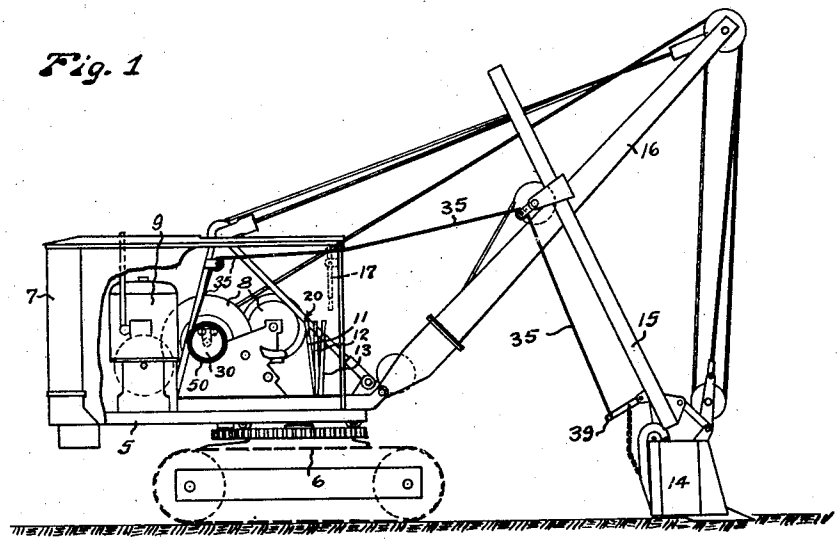
Nov. 3, 1931. A. CALABRESE 1,830,224

DUMP MEANS FOR POWER OPERATED SHOVELS

Filed July 3, 1929

Fig. 1



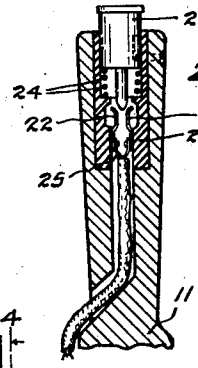


Fig. 2

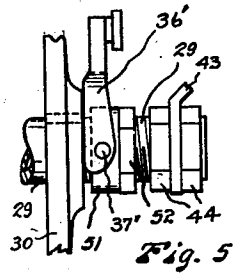


Fig. 5

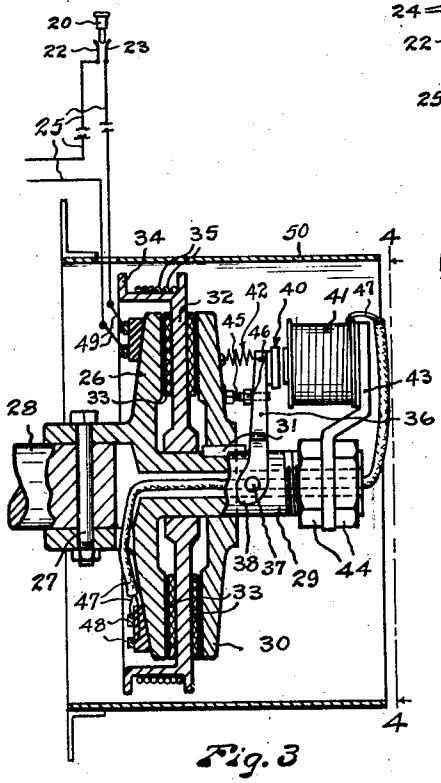


Fig. 3

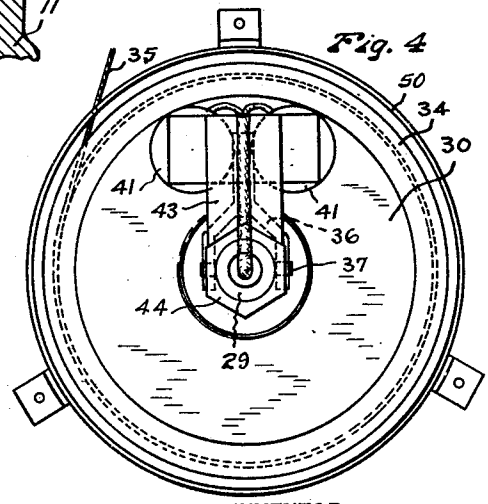


Fig. 4

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UNITED STATES PATENT OFFICE

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DUMP MEANS FOR POWER OPERATED SHOVELS

Application filed July 3, 1929. Serial No. 375,685.

My invention relates to improvements in automatic means for dumping the dippers of power operated shovels and the general object of my invention is to provide mechanism of this nature in which the dump means control is placed within or on the grip portion of one of the operating levers whereby said dump means control may be operated without necessitating the removal of the operators hand from the lever.

Another object is to provide dump mechanism of this nature which is controlled electromagnetically.

A further object is to provide dump means of this nature embodying friction clutch mechanism of improved construction.

Other objects are to provide dump means of this nature which are simple and efficient in construction, which will save time and labor on the part of the operator and which will make it possible to do more work with a power operated shovel and to discharge the load more accurately and efficiently.

Other and more specific objects will be apparent from the following description taken in connection with the accompanying drawings.

Power operated shovels of a type now in common use are manipulated by one man and usually have three operating levers for controlling the movement of the dipper, which levers require substantially constant attention during the operation of the shovel. In addition to this it is common practice to provide an additional or fourth lever which controls the dumping and requires the removal of one hand from the three operating levers for dumping the dipper. The removal of one hand from the operating levers consumes time, slows up the operation of the shovel, tires the operator and often makes its difficult to dump the moving bucket at the exact location desired. In accordance with my invention I provide power operated means for dumping the bucket and place the control member of said power operated means within, or on, the grip member of one of the operating levers so that said control member may be moved to dump the dipper without requiring the removal of the hand from the lever, or in any way interfering with the operation of the lever.

In the accompanying drawings Figure 1 is a somewhat diagrammatic view of a power operated shovel having my control means installed thereon for dumping the dipper.

Fig. 2 is a detached, fragmentary sectional view showing the grip end of a lever in which a push button type switch is installed.

Fig. 3 is a detached view partly in section and partly in elevation of a winding drum and electromagnetically operated clutch embodied in the invention.

Fig. 4 is an elevation substantially on broken line 4—4 of Fig. 3.

Fig. 5 is an elevation showing a fragment of an alternative form of mechanism for operating the clutch.

Like reference numerals designate like parts throughout the several views.

Referring to Fig. 1, I show, somewhat diagrammatically, a power operated shovel embodying a turntable 5, mounted on caterpillar treads 6, and supporting a housing 7, within which is disposed the usual winding drums 8, operated by an internal combustion engine 9.

Three operating levers 11, 12, and 13 are mounted toward the forward end of the turntable 5. These levers are the control levers for a dipper 14, which is mounted on the outer end of a dipper arm 15 that is supported from a boom 16. A fourth lever, indicated by broken lines 17, has heretofore ordinarily been supported in an inverted position near the three operating levers for dumping the dipper. The operation of this dumping lever 17 requires the removal of one hand from the levers 11, 12, 13, and thus slows up the operation of the dipper and results in a loss of time. It is the object of my present invention to dispense with this fourth dumping lever 17 and provide a more quickly operated means for dumping the dipper.

In accordance with my invention I provide within the grip portion of one of the dipper control levers, as the lever 11 which controls the sidewise swinging movement of the dipper, an electric switch, preferably in

the form of a push button member 20 disposed within a housing 21 of insulating material and arranged to be depressed, as by the thumb of the left hand with which the operator grasps the lever 11, to make contact between two terminals 22 and 23. The push button member 20 may be urged into the open switch position by a spring 24. Circuit wires 25 connect the switch terminals 22 and 23 with the source of supply of electric current of the internal combustion motor 9 and with electromagnets as hereinafter described.

I use the previously described switch to control an electromagnetically governed clutch through which power from the motor is taken off for dumping the dipper. This clutch, see Fig. 3, comprises an inner clutch disc 26 which is secured as by a bolt 27 to the main driven shaft 28 of the machine and is provided with a centrally arranged, outwardly projecting spindle 29. Another clutch disc 30 is splined on the spindle 29 as by a key 31, and a winding drum disc 32 is loosely and rotatably mounted on the spindle 29 between the two clutch discs 26 and 30. Suitable friction plates 33 are provided between the respective clutch discs 26 and 30 and the winding drum disc 32. A winding drum 34 is formed on the periphery of the disc 32 for the reception of a cable 35 which extends forwardly and is connected with a dump lever 39 on the dipper 14. The latch mechanism which holds the bottom of the dipper closed is arranged to be released by exerting a pull on the cable 35. This latch is of well known construction and is not specifically illustrated and described.

For the purpose of engaging the clutch so as to rotate the drum 34 I provide a lever 36 which is connected by pivot means 37 with the spindle 29 and has cam portions 38 arranged to bear against the hub of the clutch disc 30 to cause the discs 30 and 26 to bind frictionally on the drum disc 32. The outer end of the lever 36 has an armature bar 40 secured thereto, and suitable electromagnets 41, preferably two in number, are provided for exerting a pull on the armature bar 40 to move the outer end of the lever 36 outwardly and cause the cam portion 38 to press against the hub of the disc 30 and apply the clutch. The electromagnets 41 are supported by a bracket 43 which is adjustably secured to the spindle 29 by nuts 44. Movement of the electromagnets toward or away from the armature bar 40 adjusts the width of the gap therebetween and also varies the amount of movement of the lever 36. A tension spring 42 of sufficient strength to return the lever 36 to released position is connected between the top end of said lever and the disc 30 and an adjustable set screw 45 having a lock nut 46 thereon is provided for limiting the releasing movement of the lever 36 and insuring a drag of the clutch.

The circuit for the electromagnets 41 is formed in part by circuit wires 47 which extend through the tubular spindle 29 and are connected with two relatively insulated slip rings 48 on the inner side of the disc 26. The slip rings 48 are preferably connected by brushes 49 and circuit wires 25 with the source from which electrical current is supplied to the engine. The circuit wires 25 include the control switch 20, 22, 23 as indicated diagrammatically in Fig. 3.

The clutch and electromagnets are preferably enclosed within a shield or housing 50.

In the operation of this device the clutch discs 26 and 30 together with all parts connected therewith except the winding drum disc 32 will be rotated with the driven shaft 28. When the switch 20, 22, 23, is closed the electromagnets 41 will be energized and the outer end of the lever 36 will be moved outwardly thus causing the cam portions 38 to press the clutch disc 30 against the drum disc 32, and rotate the drum 34. This exerts a pull on the trip cable 35 and trips the dipper. As soon as the switch is released it automatically opens and the electromagnets 41 release the bar 40 and the spring 42 pulls the lever 36 inwardly thus releasing the grip of the clutch. The set screw 45 in the lever 36 is preferably adjusted so that the clutch will never be entirely released but will always exert a slight drag on the drum disc 32 just sufficient to take up the slack in the trip line 35 for all positions of the dipper but not enough to trip said dipper. This drag of the clutch will automatically take up or adjust the length of the trip line 35 when the boom 16 is raised or lowered thus making other adjustments for this purpose unnecessary.

In Fig. 5 I show alternative clutch operating means in which the spindle 29 is externally threaded as far inwardly as the clutch disc 30, and in which an adjustable collar 51 is screwed onto said spindle and locked in any desired adjusted position by a lock nut 52. A forked lever 36′ is mounted on pivots 37′ on the collar 51 and has flat front sides arranged to rest against the hub of the disc 30 when the clutch is in the released or drag position. Outward movement of the top end of the lever 36′ sets the clutch as hereinbefore described. In this construction the spring 42 and set screw 45 are both dispensed with and the drag of the clutch may be adjusted by adjusting collar 51.

Where shovels are operated electrically or by internal combustion engines current for the electromagnets is always available. If the shovel is steam operated then batteries or a generator may be provided. Where compressed air but no electric current is available the electric switch in the lever handle may be replaced by an air valve and the clutch operated by compressed air.

The placing of the dumping control in the end of the lever handle and under the thumb of the operator's hand which grasps the lever results in a great saving of time and an increase in efficiency and makes it possible for a shovel and crew to move more material.

The foregoing description and accompanying drawings clearly disclose a preferred embodiment of my invention but it will be understood that this disclosure is merely illustrative and that changes in the device may be made within the scope and spirit of the following claims.

I claim:

1. Apparatus of the class described embodying a main driven shaft, friction clutch mechanism secured to said main driven shaft and rotatable therewith, a winding drum arranged to be driven by said clutch mechanism, a trip cable on said drum, electromagnet means rotatable with said clutch mechanism for applying said clutch mechanism to said drum and a switch controlling the circuit to said electromagnet means.

2. The combination with a power shovel having a main driven shaft, of a friction clutch disc secured to said driven shaft and rotatable therewith, a spindle extending outwardly from the center of said disc, another friction clutch disc splined on said spindle, a winding drum having a disc portion disposed between said two friction clutch discs and rotatable on said spindle, a cam lever fulcrumed on said spindle and arranged to apply said friction clutch discs to said winding drum disc, electromagnet means adjustably supported from said spindle and rotatable therewith for operating said cam lever, and a switch for controlling the circuit to said electromagnet means.

3. The apparatus as claimed in claim 2 in which slip rings are provided on one of said clutch members and circuit wires extend from said slip rings through said spindle and are connected with said electromagnet means.

4. The apparatus as claimed in claim 2 in which a longitudinally adjustable collar is provided on the spindle and the cam lever is fulcrumed on said collar.

The foregoing specification signed at Seattle, Washington, this 28th day of June, 1929.

ANTONIO CALABRESE.