

F. S. WICHMAN.
 AUTOMATIC TRIPPING MECHANISM FOR STEAM SHOVELS.
 APPLICATION FILED SEPT. 28, 1909.

980,375.

Patented Jan. 3, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

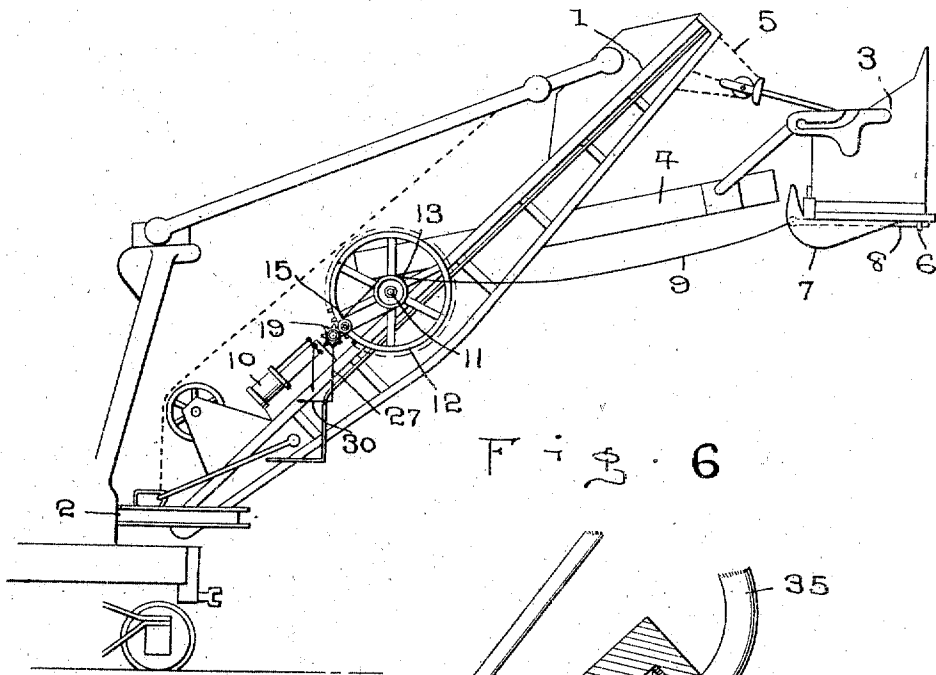
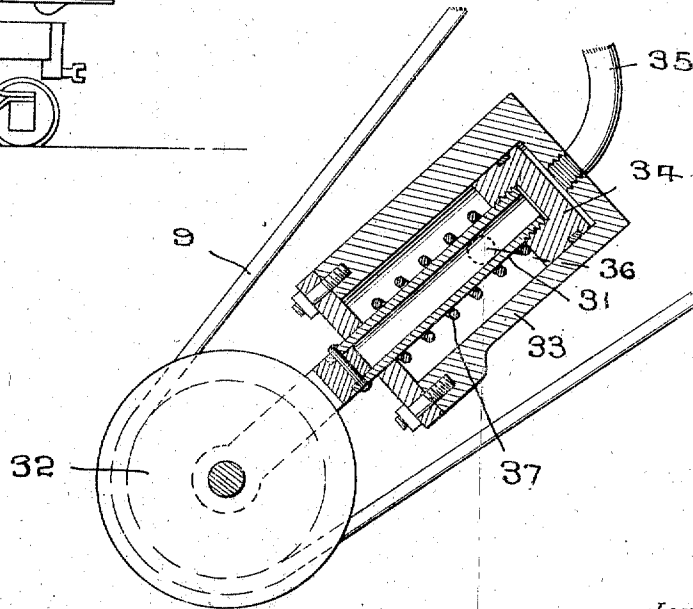


Fig. 6.



WITNESSES

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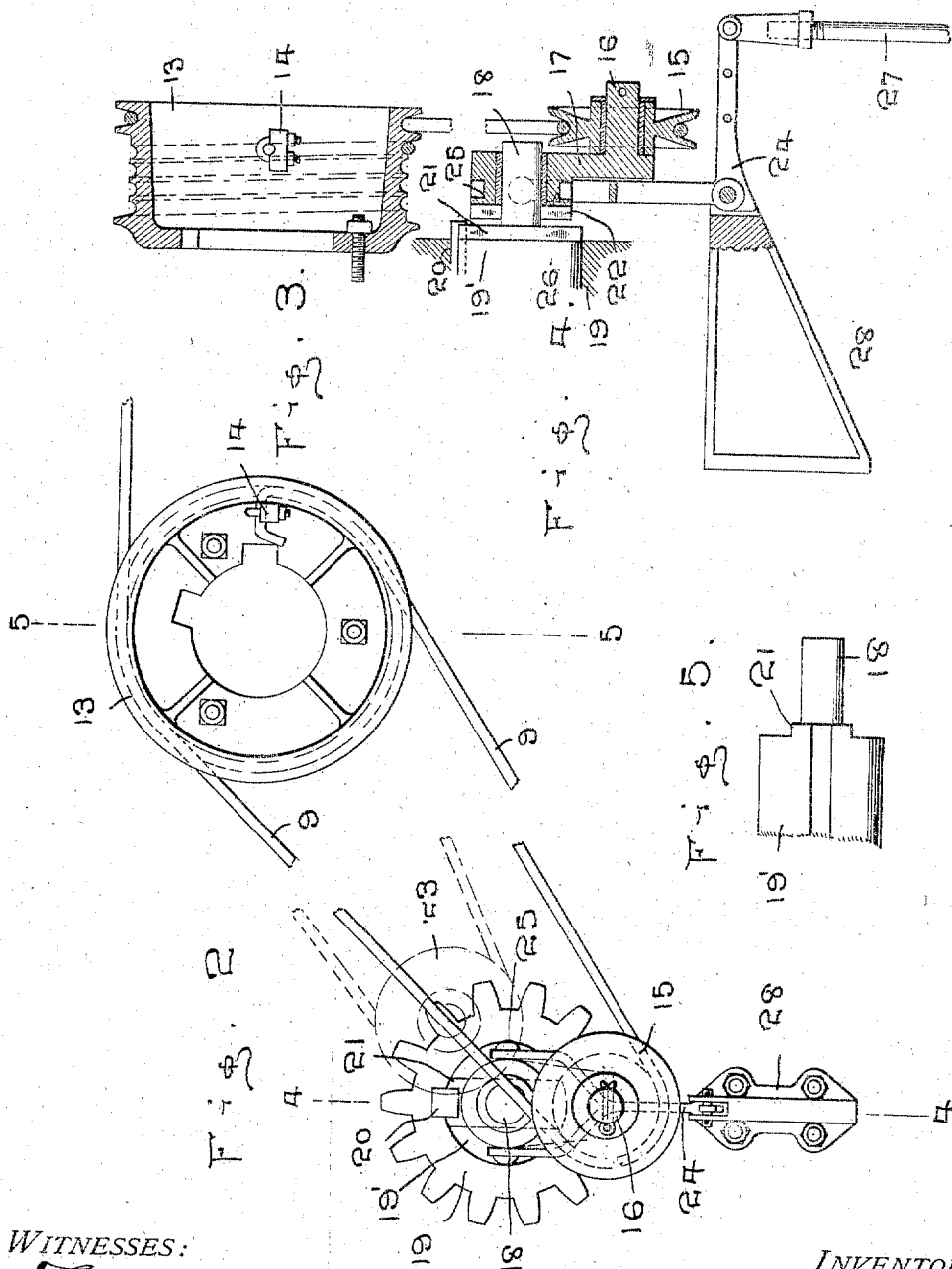
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UNITED STATES PATENT OFFICE.

FRANK S. WICHMAN, OF CULEBRA, PANAMA.

AUTOMATIC TRIPPING MECHANISM FOR STEAM-SHOVELS.

980,375.

Specification of Letters Patent.

Patented Jan. 3, 1911.

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To all whom it may concern:

Be it known that I, FRANK S. WICHMAN, a citizen of the United States, residing at Culebra, Canal Zone, Panama, have invented certain new and useful Improvements in Automatic Tripping Mechanism for Steam Shovels or Dredges; and I 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.

My invention relates to new and useful improvements in automatic tripping mechanism for steam shovels or dredges and my object is to provide means for automatically opening the door, which closes one end of the dipper or shovel of the machine.

A further object is to attach a cable to the door opening mechanism whereby the same may be released at a point a distance from the door.

A further object is to retain the cable in a taut state and prevent the same from sagging as the shovel is moved toward or from the supporting boom or crane therefor.

A further object is to provide means for giving a pull to that portion of the cable connected to the door opening mechanism whereby the door will be released and permitted to open, and a further object is to provide means for causing the parts employed for moving the cable lengthwise to release the door, to automatically operate to move the cable.

Other objects and advantages will be hereinafter referred to and more particularly pointed out in the claims.

In the accompanying drawings forming part of this application, Figure 1 is a side elevation of the boom end of a steam shovel and operating mechanism therefor, showing my improved device attached thereto. Fig. 2 is a detail elevation of the winding drum for the cable and the parts employed for moving the cable to release the door of the shovel. Fig. 3 is a sectional view as seen on line 5-5, Fig. 2. Fig. 4 is a sectional view as seen on line 4-4, Fig. 2. Fig. 5 is a plan view of the engine shaft to which the cable-operating mechanism is attached, and, Fig. 6 is a sectional view of a push piston employed for giving a pull on the cable to release the latch.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, 1 in-

dicates a boom such as is usually employed in connection with a steam shovel or dredge, which boom is suitably mounted upon a frame 2.

Operatively mounted upon the boom 1 in the usual or any preferred manner is a shovel or dipper 3, which is operated through the medium of the usual form of handle 4, said handle being employed for moving the shovel toward or from the boom, the shovel being raised or lowered by means of chains or cables 5, as is the usual practice.

At the lower end of the shovel 3 is a door 6, which is adapted to close the lower end of the shovel to retain the particles gathered thereby and in order to provide means for readily emptying the shovel without tilting the same, the door is mounted upon hinges 7, whereby the door may be swung from below the shovel and the contents of the shovel emptied, said door being held in its closed position by means of any suitable form of latch mechanism 8 and in order to operate the latch to release the door while the shovel is in an elevated position, a cable 9 is attached to one end of the latch mechanism, and extended to a point on the boom adjacent the position of an engine 10 employed to operate the handle.

The handle 4 is operated to move the shovel toward or from the end of the boom by providing any suitable form of rack (not shown) and engaging the same with a pinion on a shaft 11, said shaft being operated from the engine 10 through the medium of a gear 12 and a pinion 19 and as said shovel is moved toward or from the boom, a cable of sufficient length to extend from the boom to the shovel when said shovel is extended at its greatest distance from the boom is required and it will be readily seen that in view of this fact, the cable would sag when the shovel was in position adjacent the boom and to this end I have provided means for retaining the cable in a taut position at all times. This result is accomplished by attaching to the gear 12 or forming integral therewith, a drum 13, to which one end of the cable is attached, the end of the cable being introduced through an opening in the face of the drum and engaged with a tie block 14 and as the drum rotates with the gear 12 it will be readily seen that the cable will be paid out or wound upon the drum as the shovel is extended or moved toward the boom, thereby holding the cable taut at

whatever position the shovel may be in. In winding the cable in this manner to take up slack, the cable will not receive a sufficient amount of pulling strain to release the latch 8 as the drum is the same in diameter as the pinion used to operate the scoop handle, consequently winding or unwinding co-incident to the travel of the handle. In order to release the latch, however, the cable on its passage to its connection with the latch is extended around a sheave 15, which sheave is mounted upon a wrist pin 16 carried by a crank arm 17, said crank arm being in turn rotatably mounted upon a stub shaft 18, which is formed integral with the engine shaft 19', and on said engine shaft is mounted the pinion 19, which is fixed to the shaft by means of a key 20, which key is entered into suitable seats in the shaft and pinion. Also formed integral with the end of the shaft 19' or attached thereto by any suitable means and projecting beyond the outer face of the pinion is a lug 21, said lug being concentric with the stub shaft 18, which lug is adapted to engage a groove or clutch 22 in the inner face of the pivoted end of the crank arm 17 and by moving the clutch into engagement with the lug the crank arm and parts carried thereby, will be caused to rotate with the shaft 19'.

The sheave 15 and supporting arm therefor normally rest in the position shown by dotted lines at 23 in Fig. 2, but when it is desired to release the door of the shovel, the crank arm 17 is moved inwardly toward the face of the pinion 19 and the clutch 22 engaged with the lug 21 and as said lug and shaft to which the same is attached, are rotated, the sheave 15 and crank arm are rotated with the shaft away from the position shown in dotted lines and moved to the position shown in full lines in said Fig. 2 and as the drum 13 is held against inverse rotation, that portion of the cable 9 extending from the sheave to the latch 8, is given a rearward pull, thereby releasing the latch and permitting the door to swing open.

The clutch and crank arm are operated through the medium of a bell crank lever 24, the vertical arm of which is bifurcated and provided with pins 25, which enter a groove 26 in the periphery of the socket portion of the crank arm 17, while the horizontally extending arm of the lever 24 has attached thereto a depending rod 27 and as the bell crank lever 24 is pivoted to the bracket 28, which bracket is in turn carried by the boom 1, an upward thrust of the rod 27 will move the clutch into engagement with the lug 21 and operate the crank arm and sheave mounted thereon.

The lower end of the rod 27 is attached to a hand lever 30, which lever is pivotally mounted on parts of the boom frame 1, one end of the lever engaging the rod 27 and

it will be readily seen that by moving the free end of the lever downwardly, the rod 27 will be given an upward thrust and the clutch moved into engagement with the lug at the end of the engine shaft.

As soon as the pressure on the lever is released, the weight of the rod 27 will immediately release the clutch from the lug, whereupon the weight of the cable 9 will immediately return the pinion and crank arm to their initial upward position and while in this position, the cable may be freely wound and unwound from the drum 8 without releasing the latch on the scoop 4.

In Fig. 6 of the drawings I have shown a different means for moving the cable lengthwise to release the latch 8; which means comprises a push piston 31, which is bifurcated at its outer end to receive a sheave 32, around which the cable 9 is extended, said piston being slidably mounted in a cylinder 33 and has attached to its inner end the usual or any preferred form of piston head 34. The steam pipe 35 is connected to the closed end of the cylinder 33 and extends to the feed pipe of the engine 10, so that when it is desired to operate the latch to release the door, steam is entered into the pipe and into engagement with the piston head 34, forcing the same outwardly and moving the cable 9 lengthwise a sufficient distance to operate the latch, an escape port 36 being provided at a suitable point in the cylinder to permit the steam to escape as soon as the outward stroke of the cylinder has been completed. As soon as the latch has been released, the steam is turned off from the pipe 35, whereby the piston will be immediately returned to its initial position by means of a spring 37, which spring surrounds the piston rod 31 between the end of the cylinder 33 and the piston head 34. When this form of device is used, the crank arm 17 and sheave carried thereby are dispensed with and the cylinder 33 mounted upon the frame of the boom 1, or other suitable location and the cylinder portion of the operating device placed toward the drum, upon which the cable is to be wound, and when steam is entered into the cylinder, the sheave 32 will be moved away from the drum. Instead, however, of giving a thrust to the piston to operate the cable, the cylinder may be turned end for end and the piston normally extended, whereupon a pull will be required to move the cable lengthwise to release the latch, in which instance the steam pipe is entered into the cylinder at the opposite end thereof, so that when steam is entered therein, the piston 31 will be moved into the cylinder and in this instance, the spring is to be mounted directly into the cylinder and on the opposite side of the piston head from that shown in Fig. 6.

It will thus be seen that I have provided

a mechanism for retaining the cable normally taut while the shovel is being operated and moved toward and from its supporting boom and one that can be attached to any make of steam shovel or dipper dredge and it will be likewise seen that I have provided suitable means for automatically releasing the door of the shovel when it is desired to empty the contents of the shovel.

It will be noted that in the above description, I have used steam for the motive power, but I do not limit myself to this form and may use any other form of power desirable.

What I claim is:

1. In a tripping mechanism for shovels, the combination with a boom, a shovel operatively mounted thereon, a gear and drum operating with the driving means for said shovel, a sheave and crank arm carried by a shaft on said driving means and a cable passed over said sheave, the ends thereof being engaged with said drum and shovel, respectively; of a clutch on said crank arm, a lug on said driving means and means to throw said clutch into engagement with said lug, whereby said crank arm and sheave will be rotated.

2. The combination with an engine shaft and stub shaft carried thereon, said engine shaft also having a lug thereon; of a crank arm mounted on said stub shaft, a sheave mounted on said arm and cooperating with

a drum and shovel, said arm also having a clutch thereon and means to move said clutch into engagement with said lug, comprising a bracket, a bell crank lever pivoted to said bracket, said lever also being bifurcated and secured to said crank arm and a depending rod secured to the free end of said lever, whereby when said rod is moved upwardly, said clutch is engaged and the crank arm and sheave rotated with the engine shaft.

3. In a device of the character described, the combination with a boom, a shovel operatively mounted thereon, and driving means for said shovel; of a tripping mechanism comprising a cable having one end thereof secured to said shovel, a drum mounted on said boom to which the opposite end of said cable is secured, a sheave engaging said cable between said drum and shovel, a crank arm carried by a shaft on said driving means, said crank arm having said sheave mounted thereon, a clutch on said crank arm, a lug on said driving means and means to engage said clutch with said lug, whereby said crank arm and sheave will be moved in the arc of a circle.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK S. WICHMAN.

Witnesses:

DUANE T. McNABB,
K. DAVITT.