June 7, 1932. L. A. RUSSELL 1,861,511

CONTROL DEVICE FOR SHOVEL CRANES

Filed June 28, 1929 2 Sheets-Sheet 1

Fig. 1.

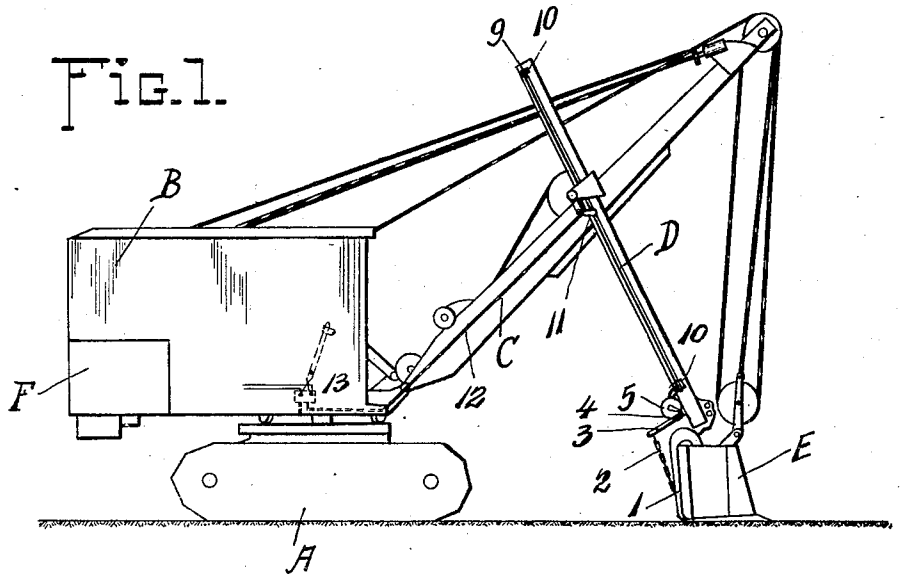
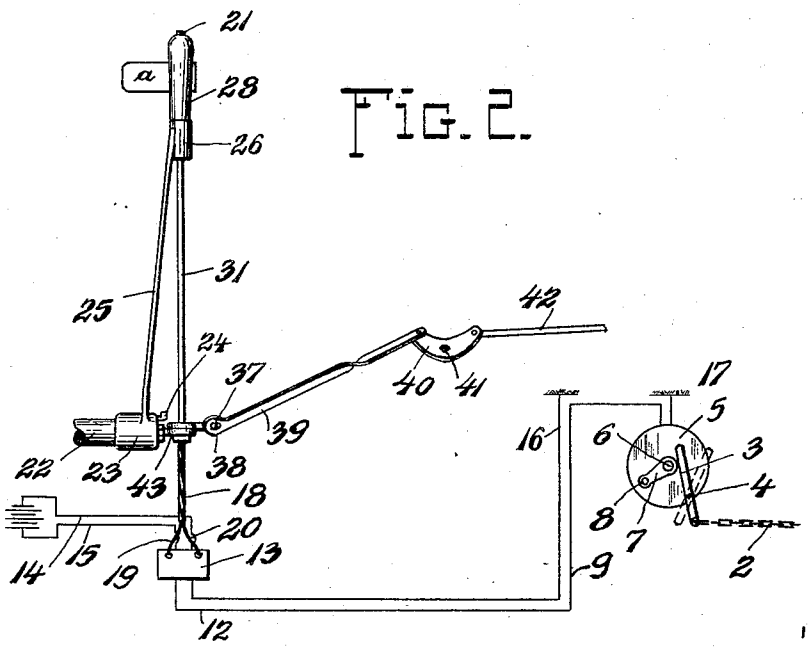


Fig. 2.



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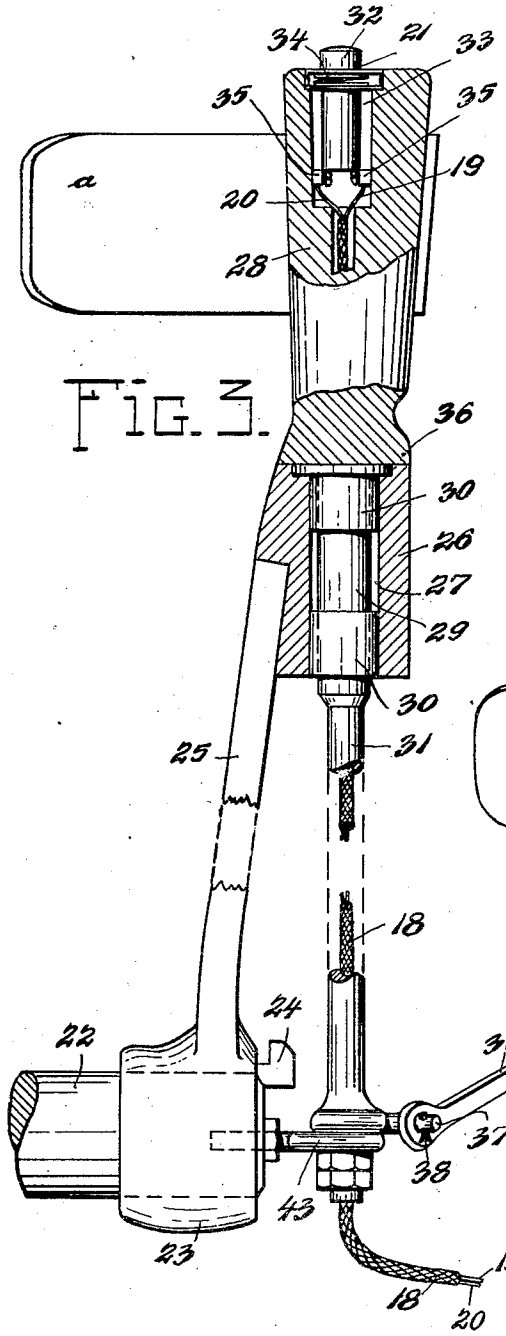


Fig. 3.

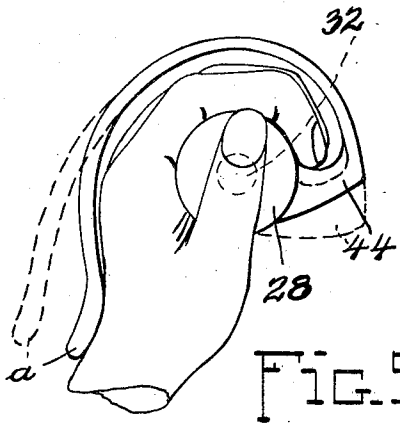


Fig. 5.

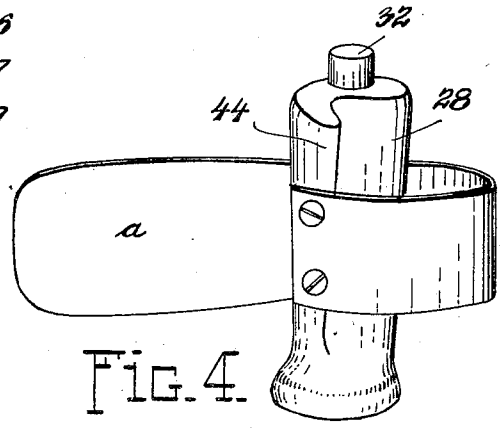


Fig. 4.

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UNITED STATES PATENT OFFICE

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CONTROL DEVICE FOR SHOVEL CRANES

Application filed June 28, 1929. Serial No. 374,500.

Modern developments in the art of excavating are taking the trend of simplifying to as great an extent as possible, the actual operations which must be performed by the operator of the machine, whereby the functioning of the latter is rendered more efficient.

This invention involves primarily the control mechanism for certain of the parts of an excavator machine, and has as an object, the provision of an operating member which may be operated in any one of three distinguishable ways in order to control separate and independent mechanisms of the shovel-crane.

The parts of an excavator with which my invention is particularly associated, are the power source, swing mechanism and the dumping instrumentalities for the dipper commonly known as the dipper trip. In the more modern types of shovels, the dipper trip is characterized by being under power, and the control of the power plant of the machine in the present instance has taken the form of an accelerator for governing the speed of operation for the power source which may be an internal combustion engine, or otherwise.

In carrying out the ideas above set forth, I employ a lever which is mounted on a shaft, the rocking of which controls the swinging operations of the excavator. A handle is provided on the lever aforesaid, at the upper end thereof, and this handle is so mounted that it may be rotated with respect to the lever. Suitable connections are provided between the handle and the power plant so that relative turning movement thereof governs the speed of the source of power. Suitable electric contact mechanism is associated with the handle aforesaid, and includes an operating member which may be availed of to cause operation of the dipper trip as occasion demands.

With these and other objects in view, as will in part become apparent, and in part be hereinafter stated, the invention comprises certain novel constructions and arrangements of parts, as will be subsequently specified and claimed.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawings, in which:—

Figure 1 is a view in side elevation, somewhat diagrammatic of an excavator with which control mechanism in accordance with this invention is associated.

Figure 2 is a diagrammatic showing of the three-in-one operating mechanism, so-called.

Figure 3 is a showing partly in section and partly in elevation with parts broken away, of the operating lever including the dipper trip and acceleration control instrumentalities.

Figure 4 is a perspective view of the handle member shown in Figure 3.

Figure 5 is a top plan view of the handle member showing the manner of gripping the same.

While a preferred specific embodiment of my invention is herein set forth, it is to be understood that I am not to be limited to the exact constructions illustrated and described, because various modifications of these details may be provided in putting the invention into practise within the purview of the appended claims.

I wish to particularly note that while I have shown the three-in-one control means as associated with an electric dipper trip, swing mechanism and accelerator instrumentalities, it might be well employed with other of the mechanisms of an excavator construction.

Throughout the various figures of the drawings and following description, like reference characters denote corresponding parts.

Referring now to Figure 1, an excavator of the shovel type is shown as comprising a traction unit A on which is swingably mount-

ed a crane body B. This crane body B carries digging instrumentalities in the form of a boom C, dipper stick D, and dipper E. A power plant F located on the crane body preferably of the gas engine type, is availed of as a source of power for operating all of the various mechanisms making up the excavator construction.

The dipper E has a bottom dump door 1 which is dumped or tripped by a chain 2 when a pull is exerted on the latter. One end of the chain 2 is made fast to the door 1 while the other end is connected to one end of a lever 3 which is pivotally mounted as shown at 4 on the dipper stick D. An electric motor 5 is properly mounted on the dipper stick D an includes an operating shaft 6 to which is keyed a cam member 7, the extremity of which terminates in a roller 8. When the door 1 is in closed position, which position is assumed under gravity action, one end of the lever 3 is normally in engagement with that part of the cam 7 which is very close to the shaft 6 but when the motor 5 is operated to cause rotation of the shaft 6 together with the cam 7, the roller 8 engages the free end of the lever 3 and causes a pull to be exerted on the chain 2 at the opposite end to effect tripping of the door 1.

A strip of some good conductive metal such as copper is shown at 9, and extends the length of the dipper stick D on one side thereof. This strip 9 is insulated from the dipper stick by insulating material shown at 10 and is constantly in engagement with a brush 11 carried by the boom C. An insulated wire 12 runs from the brush 11 down along the boom C into the crane body where it is connected to a magnetic switch shown at 13. The switch 13 is connected by the conducting lines shown at 14 and 15 with a suitable electric power source on the shovel body which may be either a battery or a generator which latter would be operated by the power plant F. From the magnetic switch 13 extends a line 16 which is grounded to the framework of the machine as is one of the terminals 17 of the motor 5. A cable 18 controls the operation of the magnetic switch 13 and includes the lines 19 and 20 which lead from the switch 13 up through an operating lever to be hereinafter described into the upper end thereof where they are adapted to be conductively connected by contact mechanism referred to generally by the reference character 21.

The crane body B carries suitable gearing of a well known construction for effecting swinging operations of the shovel body with respect to the traction base A. Needless to say these swinging operations are effected by power source F and the actual operating mechanism (not shown) is controlled by a rock shaft 22 which may be rocked in one direction for swinging the crane in one direction, and in the opposite direction for swinging the other way, an intermediate or neutral position of the rock shaft establishing a non-swinging condition.

A hub member 23 is keyed to the shaft 22 by the key shown at 24, and extending from the hub member 23 is an arm 25 which carries at it southward end a sleeve-like portion 26 that is bored as shown at 27. A handle unit referred to generally by the reference character 28 is mounted on the sleeve 26 and includes a shaft 29 which is rotatably mounted in sleeve bearings 30, located in the bore 27 of the sleeve 26. The handle unit 28 is of a hollow construction, and extending downwardly therefrom is the tubular member 31 through which extends the cable 18, leading up to the contact mechanism 21 carried in the upper end of the handle 28. This contact mechanism 21 comprises a finger member 32, which is mounted for movement in a hollow portion 33 of the handle 28. Yielding means shown at 34 including a spring normally maintains the finger member 32 in its outermost position, wherein it is out of engagement with terminals 35 to which are connected the lines 19 and 20. However, when the finger member 32 is pushed inwardly by the operator against the action of the yielding means at 34, it engages the terminals 35 and causes the circuit through the lines 19 and 20 to be completed.

The handle 28 is formed with a shoulder shown at 36 which bears against the upper part of the sleeve 26 and is, of course, mounted for rotation on the bearings 30. An arm 37 extends radially from the shaft 31, at the lower part thereof, and suitably affixed thereon, such as by a cotter pin 38, is a link member 39. One end of the link member 39 is connected to one arm of a bell crank 40 pivotally mounted at 41 and connection 42 leads from the other arm of the bell crank 40 to the power plant F to control the speed of the latter, by action on the carburetor.

It is apparent that a turning of the shaft 31 which is effected by a turning of the handle 28 will cause operation of the connections 37, 38, 39, 40, 41 and 42 to control the speed of operation of the power plant F.

A bracket 43 is carried by the shaft 22 and supports the lower end of the shaft 31 in proper operative position.

From the foregoing, it will be seen that I have associated the accelerator for the engine with the swing mechanism. This is a feature of no little importance because in the usual operation of an excavator of the shovel type, it is the swinging operation which may be accelerated to save time and at a high degree of efficiency of operation. There is, therefore, a peculiar association between the swing control and accelerator. Obviously, it would be possible to associate the accelerator control with one of the other operating levers

of the crane mechanism. Moreover, the swinging operation is also almost invariably tied up with the dumping of the bucket. This is due to the fact that almost invariably the bucket must be swung into a position over the spot where its contents are to be dumped. Hence the need for associating the dipper trip with the swing lever.

To make the turning of the handle 28 less laborious to the operator thereof, an extension shown at *a* may be applied to the handle 28 which extension contacts the wrist of the operator thereby giving him a longer leverage for accomplishing this turning operation of the handle. The manner in which the extension *a* is used, is clearly brought out in Figure 5.

The operation of the parts of an excavator with which my invention is associated as hereinbefore described, may be briefly outlined as follows. The handle 28 which includes the finger abutment member 44 is grasped by the operator as shown in Figure 5. When it is desired to effect a swing of the crane, tension is exerted on the handle 28 to cause a rocking of the lever 25 and the shaft 22. When acceleration of the motor is desired the handle 28 is turned as the occasion demands and through it the connections with the motor controls the speed thereof. When it is desired to cause tripping of the dipper E, the member 32 is pressed by the thumb of the operator to cause such action.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A control member of the class described, comprising, in combination, a lever, a sleeve carried by the lever, a handle member rotatably mounted in said sleeve, and an extension secured to the handle member for contacting the wrist of an operator therefor to facilitate rotation of said handle member.

2. A control member of the class described, comprising a tubular pivotally mounted shaft rotatable on its longitudinal axis, an electrical conducting cable passing through the shaft, sleeve bearing members for the shaft, a sleeve over the bearing members, a lever supporting the sleeve, a grip member mounted upon the sleeve and comprising a finger abutment member for facilitating manually grasping the member for rotation of the shaft, and circuit closing means upon the handle for controlling a flow of current through the cable without necessitating the handle being released.

3. A control member of the class described comprising a handle member having rotative and swinging movements, and a finger abutment on the handle member adapted for engagement with the operator's fingers to facilitate manual rotative operation of the handle member.

4. A control member of the class described comprising a handle member having rotative and swinging movements, a finger abutment on the handle member adapted for engagement with the operator's fingers to facilitate manual rotative operation of the handle member, and an operating guard member secured to the handle member and adapted to surround the hand of the operator and engage the wrist of the operator to facilitate the rotation of the handle member incident to actuation of the guard member by the wrist of the operator.

In testimony whereof I affix my signature.

LESLIE A. RUSSELL.