

W. S. PRIMROSE AND H. H. SCHWENNING.
POWER SHOVEL.

APPLICATION FILED AUG. 6, 1918.

1,315,684.

Patented Sept. 9, 1919.

3 SHEETS—SHEET 1.

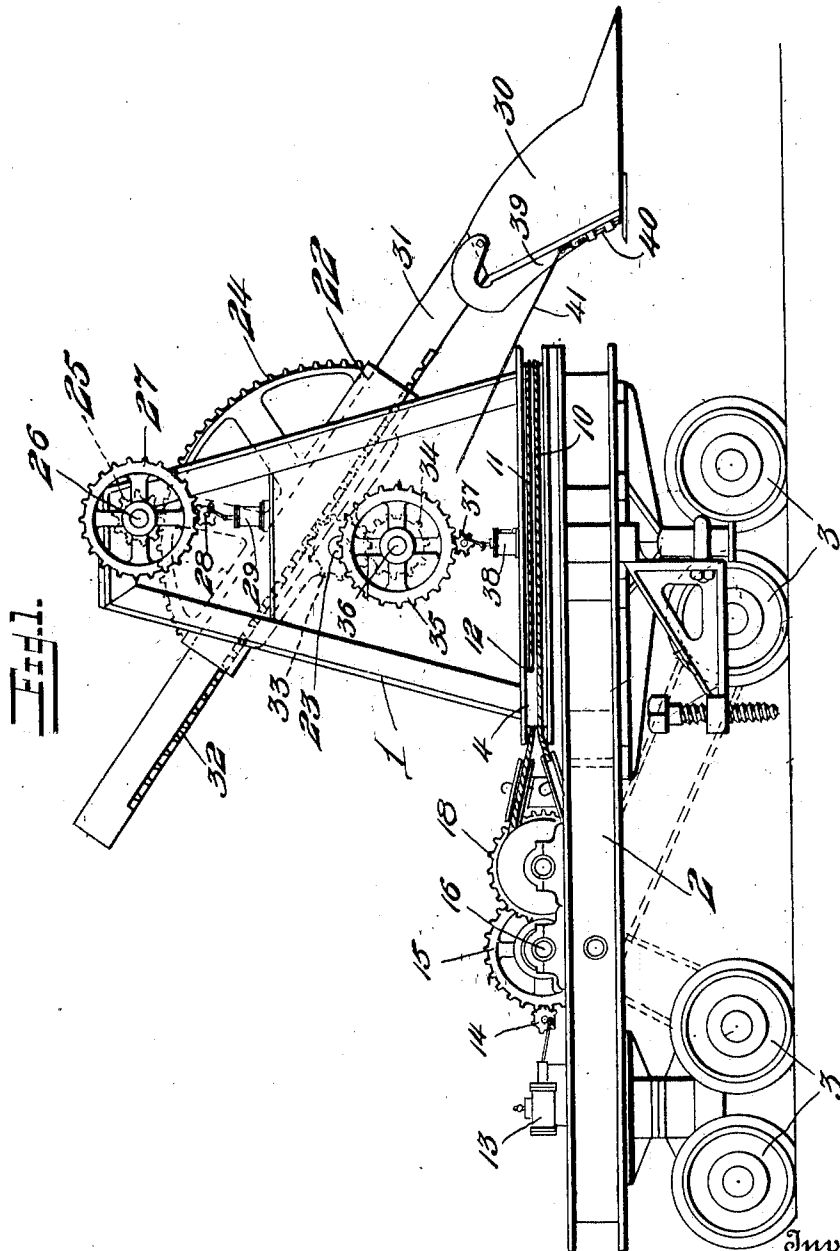


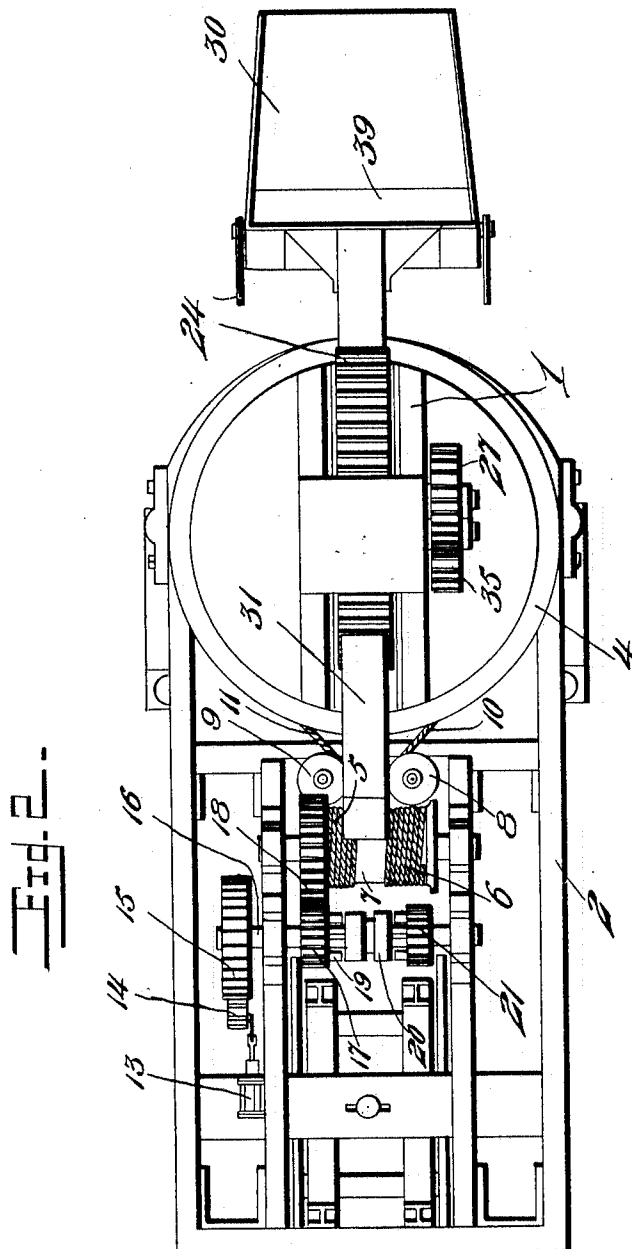
Fig. 1.

Inventors
W. S. Primrose and
H. H. Schwenning.
By
Wilkinson & Gustafson
Attorneys.

W. S. PRIMROSE AND H. H. SCHWENNING.
POWER SHOVEL.
APPLICATION FILED AUG. 6, 1918.

1,315,684.

Patented Sept. 9, 1919.
3 SHEETS—SHEET 2.



Inventors
W. S. Primrose and
H. H. Schwenning
By *Wilkinson & Gust*
Attorneys.

W. S. PRIMROSE AND H. H. SCHWENNING.

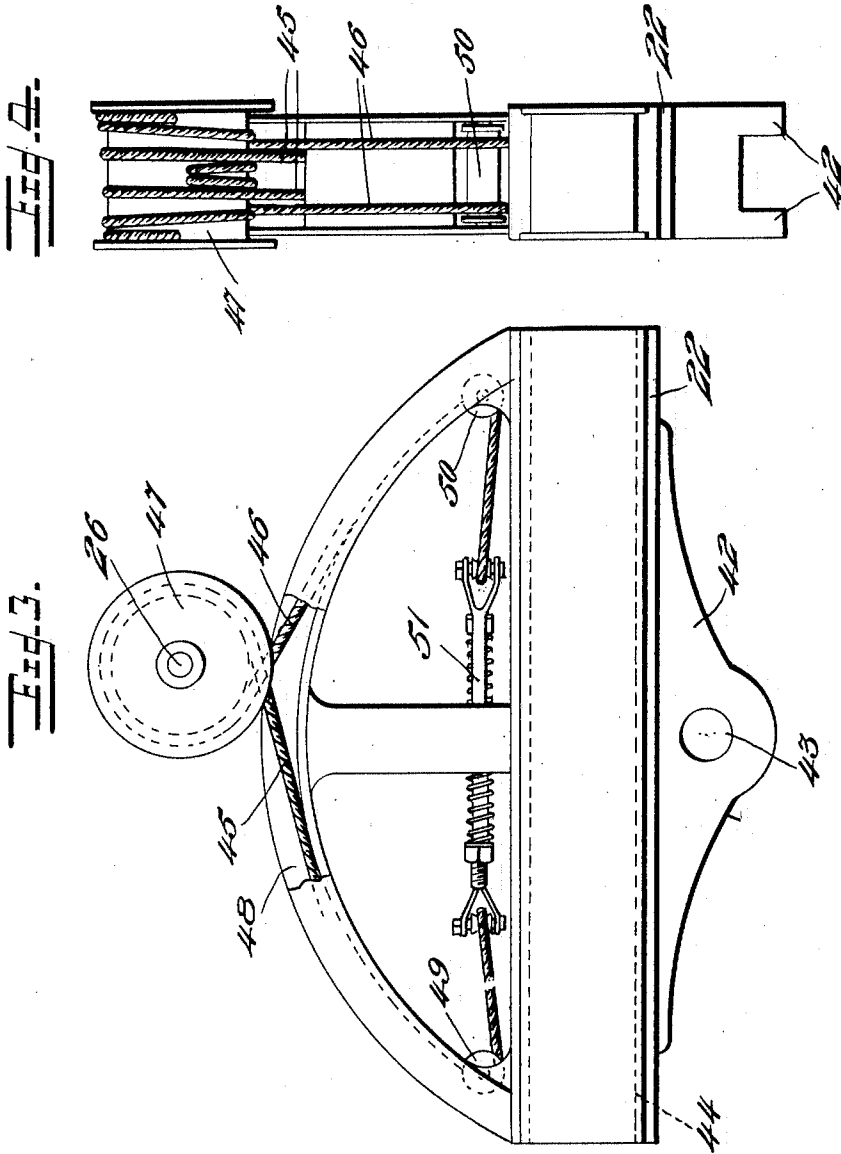
POWER SHOVEL.

APPLICATION FILED AUG. 6, 1918.

1,315,684.

Patented Sept. 9, 1919.

3 SHEETS—SHEET 3.



Inventors.
W. S. Primrose and
H. H. Schwennig
384 Wilkinson & Ginstel
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM SHAFTER PRIMROSE AND HARRY H. SCHWENNING, OF LEAD, SOUTH DAKOTA.

POWER-SHOVEL.

1,315,684.

Specification of Letters Patent.

Patented Sept. 9, 1919.

Application filed August 6, 1918. Serial No. 248,610.

To all whom it may concern:

Be it known that we, WILLIAM SHAFTER PRIMROSE and HARRY H. SCHWENNING, citizens of the United States, both residing at Lead, in the county of Lawrence and State of South Dakota, have invented certain new and useful Improvements in Power-Shovels; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to power shovels, and has for an object to provide an improved power shovel that will be compact in construction, in which the usual boom, heretofore found to be unwieldy, is dispensed with and the shovel or implement carried directly on a beam capable of a reciprocating motion and which beam is fitted to move through a saddle by which the same is supported and guided; the saddle having an oscillating movement in a substantially vertical plane and being mounted in a turret which is connected to suitable mechanism for revolving the same.

The improved construction and assembly of parts as provided in the present invention enables the apparatus to be employed where limited areas prevent the successful operation of the old boom machines.

Another object of the present invention also lies in so arranging the various parts that great power may be developed and transmitted to the shovel; and the construction furthermore admits of an exceedingly quick operation of the shovel throughout its various movements.

In the accompanying drawings forming a part of this application, and in which similar reference symbols indicate corresponding parts in the several views:

Figure 1 is a side elevational view of an improved power shovel constructed in accordance with the present invention.

Fig. 2 is a top plan view of the same.

Fig. 3 is an enlarged view of a slightly modified form of saddle; and

Fig. 4 is an end elevational view of the saddle shown in Fig. 3.

Referring more particularly to the drawings, 1 indicates the turret mounted for revolution on a vertical axis supported in a platform 2 which is preferably provided with trucks and supported on wheels 3 for movement from place to place.

The turret, near its lower part, is provided with a channel 4 adapted to receive the cables by which the necessary revolving motion may be imparted to said turret. In the instance shown in the drawings there is a cable having its intermediate part divided into two sections 5 and 6, as shown in Fig. 2; the sections being wound about opposite ends of the drum 7. The ends of the cable are drawn out from the respective portions 5 and 6, and after being trained over pulleys 8 and 9 are passed in opposite directions about the turret channel 4. These ends of the cables are indicated at 10 and 11. As shown in Fig. 1, the end portion 11 of the cable is secured, as indicated at 12, to the channel or turret, and consequently when the drum 7 is rotated in one direction the cable 11 will revolve the turret 1; when, however, the drum 7 is rotated in the opposite direction the cable 5 will be paid out and the end portion 11 slackened to permit the revolving of the turret 1 in the opposite direction. This opposite motion just referred to is communicated by the end portion 10 of the cable which passes about the channel 4 in the opposite direction and is similarly secured thereto.

The divided parts 5 and 6 of the cable are alternately wound upon and paid out from the drum 7 as the motion of the latter is reversed, and consequently the cable ends 10 and 11 will cooperate to revolve the turret 1 in either the one or the other direction as controlled by the direction of rotation of said drum 7. The direction of rotation of this drum 7 is under the control of a reversible engine 13 mounted at the rear part of the platform 2, and this engine may be the steam engine usually employed for this purpose.

Any suitable power transmission may be arranged between the drum 7 and the power source 18, one form of which has been illustrated in the present drawings and comprises the pinion 14 driven from the engine 13 and disposed in mesh with a gear wheel 15 on a shaft 16. Loosely mounted on the shaft 16 is a pinion 17 arranged in constant mesh with a gear wheel 18 fixed and directly communicating rotation to the drum 7. The clutch parts 19 projecting from the pinion 17 are complementary to parts on the shiftable clutch collar 20, and by moving this latter clutch collar toward or away from the parts 19, the pinion 17 will be either connected or disconnected from the shaft 16

which is under rotation from the engine 13. The clutch 20 also is shiftable in the opposite direction to connect the pinion 21 to the shaft 16, and this pinion 21 is adapted to set in operation the mechanism which moves the wheels 3 and causes the platform 2 to be propelled along.

The turret 1 is built up of any suitable material in any suitable structure, it being only necessary that the turret be hollowed out or otherwise formed to receive the saddle 22 and to permit the same to oscillate therein in a substantially vertical plane. The saddle 22 is preferably arranged to oscillate about a shaft 23, and the necessary motion may be communicated to the saddle in any appropriate manner.

In Fig. 1 we have shown the saddle 22 as being formed with a segmental gear 24 arranged in mesh with a pinion 25 on a shaft 26 journaled in the upper part of the turret 1. A gear wheel 27 is fixed to the shaft 26 at one side of the turret, and is arranged in mesh with a pinion 28 driven by a power plant 29. This plant 29 may be a reversible steam engine, and by reversing same the saddle may be made to swing back and forth to bring the shovel to the required position.

The shovel is indicated at 30 and is of any suitable form to meet the needs of the material operated upon. It is carried on one end of a beam 31 which is fitted through the saddle 22 and is supported and guided thereby, it having a reciprocating movement. A rack 32 is carried by the underside of the beam 31, and such rack meshes with a pinion 33 mounted on the shaft 23 about which the saddle oscillates.

A pinion 34 meshes with the pinion 33 and a gear wheel 35 drives the pinion 34, both pinion and gear wheel being mounted on the same shaft 36. The drive pinion 37 which matches the gear wheel 35, is driven by a power source 38 also preferably a reversible steam engine. This steam engine is mounted upon the lower part of the turret above the channel 4, and is independent in its operation and control from the engine 29 which drives the saddle 22.

The shovel 30 is adapted to deposit the load through a rear door 39 suspended from suitable hangers and held closed by a latch 40 under the control of a cord 41 passing up to the platform, where it may be operated together with the various engine controls by a single workman. The load 40 is removed by pulling upon the string 41 when the shovel is in a position and at a place to deposit the load, and when in this position the door 39 will be lowermost. When the shovel returns to the lowered position, for instance shown in Fig. 1, the weight of the door and the lowered position of the shovel will contribute to bring the former to a

closed position and the latch 40 will automatically spring in place, where it will hold the door effectively closed until the cord 41 is again pulled upon.

We refer now to Figs. 3 and 4, in which a slightly modified form of saddle operating device is shown. The saddle 22 is, as before, formed with the webs 42 perforated as indicated at 43 to receive the shaft 23, and is formed with the opening 44 to receive the reciprocating beam 31. In this instance, however, the gear 24 is dispensed with and a less positive drive is provided. This drive is formed by cables 45 and 46 wound about and secured to the drum 47 which may be substituted on the shaft 26 for the pinion 25 shown in Fig. 1. The same power plant may then be employed to revolve the drum 47 in either direction.

The cables 45 and 46 pass in opposite directions from the drum 47 about a segmental channel 48 carried by the saddle 22, and after arriving at the ends of said channel 48 the cables 45 and 46 are passed respectively about pulleys 49 and 50 and connected to opposite ends of an elastic tension device shown at 51. This latter device may be of any suitable construction, of which there are a variety.

The operation of the invention may be briefly described as follows:

Referring to the form shown in Figs. 1 and 2, the shovel 30, when in the position shown in Fig. 1, may be thrust forward into the material by first of all putting the engine 38 into operation. The engine 38 will drive the pinion 33 in a clockwise direction, thus feeding the rack 32 and the beam 31 downward toward the right and causing the shovel 30 to advance into the material to the required point, after which this motion is discontinued. The second motion is that of raising the shovel 30 through the material in order to carry out the excavating operation in which the shovel becomes filled with the material. This motion is accomplished by setting the other motor 29 in action, this motor driving the pinion 25 and consequently the gear 24 with which it meshes.

The pinion 25 being driven in a right hand direction will cause the gear part 24 to swing toward the left, with the result that the beam 31 carried by the saddle 22 will be swung therewith and the shovel 30 will be elevated accordingly. When the shovel has received its load this motion is discontinued by stopping the engine 29, and the next following motion is to bring the shovel 30 to the required destination where the load is to be deposited. This generally involves the revolution of the turret 1, and is done by throwing the clutch collar 20 into engagement with the clutch parts 19 of the pinion 17.

The engine 13 being in motion, the gear 130

connections shown and above described, will impart the necessary rotation to the drum 7 in the direction determined, and the cable parts 10 and 11 will, as a consequence, be pulled upon and slackened and the turret 1 will accordingly be revolved. The engine should be stopped when the motion of the turret 1 is to be arrested, and either the engine 38 or the engine 29 may be then put into motion, dependent upon the final position to which the shovel 30 is to be moved.

In any event the shovel is in the raised position when the load is deposited, so that the weight of the load may open the door 39 when the latch 40 is released. After the load has been released the door 39 is closed, as above described, and the turret and other motions necessary are gone through to bring the shovel 30 back in position for a second operation upon the material, and the various steps above described are repeated.

Referring more particularly to Fig. 3, the drum 47 is put in operation in either a clockwise or counterclockwise direction, accordingly as the engine 29 is driven forward or reversed. When driven in a clockwise direction the drum 47 winds up the cable 46 and pays out the cable 45, with the result that the saddle 22 is swung toward the left. When, however, the drum 47 is rotated in the opposite direction, the opposite results are produced and the saddle 22 is moved toward the right.

It is obvious that those skilled in the art may vary the details of construction and arrangement of parts without departing from the spirit of our invention, and therefore we do not wish to be limited to such features except as may be required by the claims.

We claim:

1. In a power shovel, a platform, a turret on said platform, drive means on said turret, a reciprocating beam, means carried by said beam for cooperating with said drive means whereby the beam may be reciprocated, a shovel attached directly to one end of said reciprocating beam, a saddle mounted in said turret so as to be capable of an oscillating motion about a substantially horizontal axis, said saddle provided with a hollow sleeve for slidably receiving said reciprocating beam and having an arcuate edge, and means engaging said arcuate edge for oscillating said saddle whereby the shovel may be raised and lowered by power transmitted through said saddle and beam and from the beam directly to said shovel, substantially as described.

2. In a power shovel, a platform, a turret on said platform, a pinion on a horizontal axis in said turret, means to rotate said pinion, a beam arranged to reciprocate and having a rack meshing with said pinion whereby the beam may be driven back and forth, a shovel attached directly and rigidly to said beam, a saddle fitted to rock about the axis of said pinion and having a hollow sleeve to slidably receive said reciprocating beam, said saddle having an arcuate edge struck from the axis of said pinion, and means in contact with said arcuate edge for rocking the saddle whereby to raise and lower the shovel by power transmitted through the saddle and beam and through the beam directly to the rigidly attached shovel, substantially as described.

3. In a power shovel, a platform, a turret mounted to rotate on a vertical axis and having a channeled base, cables passing in opposite directions about said base, means acting through said cables to rotate the turret in either direction, a pinion on a horizontal axis in said turret, means to rotate said pinion, a beam arranged to reciprocate and having a rack meshing with said pinion whereby the beam may be driven back and forth, a shovel attached directly to said beam, a saddle fitted to rock about the axis of said pinion and having a hollow sleeve to slidably receive said beam, said saddle having an arcuate edge, means in contact with said edge for rocking the saddle whereby to raise and lower the shovel by power transmitted through the saddle and beam, substantially as described.

4. In a power shovel, a platform, a revolvable turret on said platform, a saddle mounted in said turret so as to be capable of oscillation in a substantially vertical plane, said saddle formed with a sleeve, a beam fitted to reciprocate in said sleeve, a shovel rigidly and directly attached to said beam, means to reciprocate said beam and attached shovel, said saddle having a segmental channel, cords passing in opposite directions about said channel, an elastic tension device connected to ends of said cords, a pulley, the other ends of the cords wound in opposite directions about said pulley, and means to rotate said pulley in either direction, substantially as described.

In testimony whereof, we affix our signatures.

WILLIAM SHAFER PRIMROSE.
HARRY H. SCHWENNING.