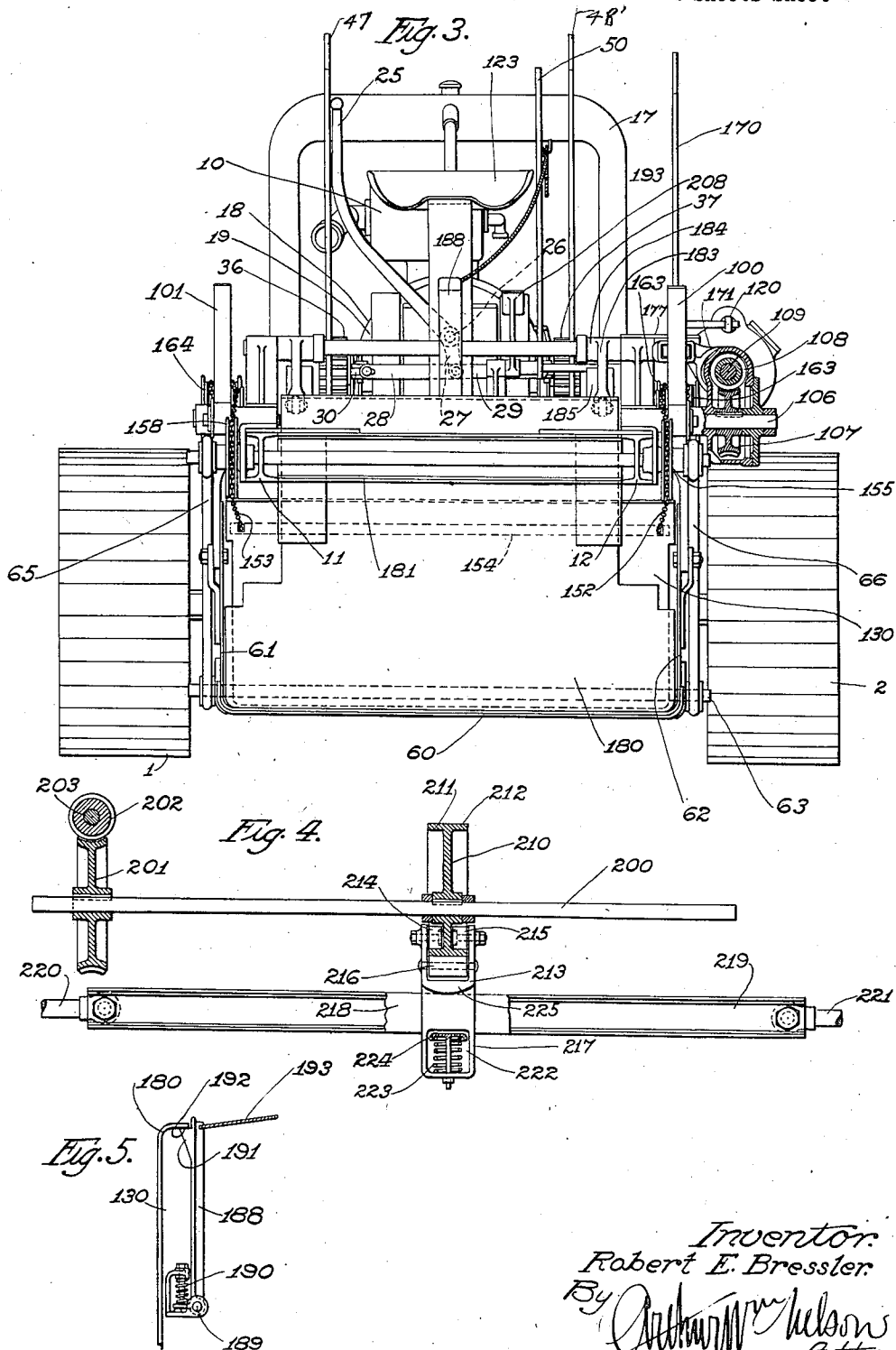
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4 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

ROBERT E. BRESSLER, OF HAMMOND, INDIANA.

AUTOMOTIVE MATERIAL EXCAVATING, MOVING, AND SURFACING MACHINE.

Application filed February 6, 1920. Serial No. 356,694.

To all whom it may concern:

Be it known that I, ROBERT E. BRESSLER, a citizen of the United States, and a resident of Hammond, county of Lake, State of Indiana, have invented certain new and useful Improvements in Automotive Material Excavating, Moving, and Surfacing Machines, of which the following is a specification.

My invention relates generally to improvements in machines of the above character and relates more particularly to machines adapted to surface, excavate, or remove material under their own power, and is generally applicable to the excavating, grading and surfacing of roadways, or similar works, both in the initial construction and subsequent maintenance, and to the placing of material in fills or other depressions.

It is an object of my invention to provide mechanism adapted to scrape or remove material even though the same be hard and compact and to carry the same to the desired place, and there automatically to discharge its load.

A further object of my invention is to provide a device of this general character which shall be adapted for operation over ground of all kinds, i. e., rough and uneven, swampy, miry, etc.

It is also an object of my invention to provide a device which shall be adapted to discharge material directly into a fill or depression, even though the sides or walls be abrupt or precipitous in their character.

My invention consists generally in the form, arrangement, construction, and co-operation of the parts, whereby the above named objects, together with others that will appear hereinafter, are attainable, and my invention will be more readily understood by reference to the accompanying drawings which illustrate that form of my invention that I consider to be the best at the present time.

In said drawings:

Fig. 1 is a plan view of a machine embodying my invention, certain of the parts being broken away, better to disclose the interior construction.

Fig. 2, is a side elevation, upon a somewhat smaller scale, of the machine shown in Fig. 1.

Fig. 3, is a front elevation of the machine, certain parts being broken away to disclose the interior construction.

Fig. 4, is a transverse detail view of parts for tilting the frame of the machine.

Fig. 5, is a detail view of latch mechanism for holding the front gate of the scraper in elevated position.

Figs. 6 and 7 are views illustrating the scraper and frame parts in different positions; and

Fig. 8 is a detail view of the means for operatively connecting the means for actuating the rear gate and for swinging the scraper element.

The character of the work to be performed by the machine herein shown varies widely, in its nature. At times it may encounter materials to be excavated which are solidly packed, as for instance, an old roadway, either paved or unpaved, hence difficult of removal and for this reason, requiring the application of enormous forces to loosen and excavate the same. Again, at times, the machine may be required to operate in soft and swampy soil, such that traction and support for the heavy mechanism, must be taken into account. In excavating work, at times excavation is conducted upon ground which is substantially level. At other times, the ground may be of such nature as to slope downwardly relative to the position of the machine; and again, the character of the ground may be such as to slope upwardly, relative to the position of the machine.

Much excavation work requires the removal of material from one location to another and in depositing the material it is very desirable, indeed, that this be very accurately done in order that rehandling may be avoided. For some of the work, it is desirable to deposit material for filling purposes into a hole or fill having precipitous walls, which has hitherto often required the dumping of the material upon the edge of the hole and the rehandling thereof with its attendant increased cost.

I have devised a machine of such a nature as to operate admirably under all of the above named conditions, as well as others, and which greatly facilitates and cheapens material excavating, moving, surfacing and filling work.

In order that the machine may exert a

tractive effort sufficient to urge the scraper into and through soil or material, no matter what its composition may be, I provide a tractor of the crawler or caterpillar type. Its details may vary to a very considerable extent. As here shown, it comprises endless elongated traction elements 1 and 2 which, in turn, are preferably provided with ridges or corrugations 3. The endless traction elements operate over spaced wheels, 4 and 5, which are carried upon journals or shafts 6 and 7, respectively. It will be understood that wheels 4 and 5 are provided on each side of the machine for co-action with respective traction elements, but since the construction and operation of the wheels on one side are the same as those upon the other, a description of one will suffice for both. The wheels 4 and 5, take the form of sprocket wheels, having teeth 4' and 5' thereon, respectively, which enter the links of the traction elements 1 and 2 and thereby drive the machine when either of the wheels 4 or 5 is rotated. The journals 6 and 7 are properly spaced and held in a frame 8, which frame also carries, by means of a plurality of brackets, a plurality of wheels or rollers 9 for co-action with and forming a support for the traction elements when in engagement with the ground. The upper span of the traction element is supported by spaced roller 9', likewise journaled in brackets finding their support upon the frame 8. For the sake of brevity, the frame 8 will be referred to, hereinafter, as the crawler frame.

In the present instance, an internal combustion engine 10 is provided for driving the tractor and for performing a number of other operations to be described in detail hereinafter. The engine 10 is mounted upon a frame substantially U-shaped in plan, and, in the present instance, I-shaped in cross-section, and comprising the side portions 11 and 12 and the end portion 13. Transverse spanning members 14, serve as a means of support for the engine. The U-shaped frame will hereinafter be termed the tractor frame. The side portions 11 and 12 of the frame extend considerably beyond one end of the endless traction elements, and, as will be found hereinafter, serves as a support for the scraper element and a number of its operating parts. The tractor frame just described, is, in turn, carried upon cradle members 15, depending from the side portions 11 and 12, and which are trunnioned upon the trunnions 16 that are positioned midway between the axes of rotation of the sprocket wheels 4 and 5, and in the crawler frames. Mechanism, hereinafter, to be described, is provided for holding the tractor frame in desired position, relative to the traction elements and crawler frame, and for moving it into different angular positions.

The internal combustion engine 10 is or may be of usual construction and hence no detailed description thereof will be given. For the purpose of identifying a few of the parts, it may be stated that 17 is the radiator, 18, the fly-wheel, and 19, the clutch. While the apparatus may, and will under certain circumstances, be operated either forwardly or rearwardly, for the sake of convenience in description I shall refer to that end of the apparatus carrying the scraper element, as being the front of the machine, in which event, the engine 10, will be considered as being positioned at the rear end of the machine. Extending forwardly from the clutch will be found a shaft 20, mounted in suitable bearings, and which, through the medium of the clutch 19, can be connected to the engine shaft. Mounted at the front end of the shaft 20, and keyed to rotate therewith, is a bevel gear 21, which meshes with two bevel gears 22 and 23, which, in turn, are rotated thereby whenever the shaft 20 is in rotation. The bevel gears 22 and 23 rotate idly upon a cross shaft 24 and they are provided, respectively, with hub band-like portions 22' and 23', respectively. In order to cause a rotation of shaft 24, internal brake bands 22'' and 23'', respectively, are provided. These brake bands by expansion are caused to rotate with the portions 22' and 23'. The hubs of the brake bands are keyed to the cross-shaft 24. Thus by expanding one of the brake bands, rotation of the cross shaft 24 in one direction, is caused, and by expanding the other brake band, rotation in the opposite direction results. For the purpose of controlling this operation, a lever 25 is provided which, in turn, is pivoted at 26, and which has a depending portion 27, (see Fig. 3), that is pivotally joined to the two transversely disposed link members, 28 and 29, the ends of which are pivotally united to the yoke levers 30 and 31, which, in turn, are mounted upon vertical pivots 32 and 33, respectively, and the yoke-like ends of which straddle the sliding hubs 34 and 35. Thus by swinging the lever 25 in one direction shaft 24 is operatively connected to one of the bevel gears for rotation in one direction, and by swinging the lever in the opposite direction is operatively connected to the other bevel gear thereby causing reverse rotation.

Also mounted, upon the cross shaft 24 will be found two spaced pinions 36 and 37, respectively, which, in turn, mesh with the large gear wheels 38 and 39, that are mounted upon the cross shaft 40. Upon the ends of the cross shaft 40, sprocket wheels are provided over which chains 41 and 42 operate. These chains in turn pass over the sprocket wheels mounted upon the stud shafts 43 and 44, respectively, carried in the crawler frames. From the shafts 43 and

44, or rather from the sprocket wheels mounted thereon, the final drive to the sprocket wheels 5 is effected through the medium of the chains 45 and 46, respectively, that pass over sprocket wheels carried upon the journals, upon which the sprocket wheels 5 of the traction elements are mounted. Thus it becomes evident that rotation of the traction elements 1 and 2, in either direction, may be effected.

For the purpose of turning the tractor, one traction element is operated and the other remains at rest. This operation is effected through the medium of the clutches 47 and 48, respectively, which, in fact, operatively connect the large gear wheels 38 and 39 to the cross shaft 40. In other words, unless the gears 38 and 39 are connected through the medium of the clutches 47 and 48 they simply rotate idly upon the cross shaft 40. Clutch 47 is operated through hand lever 47' and its connected links, and clutch 48 is operated through hand lever 48' and its connected links. These as so well shown in the drawings that it is not thought necessary to describe them in detail. Thus when the clutch 47 is in a position to connect gear 38 to shaft 40, one of the elements is in operation. When only clutch 48 is in operative position the other element is in operation, and when both clutches are in position, both elements are in operation. This construction permits turning movement of the device within a very small radius or movement of the apparatus as a whole either forward or rearward depending upon the direction of rotation of shaft 24.

The main clutch 19 of the machine is controlled by means of the hand lever 50, the yoke-lever 51, and the connecting link 52. From the foregoing, the construction and operation of the tractor, will be readily understood and I shall proceed to describe the scraper element, its operation, and the mechanism, for effecting desired movements thereof.

The scraper element, may assume different shapes, but, as here shown, it comprises a substantially flat bottom portion 60 and two upstanding side portions 61 and 62, respectively, which in practice, are usually formed of a single piece of metal. Looking at the end of the scraper element, it is of U-shape, open at both ends. Means, are provided, however, for closing both ends of the scraper element, the construction and operation of which will shortly be described. The scraper element is swingably mounted upon a cross-shaft 63, which, in turn, is mounted in brackets 64 that are secured to the tractor frame, and which depend therefrom. This cross-shaft 63, is further rigidly braced by means of the diagonally positioned tie rods 65 and 66, arranged at opposite sides of the

machine. Unless other means were provided, the bucket would swing upon the shaft 63 by gravity, and would assume a somewhat vertical position. Since this is not desired, means are provided for accurately positioning and holding the scraper element. As here shown this means comprises two upstanding members, 100 and 101, which are secured to the forward end of the scraper. The upper parts of the members 100 and 101 are provided with gear racks, 102 and 103, respectively, which in turn mesh with gear wheels, 104 and 105, respectively, that are mounted for rotation with the cross shaft, 106. The cross shaft 106 carries a worm wheel 107 at one end, which meshes with a worm 108 mounted upon the longitudinal shaft 109, which shaft is operatively connected to receive rotation from the engine by mechanism shortly to be described. This connecting means includes the jack shaft 110, (see Fig. 1) which carries at its inner end a bevel gear 111 in mesh with a bevel gear 112 fixed for rotation with the shaft 20. At its outer end shaft 110 carries another bevel gear 113 which meshes with the bevel gears 114 and 115 respectively that are operatively connected to the longitudinal shaft 109 by being mounted upon hollow clutch members 116 and 117, respectively, (see Fig. 2), which members rotate idly upon the shaft 109. For causing rotation of the shaft 109 in desired direction, two clutch members 118 and 119, are provided which are feathered on the shaft 109 and which are controlled by means of the shifter shaft 120 and the depending yokes 121 and 122 carried thereby. The shifter shaft 120 is carried forward to a point where it is connected to hand lever 170, conveniently adjacent the operator's seat 123, and in order to cushion the shifting action, the shaft is split and a spring 124 is interposed between the parts. The construction of this cushion member it is believed will be readily understood without a detailed description.

By shifting the shaft 120 in one direction, one clutch member 118 is operatively connected to the hollow member 116, and by shifting shaft 120 in the opposite direction, clutch member 118 is freed and clutch member 119 is operatively connected to the member 117 and rotation of shaft 109 in the opposite direction effected. Thus it becomes obvious that at will, the shaft 109 can be driven in either direction.

When it is desired to swing the scraper element downwardly, shaft 109 is rotated in the appropriate direction and rotation of worm 108 is effected by shifting the clutch member 125 so that portion 125' thereof comes into co-operative engagement with a portion 126 of the worm. Since the clutch member 125 is feathered to shaft 109, it is obvious that the rotation of worm 108 re-

sults and, through the mechanism before described, imparts rotation to the cross shaft 106, whereupon the gears 104 and 105, cause downward movement of the upstanding
 5 struts 100 and 101, thus swinging the scraper element downwardly. Obviously to restore the scraper to its initial position, reverse movements of the gears 105 and 104 is necessary. This is accomplished by reversing
 10 shaft 109.

The rear end of the scraper is closed by a transverse gate member 130 which is utilized not only to form a back for the scraper but also to discharge material from the scraper.
 15 To this end, the gate is made moveable longitudinally of the scraper. The gate in operation is subjected to considerable forces tending to tilt or twist same, and I therefore provide a construction adapted to overcome
 20 these forces. This comprises a trolley, composed of cross axles 131 and 132 carrying wheels 133 and 134 respectively, at their ends which operate between the inner flanges of the side portions 11 and 12 of the frame.
 25 The axles 131 and 132 are connected by the triangular gusset-like members 135 and 136, which depend therefrom and the lower portions of which are secured to the rear gate 130 so that the gate, trolley and connected
 30 parts move as a unit.

For moving the gate, 130 longitudinally to discharge material in the scraper, chains, 150 and 151 are provided which have their ends, 152 and 153 secured to a cross rod, 154, which is a part of the rear gate. The
 35 chains pass over sheaves 155, 156 and 157 upon the one side of the machine, and 158, 159 and 160 upon the other side of the machine, and the ends 161 and 162 terminate in hooks secured firmly to the rear gate. Intermediate the ends, the chains are tightly
 40 wrapped around pulleys, 163 and 164 respectively, which are secured to and move with the cross shaft, 165. The cross shaft, 165 is rotated in a manner similar to the cross shaft, 106, i. e., by means of a worm 166'' mounted for rotation with the cross shaft 165, both of which are covered by the housing 166. The worm 166'', is operatively
 50 connected to shaft 109 by means of the clutch portion, 125'' of the clutch, 125, which meshes with the clutch portion, 166''' of the worm, 166''. Thus by shifting the clutch into engagement, shaft 109 is connected to drive the cross-shaft, 165 and since the longitudinal shaft, 109, can be driven in either direction, it is obvious that the cross shaft, 165 can be driven in either direction. Thus to move the rear gate forwardly, shaft 165 is operated in the direction of arrow F (see Fig. 1) thereby winding the forward parts of the chains on the drums 163 and 164 and paying out the rearward portions. Because the gate is carried
 60 by the trolley, as before described, its move-

ment is directly forward without tilting action and a force sufficient to push forwardly any material in the scraper may be exerted. The gate is shown in its forward position in Figs. 1, 2, and 6. To return the gate to its
 70 rearward position, shaft 165 is rotated in the direction of the arrow R (see Fig. 1).

The clutch member 125 is controlled by means of the hand lever 170, which, as is probably best shown in Fig. 8, serves to shift
 75 the clutch member 125 in the direction of arrow A when it is swung in the direction of arrow A'. When it is swung in the direction of arrow B', movement in the direction of arrow B on shaft 109 takes place.
 80 This movement is occasioned by means of the yoke 171, which is pivoted at 172 and which swings in one direction thereon when spring 173 is compressed and in the opposite direction when spring 174 is compressed.
 85 Compression of the springs and movement of member 170 is occasioned through the instrumentality of the pivoted members, 175 and 176, respectively. Thus it becomes obvious that either the cross shaft 106 or the
 90 cross shaft 165 may be operatively connected to the shaft 109 depending upon the direction in which the hand lever 170 is swung. Hand lever 170 also serves to shift the rod 120, as before stated. Lever 170 operates in
 95 a plate 177, which is provided with a transverse slot and a plurality of longitudinal slots as is well shown in Fig. 1. When lever 170 is simply swung in the transverse slot, the clutch members connecting shaft 109 are
 100 not moved. To connect the shaft 109 operatively to the drive shaft, the hand lever, 170, is swung in one of the longitudinal slots. If the hand lever, 170, is swung in the central longitudinal slot, then shaft 109 is operatively connected to the engine drive shaft, and shafts 106 and 165 remain disconnected. If transverse swinging movement, and thereafter, longitudinal swinging movement of the lever 170, is effected, then
 105 either shaft 165 or shaft 106 will be operatively connected to shaft 109 depending upon whether or not hand lever 170 is swung in a forward direction or in a rearward direction.
 115

As in operation the apparatus contemplates the excavation of material at one point and carrying thereof to another between which points the ground may be very rough, it is desirable to provide a front gate to
 120 prevent undesired loss of material from the scraper. To this end I provide a front gate 180 which is vertically slidable between the cross channel members, 181 and 182. I also provide power actuated means for raising
 125 the front gate. This comprises a bell crank lever 183 pivoted at 184 and having a roller 185 which rolls upon a cam 186, which cam is secured to the cross shaft 165. By rotation of the cam, 186, it becomes obvious that
 130

the bell crank lever, 183, will rise and fall and in its upward movement will lift the gate 130 from the lower position shown in Fig. 2 to the upper position shown in Figs. 6 and 7. When it reaches its upper position, falling movement of the gate is prevented by a latch. This latch is probably best shown in Fig. 5, wherein it will be seen to comprise a vertically positioned lever 188, which is pivoted at 189 and which is normally swung toward the gate 130 by means of the compression spring 190. The upper part of the lever, 180, is provided with an inclined projecting portion, 191, having a straight upper portion 192. Thus as gate 130 moves upwardly, it strikes the inclined portion 191, thus pressing the lever 188 away from the gate until the upper part of the gate is clear of the protruding portion, at which time the latch swings into the position shown in Fig. 5 and the gate 130 is supported in its elevated position by resting upon the face, 192 of the latch. When it is desired to lower the gate 130, latch 188 is merely retracted and the gate falls, by gravity, to its lower position. In order, conveniently, to actuate the latch from the seat of the apparatus, a cord or cable 193 is provided, one end of which is secured to the upper end of latch 188 and the other end of which is tied to a hook provided on one of the operating levers of the machine, in the present instance to lever 50.

At times in the operation of the apparatus, it is desirable to tilt the entire tractor frame and scraper as a whole relative to the endless traction elements and their frames. This, I arrange to do by means driven from the engine. As before stated, the tractor frame is trunnioned upon a cross shaft, 16, and, unless some means were provided for controlling the swinging movement of the tractor frame, it would be swung upwardly or downwardly depending upon which end was overbalanced. For controlling the position of the frame and parts supported thereby, I provide a cross shaft 200, which at one end carries a worm wheel 201 in mesh with a worm 202 fixed on the shaft 203. The shaft 203 carries a gear 204 in mesh with a gear 205, which is freely mounted on the longitudinal shaft 109 and which carries, upon its hub, at one end, a hollow clutch member 206. Feathered to shaft 109 is an internal clutch member 207, which when pressed into engagement with the member 206, operatively connects the gear 205 for rotation with shaft 109. Thus, by controlling the movement of the clutch member 207, rotation of shaft 200 may be caused. Since shaft 109 may be rotated in either direction, as before described, it becomes obvious that rotation of shaft 200 in either direction can be effected. In controlling clutch member 207 a foot pedal 208 is provided conveniently

adjacent the vehicle seat 123, and which is operatively connected to the member 207 by means of the rod 209.

Mounted centrally on the cross shaft 200 and eccentrically thereof is a cam member 210 provided with flanges 211 and 212, (see Fig. 4). Depending upon the cam 210 is a yoke-like member 213, which, as is probably best shown in Fig. 4, has two rollers 214 and 215, which roll upon the inner faces of the flanges 211 and 212, and a roller 216, which rolls upon the outer face of the cam. By this construction, it is obvious that yoke 213 can be moved in either direction, i. e., raised or lowered depending upon the motion of cam 210. Yoke 213 has a lower portion 217 which extends through the spaced channel members, 218 and 219 that connect opposite traction elements. Inasmuch as relative movement of the traction elements, i. e., vertically, may be required depending upon the character of the ground, the cross channel members, 218 and 219 are, at their ends, pivotally joined to studs 220 and 221. The extreme lower part of yoke 213 is provided with an opening 222 in which a spring 223 is provided which presses against a spring retainer 224, the upper end of which engages the bottom flanges of the cross channel members, 218 and 219. Just above the channel members, 218 and 219 the yoke is of greater width and the shoulders thus provided, as indicated at 225 and 226, are curved. Spring 223 is of such strength as to be able to swing the frame of the machine on its trunnions without undue compression, but, at the same time, it permits the cross channel members to rock when there is relative vertical movement of the endless traction devices. In such rocking or swinging movement of the channel members, 218 and 219 they roll upon the curved surfaces 225 and 226 of the yoke.

The positions that the parts occupy when the tractor frame is in its normal position paralleling the crawler frames is shown in Figs. 2, 3 and 7. One angular position of the frame relative to the endless traction devices and their frames is shown in Fig. 6. In Fig. 6 the apparatus is shown as being positioned upon a grade or incline 227 and as digging into a relatively horizontally disposed expanse, 228. It will be understood that to swing the frame from the position shown in Fig. 7 to that shown in Fig. 6, the rotation of the cam 210 in the direction of the arrow U (Fig. 7) obviously to restore the frame rotation in the opposite direction is required and if the frame is to be tilted downwardly at its forward end, then still further movement of the cam beyond its original position is required.

From the foregoing description, it will be understood that complete operation of the engine, tractor elements, scraper, scraper

gates, and all desired movements thereof, together with swinging movement of the tractor frame relative to the traction elements, can be controlled by the operator on the seat, 123, all of the controls being within easy reach.

In operation, if digging is to take place upon a substantially horizontal or level ground, as indicated at Fig. 2, the front end of the scraper is swung downwardly; then forward movement of the apparatus, as a whole, forces material into the scraper. Forward movement of the apparatus with the scraper in this position is continued until the desired load is placed in the scraper, at which time mechanism controlling swinging movement of the scraper is set into operation to restore it to its normal horizontal position. If the material is to be conveyed any considerable extent over rough ground, the front gate may be lowered to prevent loss of material in transit. As before stated, much of the operation of the machine will be that of conveying material from one point and dumping it into depressions or fills. Thus in Fig. 2 of the drawings, 230 represents the ground adjacent the hole or fill, 231, having a precipitous side wall, 232. In practice, it has heretofore been customary, under such conditions, to dump the material upon the ground, 230 and then re-convey it as by shoveling or pushing into the fill. As is well shown in Fig. 2, I am enabled to run the apparatus so that the scraper is positioned over the fill, at which time the front gate can be raised and rear gate, 30, moved longitudinally forward to discharge the material into the fill, thus avoiding the necessity of re-handling. In operation, the device effects a great saving over prior methods of excavating, moving and handling material of the character outlined. From this detailed description, it is thought that the advantages of the invention will be apparent to those skilled in this art without further comment, but inasmuch as this disclosure will suggest to others, certain modifications, I do not wish to be limited to the specific construction herein shown and described, except only as may be necessary by limitations in the hereunto appended claims.

I claim:

1. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, a motor mounted upon said frame, mechanism operable by said motor

for swinging said scraper, a trolley mounted for movement longitudinally of the tractor frame and having wheels operable thereon, a material discharge gate carried by the trolley and positioned in said scraper, and mechanism operable by said motor for driving said trolley.

2. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, a motor mounted upon said frame, mechanism operable by said motor for swinging said scraper, a trolley mounted for movement longitudinally of the tractor frame and having wheels operable thereon, a material discharge gate carried by the trolley and positioned in said scraper, and mechanism operable by said motor for driving and reversing said trolley.

3. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a motor mounted upon said tractor frame, said tractor frame being mounted for swinging movement relative to the frame of the traction elements, means operable from said engine for swinging said tractor frame, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, mechanism operable by said motor for swinging said scraper, a material discharge gate mounted for movement longitudinally of said scraper, and mechanism operable by said motor for causing longitudinal movement of the material discharge gate.

4. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a motor mounted upon said tractor frame, said tractor frame being mounted for swinging movement relative to the frame of the traction elements, means operable from said engine for swinging said tractor frame, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, mechanism operable by said motor for swinging said scraper, a

trolley mounted for movement longitudinally of the tractor frame and having wheels operable thereon, a material discharge gate carried by the trolley and positioned in said scraper, and mechanism operable by said motor for driving said trolley.

5. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a motor mounted upon said tractor frame, said tractor frame being mounted for swinging movement relative to the frame of the traction elements, means operable from said motor for swinging said tractor frame, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, mechanism operable by said motor for swinging said scraper, a trolley mounted for movement longitudinally of the tractor frame and having wheels operable thereon, a material discharge gate carried by the trolley and positioned in said scraper, and mechanism operable by said motor for driving and reversing said trolley.

6. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, a motor mounted upon said tractor frame, mechanism operable by said motor for swinging said scraper, a front gate, and mechanism for raising same by operation of said motor.

7. An apparatus adapted to excavate material, carry it, discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, a motor mounted upon said tractor frame, mechanism operable upon said motor for swinging said scraper, a front gate, mechanism for raising same by operation of said motor, and means for locking same in raised position.

8. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending

beyond the traction elements, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, a motor mounted upon said frame, mechanism operable upon said motor for swinging said scraper, a trolley mounted for movement longitudinally of the tractor frame and having wheels operable thereon, a material discharge gate carried by the trolley and positioned in said scraper, and mechanism operable by said motor for driving said trolley, said trolley moving mechanism including drums, cables wrapped around said drums, and having portion-passing around spaced sheaves, the ends of which are attached to said gate, and mechanism for operating said drums from said motor.

9. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, said tractor frame being mounted for swinging movement relative to the frame of the traction elements, means operable from said engine for swinging said tractor frame, and a scraper carried by said extended portion of the tractor frame, said tractor frame swinging mechanism including a cam rotatably mounted in the tractor frame, a depending yoke, and a connection between said yoke and the frame of the traction elements.

10. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, said tractor frame being mounted for swinging movement relative to the frame of the traction elements, means operable from said engine for swinging said tractor frame, and a scraper carried by said extended portion of the tractor frame, said tractor frame swinging mechanism including a cam rotatably mounted in the tractor frame, a depending yoke, and a cushion connection between said yoke and the frame of the traction elements.

11. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, said tractor frame being mounted for swinging movement relative to the frame of the traction elements, means operable from said engine for swinging said tractor frame, a scraper carried by said extended portion of the tractor frame, said tractor frame swinging mechanism including a cam rotatably mounted

ed in the tractor frame, a depending yoke, and a connection between said yoke and the frame of the traction elements, said yoke having curved portions to permit rocking movement.

12. An apparatus adapted to excavate material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a scraper having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, a motor mounted upon said frame, mechanism operable by said motor for swinging said scraper, a trolley mounted for movement longitudinally of the tractor frame, a material discharge gate carried by the trolley and positioned in said scraper, and mechanism operable by said motor for driving said trolley.

13. An apparatus adapted to excavate

material, carry it, and discharge it over a precipitous declivity, embodying therein traction elements, a frame carried thereby, a tractor frame having a portion extending beyond the traction elements, a motor mounted upon said tractor frame, said tractor frame being mounted for swinging movement relative to the frame of the traction elements, means operable from said engine for swinging said tractor frame, a scraper, having a cutting edge, carried by said extending frame portion and mounted for swinging movement so that the cutting edge can be positioned below the plane of the traction elements, mechanism operable by said motor for swinging said scraper, a trolley mounted for movement longitudinally of the tractor frame and having wheels operable thereon, and mechanism operable by said motor for driving said trolley.

In testimony whereof, I have hereunto set my hand, this 9th day of January, 1920.

ROBERT E. BRESSLER.