Jan. 25, 1927. 1,615,284

A. T. KENNEDY

SHOVELING MACHINE

Filed July 10, 1926 2 Sheets-Sheet 1

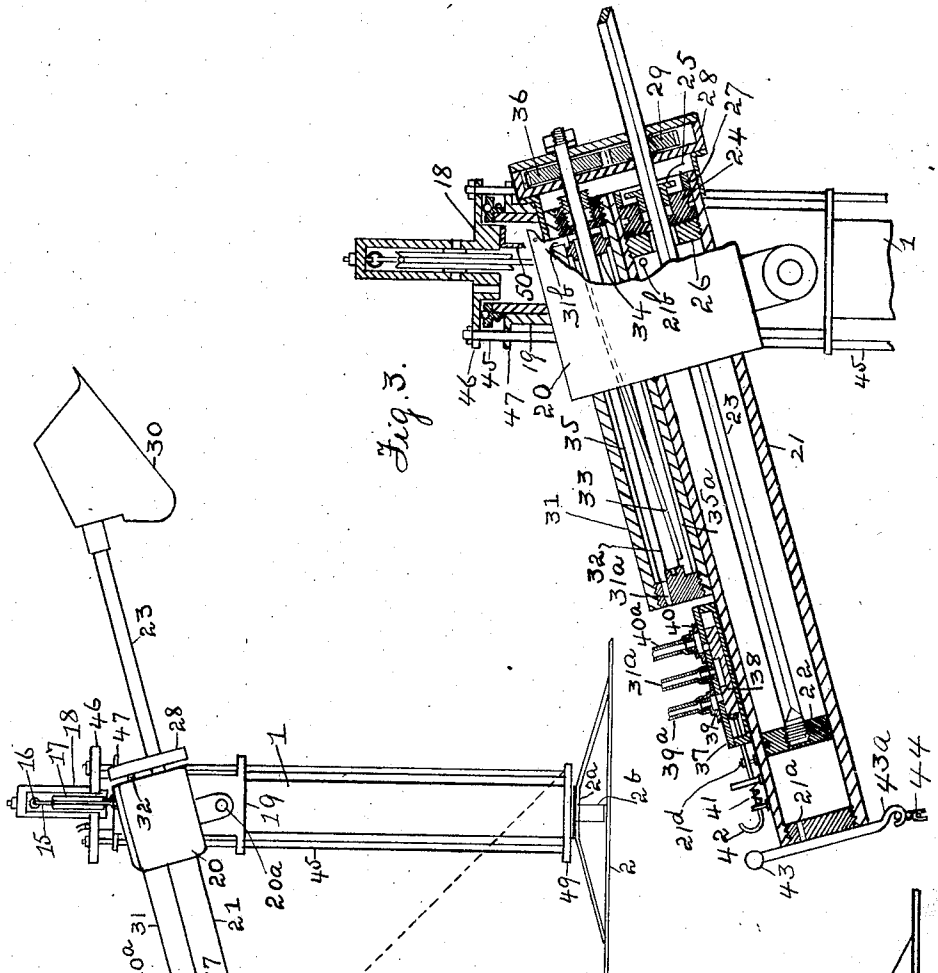


Fig. 1.

Fig. 3.

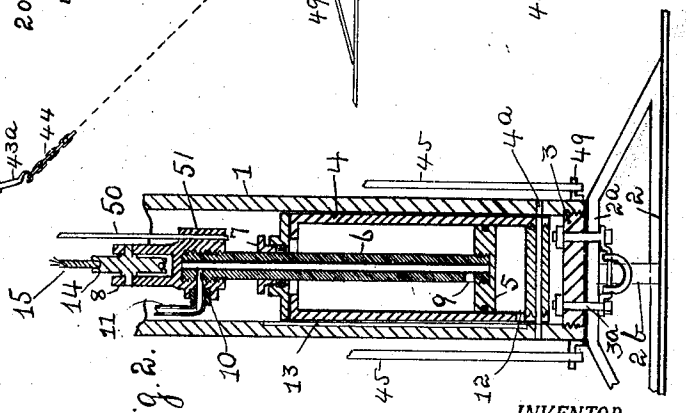


Fig. 2.

Witnesses
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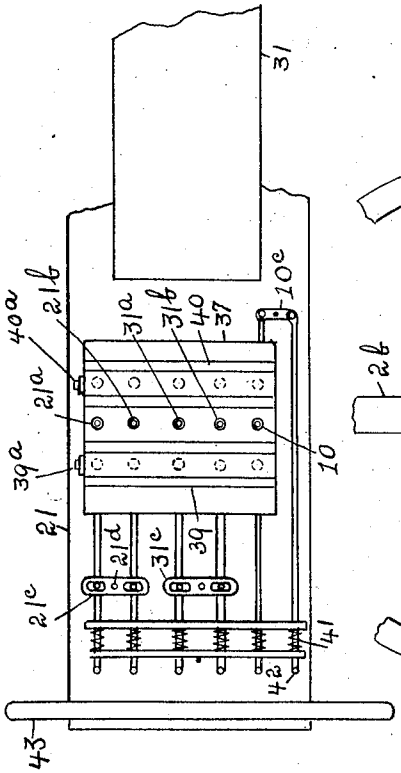


Fig. 4

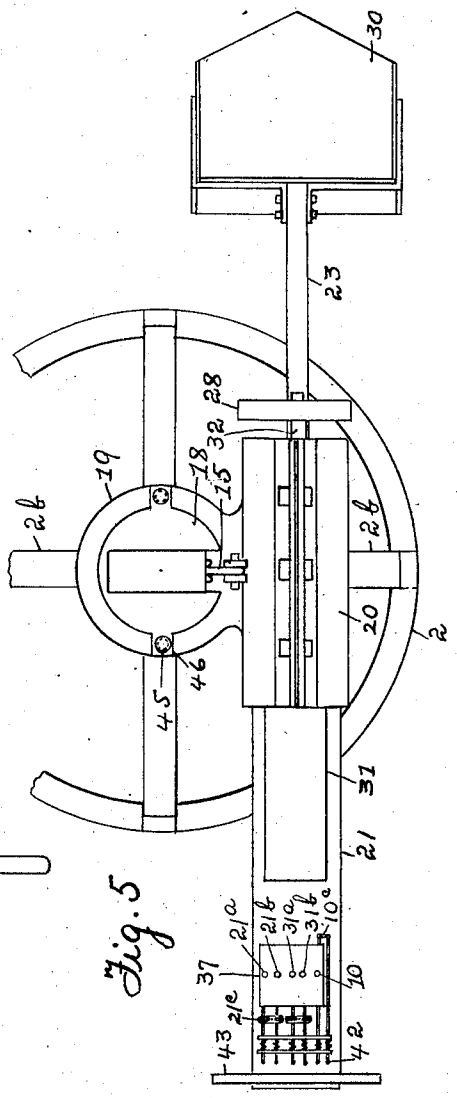


Fig. 5

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UNITED STATES PATENT OFFICE.

ARTHUR T. KENNEDY, OF DULUTH, MINNESOTA.

SHOVELING MACHINE.

Application filed July 10, 1926. Serial No. 121,702.

My invention relates to shoveling machines and has for its object the provision of a simple, durable, efficient and convenient fluid-operated shoveling machine, adapted for use in underground mining, or in other places where there is but little working space.

With these and other objects in view, it consists of the constructions, combinations and arrangements of parts hereinafter described and claimed.

In the drawings, Fig. 1, is a side elevation of my said invention. Fig. 2, is an enlarged central vertical section of the hereinafter described base, and of the lower end of a tubular post mounted thereon, and of a hoisting cylinder positioned in said post. Fig. 3, is an enlarged central vertical section partly in elevation of the upper end of said post and of a vertically reciprocable collar thereon; also an enlarged central vertical section, partly in elevation, of a shovel driving mechanism and a shovel turning mechanism (omitting the shovel) mounted on said collar. Fig. 4, is an enlarged top plan detail of the rearward ends of the power cylinders and valve chambers and valve stems of said driving and turning mechanisms, and Fig. 5, is a top plan view of said shovel, partly broken away.

In the drawings, a tubular post 1, is mounted upon, and secured in any suitable manner to a base of any suitable structure, preferably comprising a circular horizontal bottom flange 2, an elevated central hub 2^a, and radial supporting legs 2^b extending between said hub and flange. The lower end of said post is closed by any suitable means or in any suitable manner as by a screw plug 3. Said post is secured to said base in any suitable manner, or by any suitable means, as by bolts 3^a passed through said plug 3, and said hub.

Within said post, near the lower end thereof is positioned a vertical power cylinder 4, preferably supported upon said post and prevented from turning therein by a rod 4^a projected through said post and through the lower end of said cylinder. Within said cylinder is a piston 5 secured in any suitable manner to a tubular piston rod 6, which extends upwardly through a packing gland 7 and outwardly of the upper end of said cylinder. The upper end of the vertical or axial passage in said tube is closed in any suitable manner or by any suitable means, as by a sheave clevis 8 secured to the upper end of said tube. A port 9 formed in the lower end of said rod communicates with the vertical or axial passage in said tubular rod and with the space around said rod within said cylinder above the piston. A port 10 near the upper end of said tubular rod communicates with the vertical passage in said tube and through a flexible pipe or hose 11 with an hereinafter described valve, by which pipe or hose, power fluid of any suitable nature, as compressed air, is introduced to, or is exhausted from said cylinder above the piston. To prevent suction or compression below said piston a port 12 is formed in the wall of said cylinder near its lower end and is adapted to communicate at all times with the space in said cylinder below the piston and with the atmosphere. If the cylinder wall is in contact with the interior face of the side wall of said post adjoining said atmospheric port, the face of said side wall may be scored, as at 13, to admit the flow of air to or from the upper end of said post from or to said atmospheris port. Since the base or lower end of said post may occasionally stand in water, it is not advisable to provide any open port extending through said post near the lower end thereof.

Mounted in said clevis is a sheave 14, adapted to engage a cable 15, which is secured at one end to an overhead anchorage 16 and is passed below said sheave 14 and thence over an overhead or cap pulley or sheave 17 and is secured at its opposite end to the hereinafter described vertically reciprocable collar on said post.

Said anchorage and said cap sheave are mounted on a horizontal rotatable head or cap 18 positioned on the upper end of said post.

Encircling said post is a vertically reciprocable collar 19, upon one side of which is pivotally mounted a bracket or stirrup 20 of any suitable structure, upon which are supported a shovel driving mechanism and a shovel turning or dumping mechanism. Said driving mechanism comprises a driving cylinder 21, containing a piston 22 secured to a piston rod 23 of non-circular cross-section which rod extends outward of one end of said driving cylinder through a rotatable sleeve 24 and packing gland 25 of any suitable structure secured to said sleeve. A bearing or supporting ring 26 for supporting the inward end of said sleeve is prefer-

ably mounted in said cylinder in any suitable manner and a retaining ring 27 is preferably mounted in the adjacent end of said cylinder for retaining said sleeve therein. Said rod 23 continues outwardly through a gear box 28 and a gear 29 therein, which gear is adapted to rotate said rod, and through which gear said rod is adapted to slide. To the outward end of said rod is secured a shovel 30 of any suitable structure.

The shovel turning mechanism hereinbefore referred to, comprises a cylinder 31 in which is mounted a longitudinally stationary rotatable shaft 32 having a thread or rib 33 formed thereon extending approximately from one end to the opposite end of the portion of said shaft within said cylinder and extending approximately one half of the distance around said shaft. Mounted upon said shaft 32 is a reciprocable piston 34 adapted on opposite sides to slide in longitudinal grooves 35, 35^a, formed in the wall of said cylinder, through which piston said rib extends, whereby said piston is adapted during its passage from end to end of said cylinder, to turn or counter-turn said shaft one half of a revolution. Said shaft 32 extends outward of the forward end of said cylinder and through said gear box and through a gear 36 which is keyed to said shaft which gear 36 is adapted to engage said gear 29, whereby the turning of said shaft 32 and gear 36 operates to turn said gear 29 and rod 23 one half revolution to turn over or dump said shovel.

Each of said cylinders 21 and 31 is provided with a port at each end, as 21^a, 21^b, 31^a, 31^b, for the purpose of conducting power fluid thereto and conducting the exhaust therefrom—a single port in each case being adapted to operate as both intake and exhaust port; and for the purpose of distinction each said port may be designated as an alternative port. The port 10 in said piston rod 6 may also be designated as an alternative port. Each of said alternative ports is connected in any suitable manner as by a pipe or flexible hose with a respectively corresponding port in a valve box 37 mounted upon the rearward end of said cylinder 21. For the purposes of description and brevity, each alternative port may be regarded as including a cylinder end, a valve box end and a connecting pipe or hose between said ends, which ports may be positioned in any suitable and desirable places, and which connecting pipes may extend in any suitable and desirable directions. Preferably the connecting hose between the cylinder end of the port 10 and its valve box end extends from the piston rod 6 upwardly through the cap 18 and thence to the corresponding valve box end. Each alternative port is adapted at its valve box end to be governed by a relatively independent slide valve, as 38, adapted to connect the corresponding alternative port alternately with a corresponding port, as 39^a, in a power fluid supply manifold 39, or with a corresponding port as 40^a in an exhaust manifold 40. The stems of the valves governing the alternative ports 21^a and 21^b respectively are preferably connected by a link as 21^c which is pivoted centrally to a stationary anchorage 21^d, whereby the valve governing the port 21^a is moved forwardly to connect said port with the exhaust manifold when the valve governing the port 21^b is drawn back to connect the port 21^b with the power fluid supply manifold. In like manner and for a similar purpose the stems of the valves governing the ports 31^a and 31^b respectively are connected by a pivoted link as 31^c. The valve governing the port 10, is preferably provided with a valve stem at each end, so that it may be pulled in either direction, one of said stems including a bell-crank lever 10^c to enable the operator to pull in one direction in order to operate the valve in either direction. Each valve is also governed by a retracting spring as 41, of any suitable structure or position to retract the valve to central or neutral position when the valve is released by the operator. A finger hold 42 is preferably formed on the free end of each valve stem.

Secured to the rearward end of said cylinder 21 is a handle bar 43, for swinging said collar 19 and parts mounted thereon around said post and for tilting said bracket 20 on its pivot 20^a. Said handle 43 is preferably so placed that the operator can reach any of the said finger holds of said valves without taking his hands off of said handle. Depending from said handle is a hook 43^a adapted to engage a chain stay 44 which extends to any suitable anchorage near or beyond the bottom of said post whereby the rear end of said shovel-driving cylinder may be held down and its forward end and the shovel retained in an upward tilted position. Said stay also serves to shift the center of equilibrium of said post.

It will be observed that to prevent the twisting of said cable 15, it is desirable to have said cap 18 rotate with said collar 19, to assure which action torsion rods 45 are extended through ears 46 on said cap and loosely through ears 47 on said collar 19, and through ears 48 on a loose collar 49 encircling said post near the foot thereof. When, therefore, said collar 19 turns around said post, its turning action is communicated through said rods to said cap.

A cheek bar 50 secured to said cap extends downwardly through an eye 51 on one side of the clevis 8 and is adapted to bear against the side of said clevis and turn it together with said rod and piston when the cap turns.

In operation, said machine being in posi-

tion facing the breast of material to be loaded, with the shovel at the desired digging level, the operator pulls the valve which admits power fluid behind the piston 22 which is thus driven ahead, forcing the shovel into the material to be shoveled. The operator then bears down yieldingly on the handle bar causing the shovel to tilt upward, and at the same time pulls the valve which admits power fluid to the cylinder 4 above the piston therein, which in descending draws down the rod 6, and the sheave 14, and the loop of the cable 15, thereby raising the collar 19 and bracket 20 and said shovel to the desired height said valve returning to inoperative or neutral position upon being released.

The operator may then engage said stay with said hook.

The operator may then swing said bracket, and the parts mounted thereon, around said post so that the shovel will come over a car or a traveling belt, not shown, or other receptacle for the material being shoveled. The operator then pulls the valve which controls the admission of power fluid to the proper end of said cylinder 31, thus causing the piston therein to turn the gear shaft in said cylinder and the gear 36, which, being in mesh with the gear 29 on the shovel rod, turns said rod 29, and shovel over, to dump said shovel.

The operator then rotates or counter rotates said collar and bracket to return said shovel to its original direction and draws the proper valves to operate the machine to right said shovel and retract the shovel arm to driving position. The pressure in cylinder 4 is then relieved and the collar 19 and bracket 20 and parts mounted thereon are permitted to descend by gravity to the desired level. It will be understood, however that, there may be several variations of said procedure.

It is obvious that the structure embodying my said invention may be altered or modified in various particulars within the spirit and scope of certain of my claims.

I claim:

1. In a shoveling machine, the combination of a base, a stationary tubular post erected upon said base, a vertical power cylinder positioned in the lower end of said post, a piston in said cylinder and a piston rod extending upwardly therefrom, a sheave mounted on the upper end of said rod, a vertically reciprocable horizontally rotatable collar encircling said post, a cap mounted on said post, a sheave mounted on said cap, flexible hoisting means secured at one end to a vertically stationary anchorage and at its opposite end to said collar, said flexible means engaging said sheaves intermediate of its ends, a second power cylinder pivotally mounted on said collar and extending transversely of said post, said second power cylinder containing a piston, a piston rod secured to the said second piston and extending through one end of said second cylinder, a shovel mounted upon the free end of the second piston rod, means for turning the rod upon which said shovel is mounted, said cylinders being provided with power fluid intake and exhaust ports, and means for governing the flow of power fluid to said ports and for governing the flow of exhaust fluid therefrom.

2. In a shoveling machine, the combination of a base, a stationary tubular post erected upon said base, a vertical power cylinder positioned in the lower end of said post, a piston in said cylinder, a piston rod secured to said piston and extending upwardly and outwardly of said cylinder, a sheave mounted upon the upper end of said rod, a vertically reciprocable horizontally rotatable collar encircling said post, a cap mounted on said post, a sheave mounted on said cap, flexible hoisting means secured at one end to a vertically stationary anchorage and at its opposite end to said collar, said flexible means engaging said sheaves intermediate of its ends, a second power cylinder pivotally mounted on said collar and extending transversely of said post, said second cylinder containing a piston, a rotatable sleeve in the forward end of said second cylinder, a piston rod secured to the piston in said second cylinder and slidably extending through said sleeve, a shovel mounted on the free end of the latter said rod, a gear mounted upon said rod and adapted to turn the same, said rod being adapted to slide in said gear, a third power cylinder mounted upon said collar and containing a rotatable piston rod, a piston slidably meshed with said third cylinder and with said rotatable rod therein and adapted to turn said rotatable rod a half revolution while sliding on said rod, said rotatable rod extending outwardly of said third cylinder at one end and having a gear keyed to said outward end adapted to mesh with said gear on said shovel carrying rod, said cylinders being provided with power fluid intake and exhaust ports, and means for governing the flow of power fluid to said ports and for governing the flow of exhaust fluid therefrom.

3. In a shoveling machine, the combination of a base, a tubular post erected upon said base, a vertical power cylinder positioned in said post near the lower end thereof, a piston within said cylinder, a piston rod secured to said piston and extending upwardly out of said cylinder, a horizontally rotatable cap mounted on said post, a sheave journalled on said cap, a vertically reciprocable horizontally rotatable collar encircling said post, hoisting means en-

gaging said sheave and connected to said collar and rod for raising said collar, a bracket pivotally secured to said collar, cylinders supported on said bracket, a piston rod extending from one of said bracket supported cylinders, a shovel mounted upon and secured to said latter piston rod, a counter shaft extending from the other of said bracket supported cylinders, a piston slidably meshed with the latter cylinder and with said countershaft for turning said countershaft during the sliding movement of said piston and for preventing said shaft from turning while said piston is not sliding, transmission gears engaging said countershaft and said shovel rod for communicating the rotary movement of said countershaft to said shovel rod and for preventing the turning of said shovel rod when said countershaft is not being turned by said sliding piston, and means for connecting said cylinders with a source of power fluid supply and for conducting exhaust fluid away from said cylinders.

4. The combination of a base, a hollow post erected upon said base, a vertically reciprocable and horizontally rotatable collar encircling said base, a bracket pivotally secured to said reciprocable collar, a cylinder mounted on said bracket, a piston in said cylinder, a piston rod extending out of one end of said cylinder, a second cylinder mounted on said bracket, a shaft extending into said second cylinder, fluid operated means within said second cylinder adapted to turn said shaft on its longitudinal axis, transmission means for transmitting a rotary impulse from said shaft to said rod when said shaft is turning and for preventing the rotation of said rod when said shaft is stationary, and means connected to said collar and including fluid operated means within said post for raising said collar.

5. The combination of a base, a hollow post erected upon said base, a horizontally rotatable cap positioned on said post, a sheave mounted on said cap, a vertically reciprocable and horizontally rotatable collar encircling said post, a shovel, means supported by said collar for supporting and reciprocating said shovel transversely of said post, means supported by said collar for rocking said shovel, flexible means extending over said sheave for lifting said collar and hauling means engaging said flexible means within said post.

6. The combination of a base, a hollow post erected upon said base, a vertically reciprocable and horizontally movable bracket loosely engaging said post and adapted to swing around the same, a shovel, means supported by said bracket for supporting and reciprocating said shovel transversely of said post, means supported by said bracket for rocking said shovel, and hauling means partly positioned within said post and connected to said bracket for lifting said bracket.

In testimony whereof, I hereunto affix my signature.

ARTHUR T. KENNEDY.