

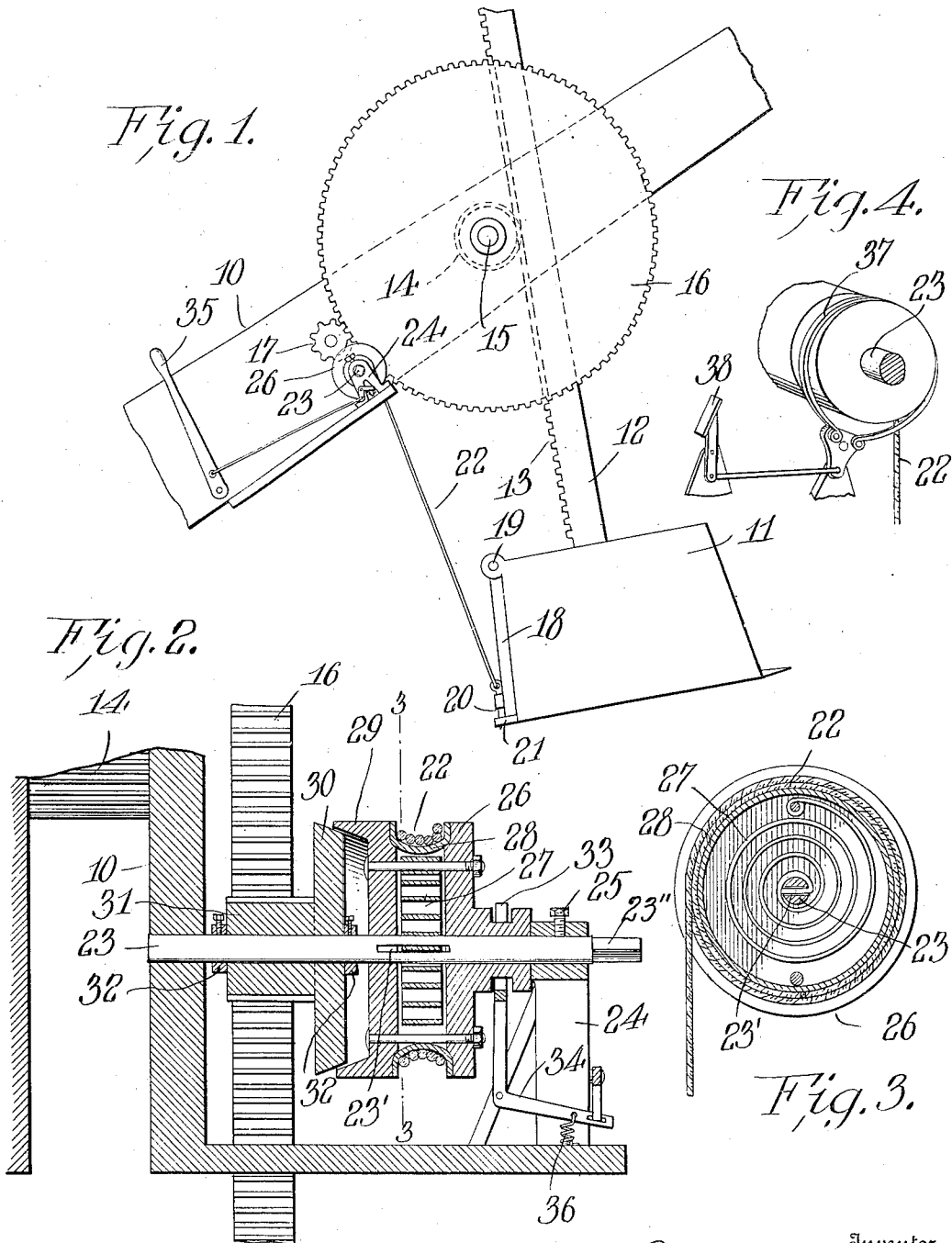
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TRIPPING MECHANISM FOR POWER SHOVELS.

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Witnesses

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TRIPPING MECHANISM FOR POWER-SHOVELS.

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To all whom it may concern:

Be it known that I, JOHN H. FREEL, a citizen of the United States, residing at Las Cascadas, Canal Zone, Panama, have invented certain new and useful Improvements in Tripping Mechanism for Power-Shovels, of which the following is a specification.

This invention relates to certain improvements in devices relating to power excavators, and particularly to steam shovels. In the use of apparatus of this class it has been found exceedingly difficult to provide a means for operating the tripping mechanism for the shovel with convenience, facility, and precision. The shovel being so large ordinarily and the contents thereof being so massive, the door locking device and the means for unlocking the same are required to be exceedingly strong, and for the reason that the apparatus is subjected to the greatest amount of rough usage, it has been found very difficult to provide in actual practice a tripping mechanism which is easy to operate.

For a full understanding of the present invention, including its mode of operation and advantages, reference is to be had to the following description and the accompanying drawings, in which—

Figure 1 is a general view in elevation showing a fragment of a power shovel boom, a dipper mounted thereon, and showing the present invention in its relation to said parts; Fig. 2 is a vertical sectional view of the invention on an enlarged scale; Fig. 3 is a transverse sectional detail taken on the line 3—3 of Fig. 2, and Fig. 4 is a detail perspective of a slight modification of the invention.

Throughout the following description and on the several figures of the drawings similar parts are referred to by like reference characters.

The improvements comprising the present invention are adapted for a considerable range of use, but as a preferred embodiment of this application I have herein illustrated, in a conventional way, a boom 10 which will be understood to be a part of a power excavating apparatus. This boom is operated ordinarily by the engineer on the main part of the machine in order to elevate the same or swing it laterally. The dipper 11, connected to the dipper arm 12, is operated ordinarily by a craneman located usually upon the boom. The dipper is commonly operated by means of a rack and pinion connection

with gearing mounted on the boom and driven by an independent engine directly under control of the craneman. The arm 12 is shown as being provided with teeth 13 in mesh with a pinion 14 mounted on a shaft 15, driven by one or more bull-wheels 16 driven by as many pinions 17 on the engine shaft.

Thus far described the apparatus is conventional.

The dipper bottom 18 is hinged at its upper edge at 19 to the dipper. Ordinarily the bottom 18 closes automatically by gravity and is locked closed by a latch 20 which co-operates with a lip 21, as a stationary part of the dipper. After the dipper has been loaded and elevated over the car or dump upon which its contents are to be discharged, the latch 20 is usually opened either by hand or by having connected thereto a connection in the nature of a cable or rope 22 leading to some distant point, such as to the engineer on the machine, to the craneman, or in some instances the free end of such cable is snubbed about a post or some other fixed point which will serve to draw the latch out of engagement with the lip in the event that the dipper reaches a certain elevation or distance from the machine. In all such means ordinarily employed for operating the locking mechanism there has been experienced a great deal of loss of time and annoyance due among other things to the fact that the cable 22 is liable either to have too much slack or else if the end of the cable is fixed there is danger of its being drawn upon too soon, and furthermore it has been found difficult to provide means which will readily permit the dumping of the dipper in any one of a number of different positions, it being desirable to dump on different parts of a flat car for instance.

Referring now particularly to Fig. 2, I mount upon the boom 10 close to and preferably just below the bull wheel 16 a shaft 23, supported at one end on the boom and at the other end in a bracket 24 supported on any suitable fixed support as for instance an extension of the boom 10. The shaft 23 is normally stationary, and is secured in such position by a suitable locking device such as a set screw 25. Mounted loosely upon the shaft 23 is a drum 26 housed within which is a spiral spring 27, one end of which is secured to the shaft and the other end is secured to the drum. The drum furthermore is provided with a concave periphery 28

upon which the tripping cable 22 is connected and adapted to be wound. As a convenient illustration of one of the many ways in which the spring 27 may be secured to the shaft, I have indicated the latter as being provided with a slot 23' through which the end of the spring is passed and therein secured, the slot being enough longer than the width of the spring to permit free movement of the drum longitudinally of the shaft as may be desired. The purpose of the spring is to cause the drum 26 to automatically wind up all looseness or slack in the cable 22. To this end in assembling the device, the dipper may be elevated to the point nearest the drum or bull-wheel and the operator will then wind up the spring just to the proper tension, as by application of a wrench to the squared end 23'' of the shaft, and then lock the shaft in place as before stated. Upon outward or downward movement of the dipper thereafter the cable 22 will turn the drum, paying out therefrom, and winding up the spring 27. It will be understood of course that the spring 27 will be of any desired length to permit of operation of the dipper. It will now be understood that as the dipper is manipulated in either direction the tension of the spring will be sufficient to automatically cause the cable 22 to wind upon the drum 26.

Thus far described it will be appreciated that the cable and drum in their movements will follow the movements of the dipper. In order to trip the latch mechanism and dump the dipper, it will only be necessary therefore to either stop the rotation of the drum or cause it to rotate in the reverse direction to cause the cable to trip the latch mechanism while the dipper is moving outwardly, such direction of movement of the dipper being the one in which it is ordinarily desirable to dump the same. As one of the several ways in which I may stop such rotation of the drum 26 and thereafter cause it to rotate reversely I may provide any suitable form of a clutch device, herein indicated as a friction clutch, one part 29 of which is secured to the drum and the other part 30 of which is secured to or made an integral part of a pinion 31 mounted loosely upon the aforesaid shaft 23, and in mesh with the bull-wheel 16. The pinion 31 and actuating member secured thereto may be held in proper position on the shaft by adjustable collars 32. By reference to Fig. 1 it will be noted that when the dipper is moving outwardly the bull-wheel will cause a rotation of the pinion 31 in a direction opposite to the direction in which the drum 26 is rotated. If then the drum is moved longitudinally on the shaft causing the members of the clutch to engage each other, the drum will be stopped, or if the friction is sufficiently great will be caused to rotate in uni-

son with the pinion 31, such pinion being always in mesh with the bull-wheel. The result therefore will be to either stop the rope 22 or draw it rearwardly, releasing the latch and permitting the contents of the dipper to dump. The drum 26 may be moved longitudinally of the above parts by means of a yoke 33 connected to a bell crank 34 pivoted to the support 24. The bell crank 34 may be operated by a lever 35 within reach of the craneman. In order to insure the ready disengagement of the clutch members 29 and 30 a spring 36 or its equivalent may be employed, herein indicated as being attached to the bell crank 34.

In the modification illustrated in Fig. 4 the same invention, in all essential features as that above described, is used. Instead, however, of providing means for stopping the rotation of the drum and then causing it to move in a reverse direction, I have shown frictional means in the form of a strap brake to stop the rotation of the drum. In this construction the same arrangement of the shaft 23 and its mountings is employed, the spring within the drum is the same, and the operation of the spring and drum, excepting as just stated, is the same as in the other case. In this construction the strap brake 37 may be operated by any suitable lever, such as a foot lever 38, under the immediate control of the operator. When the dipper is moving outwardly and as it nears the point at which it is to be dumped the operator will apply friction to the drum, stopping the same, and thereby trip the dipper.

In view of the fact that machines of the type to which this invention applies are subjected to the severest kind of usage, due largely to the use of high explosives in the immediate vicinity of the machines and also being subjected to all kinds of, severe weather, it will be appreciated that since the improvements comprising my invention are by no means of a delicate nature, and also that the spring is thoroughly housed within the drum it is well protected. The invention therefore is of a simple nature and not likely to get out of order.

Having thus described the invention, what is claimed as new, is:

1. The herein-described improvement in tripping mechanism for power shovels comprising, in combination, a fixed support, a drum rotatable upon said support, a spiral spring within the drum connected at one end to the support, coiled therearound, and fixed at the other end to the drum, a cable secured to the periphery of the drum and wound thereupon in the same direction in which the spiral spring is coiled about the support, and means under the control of the operator to check the rotation of the drum.

2. In combination, a boom, a dipper

mounted thereon, means on said boom including a bull-wheel for operating said dipper, the dipper having a movable bottom, a latch to secure the bottom closed, a cable
5 secured to the latch to trip the same, a stationary support on the boom, a drum rotatable upon said support and upon which said cable is wound, a coil spring within the drum one end of which is secured to the
10 support and the other end to the drum, a pinion on said support and in mesh with said bull-wheel, and means to cause said pinion to control the movement of the drum.

3. In combination, a boom, a dipper operated thereupon, tripping means for the dipper including a cable, a supporting shaft

mounted upon the boom, a drum rotatable upon the said shaft and to which the cable is connected, means within the drum to cause the same to wind the cable thereupon, 20 means under the control of the operator for applying friction to the drum to control its movements, and means for adjusting said shaft and locking the same in its supports with respect to the said means within the 25 drum.

In testimony whereof I affix my signature in presence of two witnesses.

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Witnesses:

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