May 5, 1925.

1,536,282

J. C. BRACKETT

SHOVELING AND LOADING MACHINE

Filed May 20, 1924

4 Sheets-Sheet 1

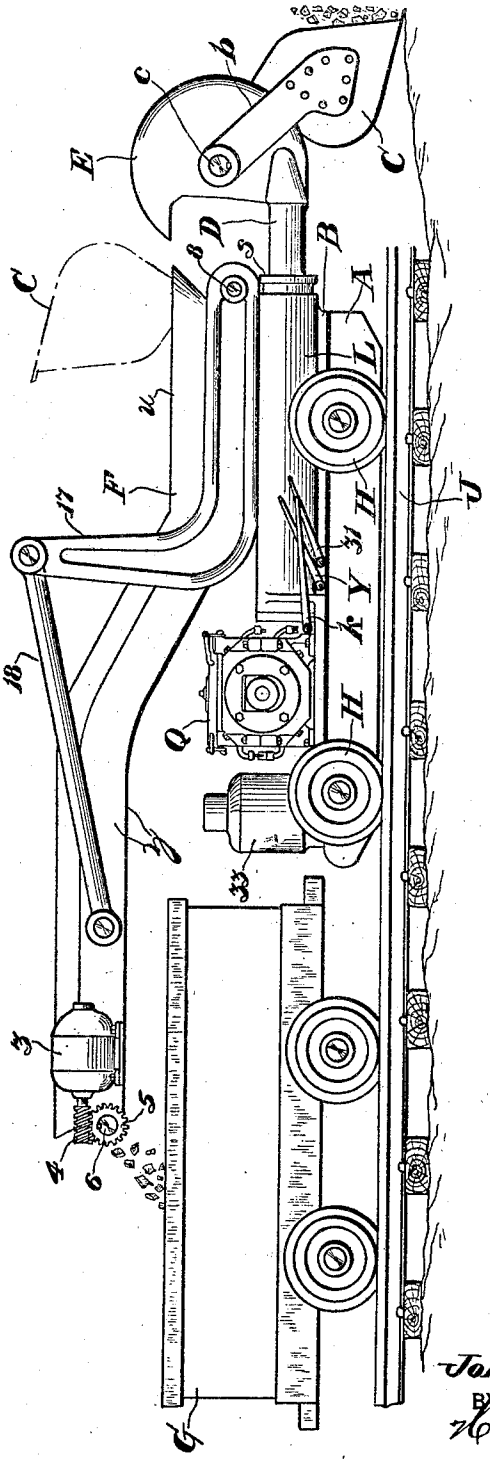

Fig. 1

INVENTOR
John C. Brackett
BY
Herbert B. Ogden
HIS ATTORNEY

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4 Sheets-Sheet 2

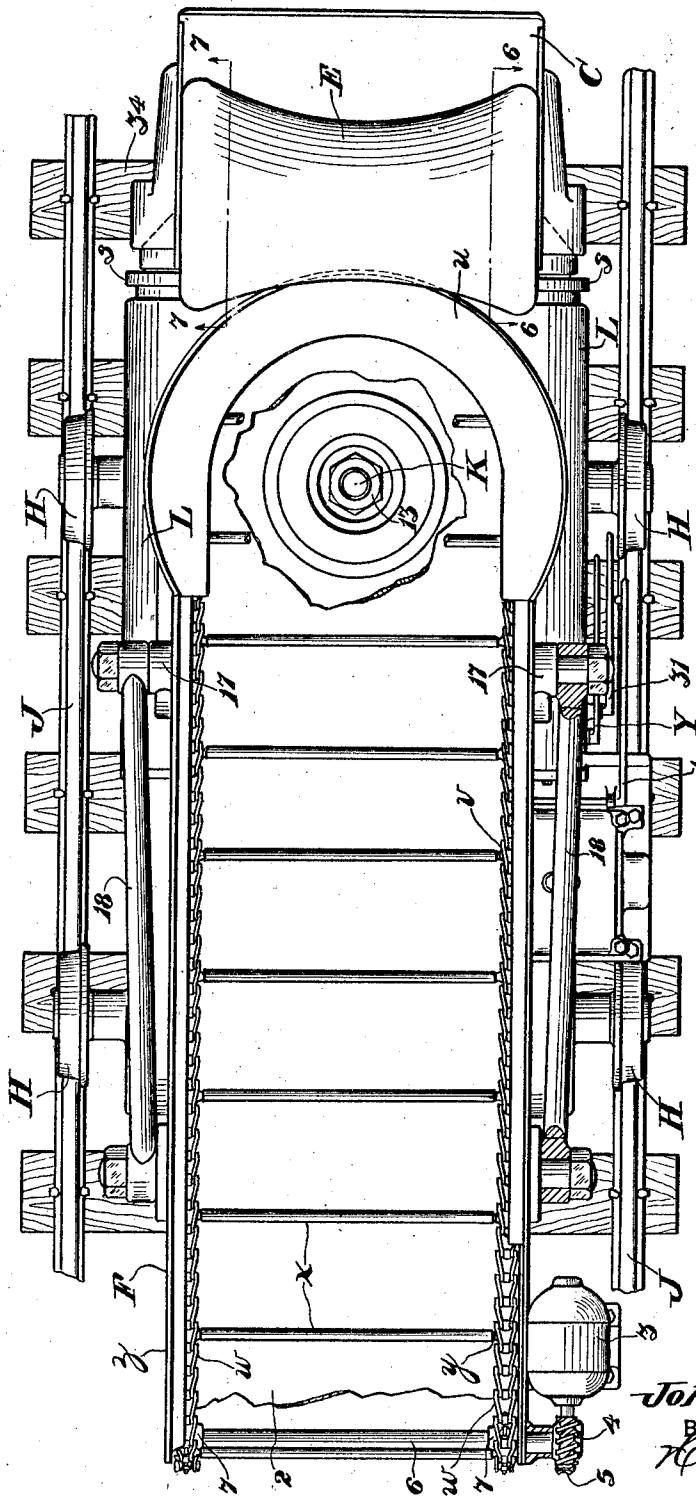

Fig. 2

INVENTOR

John C. Brackett

BY

Herbert E. Ogden

HIS ATTORNEY

May 5, 1925.

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J. C. BRACKETT

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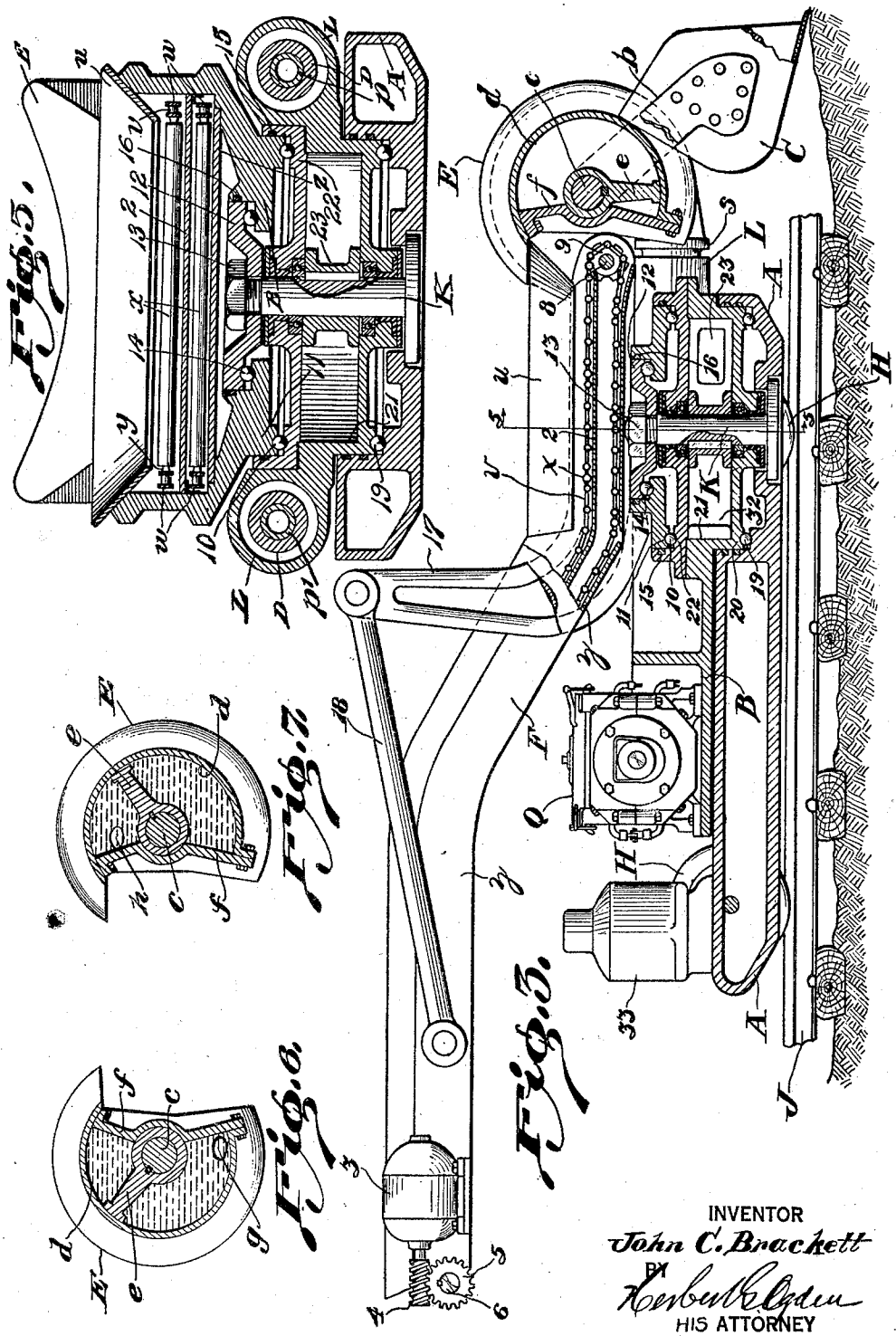

Fig. 5.

Fig. 7.

Fig. 6.

Fig. 3.

INVENTOR

John C. Brackett

BY

Herbert K. Ogden

HIS ATTORNEY

May 5, 1925.

1,536,282

J. C. BRACKETT

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4 Sheets-Sheet 4

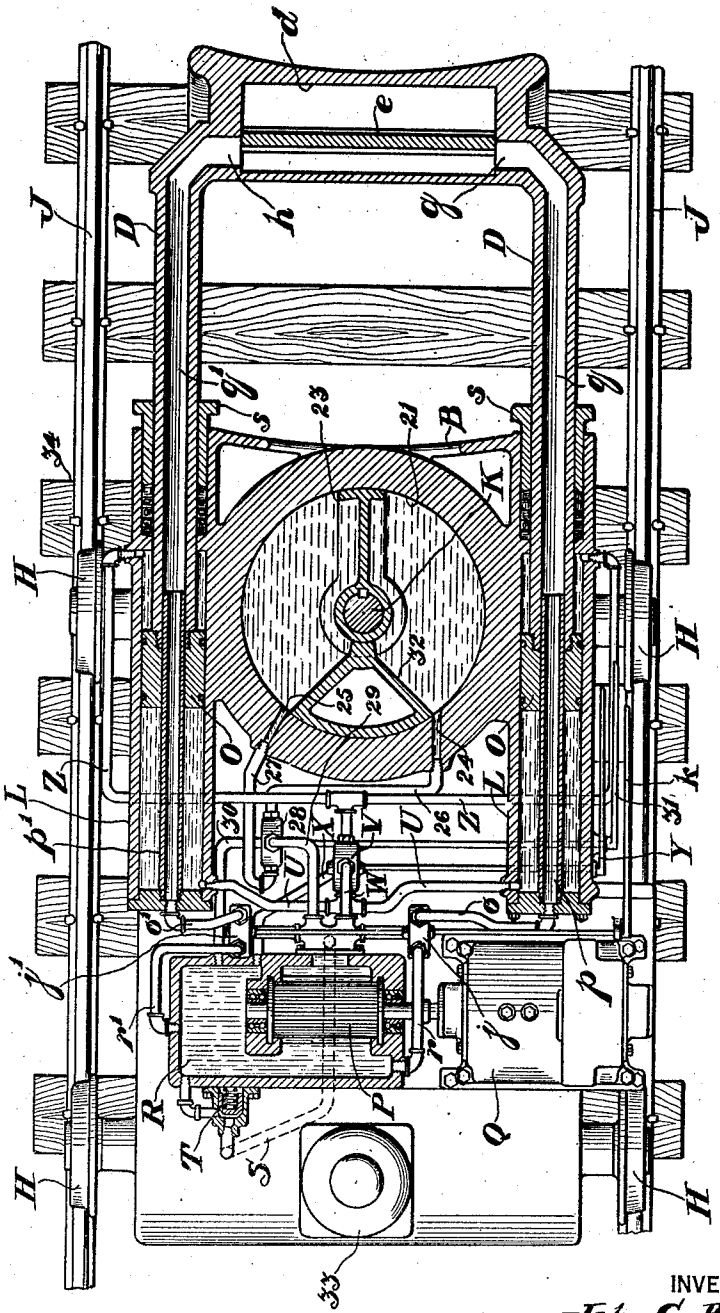

Fig. 4

INVENTOR
John C. Brackett
BY
Herbert Alden
HIS ATTORNEY

Patented May 5, 1925. 1,536,282

UNITED STATES PATENT OFFICE.

JOHN C. BRACKETT, OF PHILLIPSBURG, NEW JERSEY, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHOVELING AND LOADING MACHINE.

Application filed May 20, 1924. Serial No. 714,559.

To all whom it may concern:

Be it known that I, JOHN C. BRACKETT, a citizen of the United States, and a resident of Phillipsburg, county of Warren, and State of New Jersey, have invented a certain Shoveling and Loading Machine, of which the following is a specification, accompanied by drawings.

This invention relates to shoveling and loading machines, and more particularly to such machines in which a shovel or scoop is adapted to move through a predetermined cycle of movements. The particular type of machine, hereinafter described, is especially designed for use in places such as tunnels, headings of mines and like places in which limited space is provided.

It is an object of this invention to simplify the movements of the shovel in lifting its load and depositing it in a suitable receptacle. In the preferred embodiment hereinafter described, the movements of the shovel, independent of the mechanism provided for directing its action, may be resolved into a horizontal thrust toward or away from the material it is desired to operate on and a purely circular swinging motion for lifting the loaded shovel upwardly and back to the point at which the material is to be deposited. Preferably, the forward thrust is accomplished by means of plungers supporting the shovel and the circular motion is accomplished by a device supported by the plungers and swinging the shovel about a pivot fixed with respect to the plungers. This invention also contemplates the use of a conveyor of the endless type in which the material is unloaded from the shovel and by which it is carried back and removed to a suitable receptacle such as the usual mining car.

The invention will be more clearly understood by reference to the following description taken in connection with the drawings, in which—

Figure 1 is a side elevation of a shoveling and loading machine constructed in accordance with the practice of the invention;

Figure 2 is a plan view of the machine showing more particularly the conveyor;

Figure 3 is a side elevation of the machine partly in section to show the means for directing the shovel with respect to the material which it is desired to remove and the means for horizontally adjusting the conveyor mechanism;

Figure 4 is a horizontal section through the machine showing the internal construction of the device for directing the shovel toward the material to be removed and more particularly the internal construction of the cylinders and associated plungers for thrusting the shovel longitudinally;

Figure 5 is a cross sectional detail view of the swivel joint about which the shovel supporting frame and the conveyor are pivoted;

Figure 6 is a cross section taken along the line 6—6 of Figure 2 looking in the direction of the arrows through the device for swinging the shovel in this circular motion to its dumping position; and

Figure 7 is a cross section of the device shown in Figure 6 taken along the line 7—7 of Figure 2 looking in the direction of the arrows.

Referring to the drawings, the machine includes a wheeled base A, a frame B supported on the base, adapted to be swung horizontally for adjusting the direction of the shovel C toward the material to be removed, plungers D for thrusting the shovel C forwardly, a raising device or motor E by means of which the shovel C is caused to rotate upwardly to dumping position, and a conveyor F preferably of the endless type which carries the material deposited thereon back to a suitable car G or other means for carrying off the material. The base A is preferably provided with flanged wheels H by which the machine is conveyed about from place to place on suitable tracks J. A center pin K (Figure 3) forms a pivot about which both the frame B and the conveyor F may be swung.

To operate the plungers D for the purpose of thrusting the shovel C, two cylinders L are formed integrally with the frame B preferably on either side of the frame and are each provided with a piston O attached as by screw threaded engagement to the ends of the plungers D. A source of pressure fluid, such as the gear pump P mounted on the rearward end of the frame B, is adapted to supply a fluid such as oil to the interior of the cylinders L for actuating the plungers D.

Preferably, the gear pump P is in a state of continuous operation and to this end a direct connected electric motor Q, also mounted on the frame B, supplies the motive power to the pump P for continuously maintaining a circulation of oil to and from an oil reservoir R through a suitable by-pass S. A spring pressed valve T resists the flow of oil in the by-pass S and in this manner the desired pressure in the oil supply is maintained.

To thrust the plungers D forward, the oil under pressure from the pump P is admitted through pipes U associated with the source of supply by means of a valve V which is connected by means of a pipe W to the pump supply and by a pipe X with the reservoir R. The valve V is controlled by means of a lever Y which is directly connected with the valve V. In one position of the valve V, oil is supplied from the pump P through the pipe W, the valve V, and the pipes U to the back of the cylinders L. In another position of the valve V, the pipes U are connected to the pipe X leading to the reservoir R permitting the oil to flow back from the rear end of the cylinders L into the reservoir R. An additional pair of pipes Z lead to the front end of the cylinders L and in the last mentioned position of the valve V oil is supplied through these pipes to provide pressure against the pistons O to withdraw the plungers D. In the neutral position of the valve V, the oil is trapped in both ends of the cylinders L and no more is supplied to or returned therefrom.

The shovel C is mounted on a pair of arms *b* fastened to opposite ends of a shaft *c* which is rotatably mounted on a lifting device supported by the plungers and adapted to swing the shovel about the shaft *c* as a pivot, the axis of which is fixed with respect to the ends of the plungers D. The device for rotating the shaft *c* to lift the shovel C consists of a cylindrical chamber *d* concentric with the shaft *c* and having a flat piston *e* secured to the shaft *c* for rotation within the chamber *d*. Preferably, the chamber *d* is not a complete cylinder since the piston *e* does not describe a complete revolution. Accordingly a stationary head *f* is provided at the limiting positions of the piston *e*. In order to raise the shovel C, oil under pressure is supplied from the pump P to the rearward side of the piston *e* through a port *g* (Figure 6). For reversing this movement of the shovel C, oil is adapted to be introduced into the chamber *d* at the forward face of the piston *e* through a port *h* which provides pressure to force the oil back through the port *g* into the reservoir R. The supply of oil to the chamber *d* is controlled by a pair of valves *j* and *j'* which may be operated by a control lever *k*, these valves being adapted to control the flow of oil through pipes *o* and *o'* connected with tubes *p* and *p'* extending longitudinally into the cylinders L and communicating with passages *q* and *q'* in the plungers D leading to the ports *g* and *h* respectively. Suitable return pipes *r* and *r'* lead from the valves *j* and *j'* respectively to the reservoir R. The valves *j* and *j'* being directly connected to each other and with the lever *k* are arranged so that when one of these valves connects its respective pipe with the supply from the pump P, the other connects its pipe with the return pipe. Thus, for instance, as oil is being forced into the chamber *d* through the port *g*, oil is simultaneously being forced out of the chamber *d* through the return pipe *r'* into the reservoir R.

The tubes *p* and *p'* preferably telescope with the plungers D and preferably, the sliding surfaces of these tubes and the passages *q* and *q'* are made to fit accurately. Leakage from the cylinders L is prevented by means of suitable glands *s* within which the plungers D are adapted to slide. The plungers D may be made integrally with the cylindrical chamber *d* thereby insuring rigidity.

In operation, the shovel C is drawn back by manipulation of the lever Y controlling the valve V. The shovel C is then lowered by admitting oil through the port *h* as above described. With the shovel in its lowered position, the valve V is then operated by means of the lever Y to admit oil into the rear end of the cylinders L, thrusting the shovel forward into the pile of material to be removed. The shovel having been thrust forward and filled, the control lever *k* is then operated to admit the oil under pressure through the port *g* thereby rotating the shovel C. Simultaneously, oil is admitted by means of the valve V to the front end of the cylinders L to withdraw the shovel. The shovel, therefore, moves through a circular arc and backward to its dumping position.

The coal or other material is dumped from the shovel C into a hopper *u* above a conveyor *v* by which it is carried back and dumped into a suitable receptacle, such as a car G. The conveyor *v* (Figure 2) is provided with side chains *w* by which it is propelled and which support flights *x* pivoted on rods *y* secured at their opposite ends to the side chains *w*. At the sides and bottom there is provided a housing *z* which assists in guiding the belt. The upper run *v* is adapted to slide on a plate 2 suitably secured to the sides of the housing *z*.

Suitable means may be provided to operate the conveyor *v*, such as an electric motor 3 provided with a worm 4 meshing with a worm wheel 5 on the end of a shaft 6 to which are attached a pair of sprockets

7 for the chains *w*. A shaft 8 adjacent the opposite end of the conveyor F is provided with a pair of similar sprockets 9 for guiding the chains *w*.

The conveyor F is mounted on anti-friction bearings 10 on the frame B. The upper bearing race 11 forms the base of the conveyor F which is held against tipping by a retainer 12 held on the center pin K by means of a suitable nut 13. Ball bearings 14 between the retainer 12 and the race 11 are provided to reduce friction therebetween. Suitable packing 15 and 16 prevents dust from getting into the bearings 10 and 14.

A pair of upwardly extending arms 17 formed integrally with the base 11 are provided with rearwardly extending links 18 suitably attached to the rearward end of the conveyor F to support the rear end of the conveyor F.

Being provided with the anti-friction bearings 10 and 14 the conveyor may be swung about the center pin K as a pivot to any desired rearward direction. The hopper *u* is constructed partly circular so as to receive the material from the shovel C regardless of the angle at which the conveyor F is turned with respect to the frame B.

In practice it becomes desirable to direct the shovel C in a great variety of directions and therefore, the base B is also adapted to be turned about the center pin K as a pivot. The frame B is supported on anti-friction bearings 19 on which the circular race 20 is adapted to turn. The frame B is ordinarily too heavy to be swung easily by hand and therefore, power driven means are provided for performing this function. For this purpose a cylinder 21 is formed in the frame B with the pin K as a center. The top of this cylinder is closed by the lower race 22 for the bearings 10. A flat piston 23 keyed to the center pin K is adapted to receive on either side fluid pressure of oil introduced through apertures 24 and 25 associated with pipes 26 and 27 leading to the valve 28. A supply pipe 29 connects the discharge side of the pump P with the valve 28 and a return pipe 30 connects the valve 28 with the reservoir R. A lever 31 controls the valve 28. The cylinder 21 is divided into two compartments by the piston 23 and a head 32 rigidly attached to the wall of the cylinder 21, one of the compartments being supplied with oil from the aperture 24 and the other being supplied through the aperture 25. The valve 28 is so arranged that when the supply pipe 29 is connected with one or the other of the pipes 26 and 27, the other pipe is connected with the return pipe 30. Thus, when oil is being supplied into one of the compartments of the cylinder 21, the other compartment is being exhausted. Oil entering by the aperture 25, by reaction causes pressure against the piston 23 and rotates the cylinder and the frame B counter-clockwise. Similarly when oil is forced through the aperture 24 the motion of the frame B is clockwise. Very accurate pointing of the shovel C in the proper position may thus be obtained.

The machine may be propelled in any desired manner. Being heavy it is preferred to provide a power drive, such as the electric motor 33 for driving the flanged wheels H through suitable gearing as for instance, a worm wheel and worm (not shown). The wheels H may be spaced at any desired gauge so as to fit as for instance, the railway tracks 34.

I claim:

1. A shoveling and loading machine, comprising the combination of a base, a shovel, means for thrusting said shovel forwardly and back, means including a cylindrical pressure chamber, and a pivotally supported flat piston swinging in said pressure chamber for raising and dumping said shovel.

2. A shoveling and loading machine, comprising the combination of a base, a frame pivotally supported on said base, a shovel, means for thrusting said shovel forwardly and back, means including a cylindrical pressure chamber and pivotally supported flat piston swinging in said pressure chamber for raising and dumping said shovel.

3. A shoveling and loading machine, comprising the combination of a base, a frame, a shovel, means mounted on said frame for thrusting said shovel forwardly and back, and means including a cylindrical pressure chamber and a pivotally supported flat piston swinging in said pressure chamber for raising and dumping said shovel.

4. A shoveling and loading machine, comprising the combination of a base, a frame pivotally supported on said base, a shovel, means mounted on said frame for thrusting said shovel forwardly and back and means including a cylindrical pressure chamber and a pivotally supported flat piston in said pressure chamber for raising and dumping said shovel.

5. A shoveling and loading machine, comprising the combination of a base, a frame pivotally supported on said base, a shovel, fluid actuated plungers mounted on said frame for thrusting said shovel forwardly and back, means including a cylindrical pressure chamber mounted on said plungers, and a fluid actuated piston rotatably mounted in said chamber for raising and dumping said shovel.

6. A shoveling and loading machine, comprising the combination of a base, a frame on said base, a shovel, means associated with said frame to thrust said shovel forwardly and back, means for raising and dumping said shovel, means including a cylindrical pressure chamber, and a relatively rotatable

fluid actuated flat piston in said cylinder for swinging said frame with respect to said base.

7. A shoveling and loading machine, comprising the combination of a base, a frame on said base, a shovel, means on said frame for thrusting said shovel forwardly and back, means to raise and dump said shovel, means including a cylindrical pressure chamber formed in said frame, and a relatively rotatable fluid actuated flat piston fixed with respect to said base to swing said frame with respect to said base.

8. A shoveling and loading machine, comprising the combination of a base, a frame mounted on said base, a shovel, means supported by said frame for thrusting said shovel forwardly and back, means for raising and dumping said shovel, means including a center pin supported on said base, a cylindrical pressure chamber concentric with said center pin and stationary with respect to said frame, and a relatively rotatable fluid actuated flat piston in said chamber and attached to said center pin to swing said frame with respect to said base.

9. A shoveling and loading machine, comprising the combination of a base, a frame supported by said base, a shovel, plungers on said base for thrusting said shovel forwardly and back, means for raising and dumping said shovel, means including a cylindrical pressure chamber, and a relatively rotatable fluid actuated flat piston in said cylinder for swinging said frame with respect to said base.

10. A shoveling and loading machine, comprising the combination of a base, a frame on said base, a shovel, fluid actuated plungers supported by said frame, a pressure chamber on said plungers, a rotatable fluid actuated flat piston rotatable in said cylinder and adapted to raise and dump said shovel, means including a cylindrical pressure chamber, and a relatively rotatable fluid actuated flat piston in said cylinder for swinging said frame with respect to said base.

11. A shoveling and loading machine, comprising the combination of a base, a frame supported by said base, a shovel, plungers mounted on said frame and adapted to thrust said shovel forwardly and back, a cylindrical pressure chamber mounted on said plungers, a flat rotatable piston within said chamber adapted to raise and dump said shovel, said chamber having a concave outer surface to guide the material dumped from said shovel, and a conveyor having a circular hopper cooperating with said concave outer surface of the pressure chamber to receive the material dumped from said shovel.

In testimony whereof I have signed this specification.

JOHN C. BRACKETT.