E. G. DEUCHER.

MEANS FOR OPERATING MASTER CONTROLLERS.

APPLICATION FILED JULY 28, 1909.

957,662. Patented May 10, 1910.

2 SHEETS—SHEET 1.

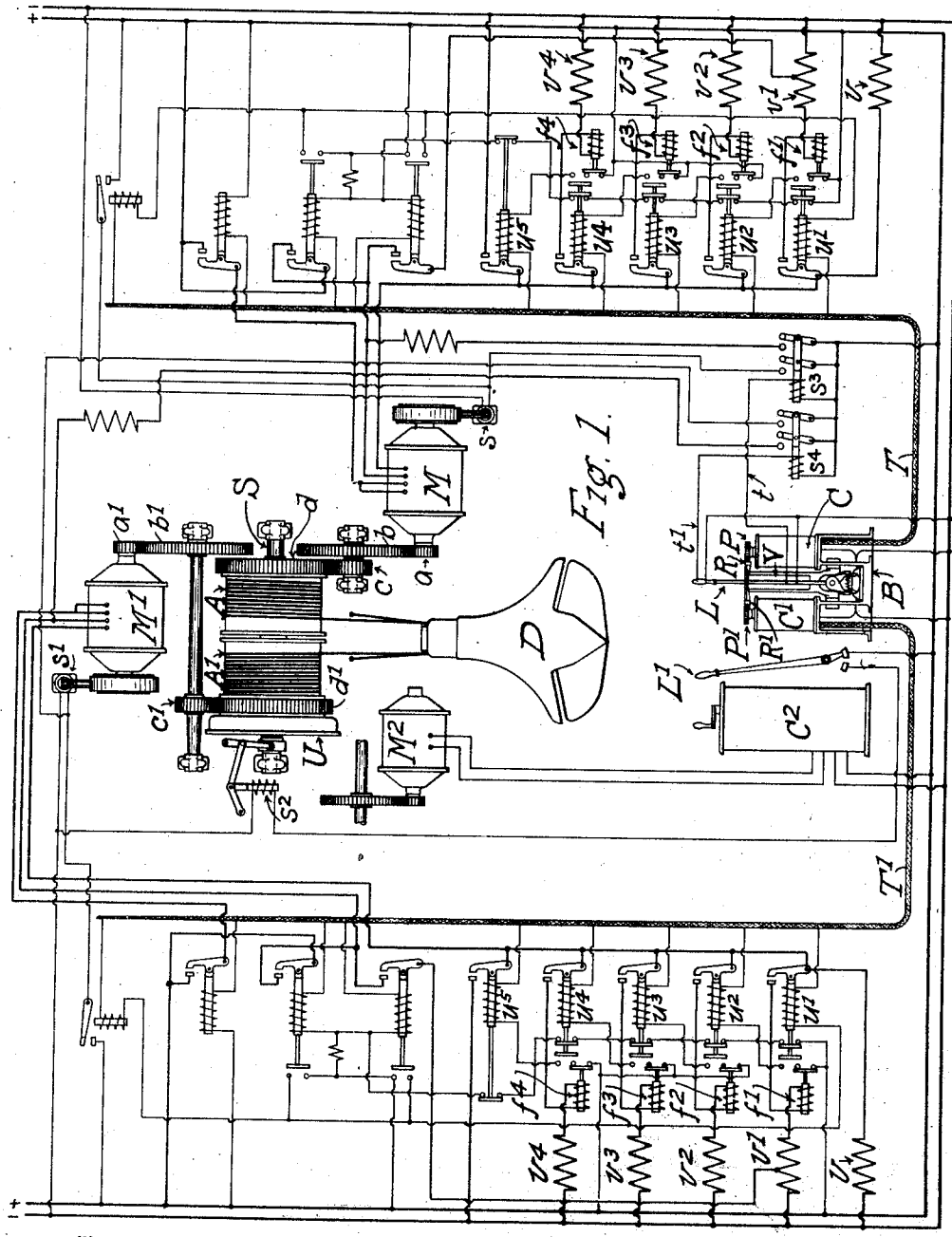

Fig. 1.

Witnesses:

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2 SHEETS—SHEET 2.

Fig. 3.

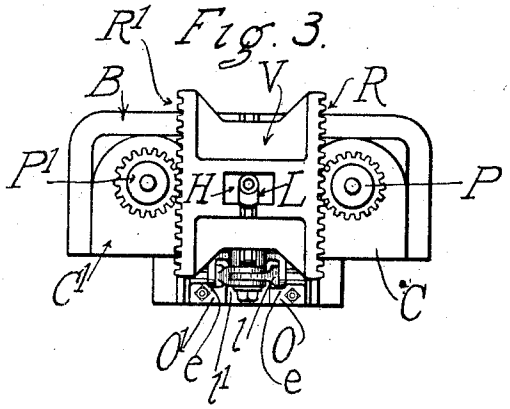


Fig. 5.

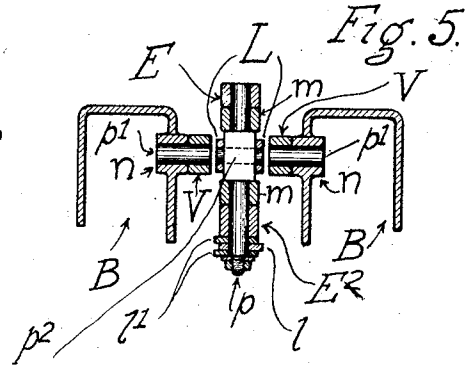


Fig. 2.

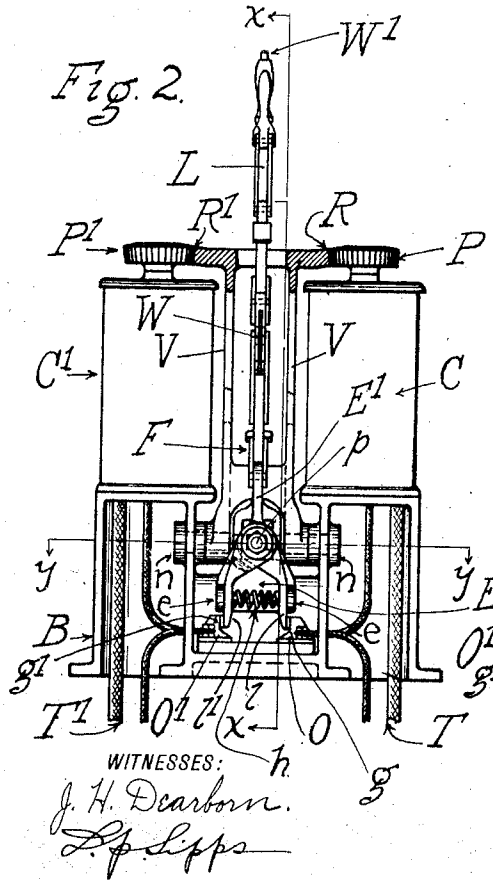


Fig. 4.

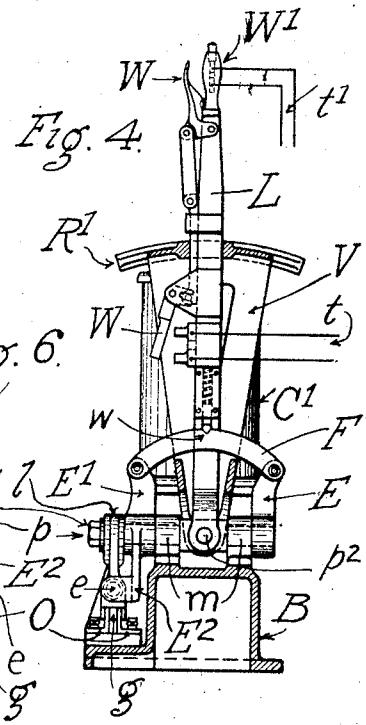
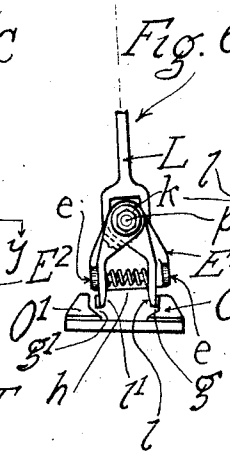


Fig. 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

EUGENE G. DEUCHER, OF CLEVELAND, OHIO, ASSIGNOR TO THE BROWN HOISTING MACHINERY COMPANY, OF CLEVELAND, OHIO.

MEANS FOR OPERATING MASTER-CONTROLLERS.

957,662. Specification of Letters Patent. Patented May 10, 1910.

Application filed July 28, 1909. Serial No. 509,973.

To all whom it may concern:

Be it known that I, EUGENE G. DEUCHER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Means for Operating Master-Controllers, of which I hereby declare the following to be a full, clear, and exact description, reference being had therein to the accompanying drawings as a part of the specification.

The invention pertains more especially to hoisting and conveying machines adapted to the handling of coal, ore or like substances in the process of loading or unloading the same from ship or trains, to docks and dump-piles, or, vice versa. In this class of apparatus a grab-bucket, suspended from a trolley that travels to and fro upon an overhead track between the source of supply and the dumping point, is the medium of transfer, and, the various movements involved are effected by electrically driven motors provided for the purpose. This arrangement involves a magnetic equipment, with current-limit relays, whose essential features are a series of rheostats to reduce or throttle the current to the minimum needed to start the motors, a series of individual switches to open or close the current paths through this rheostat resistance, and, master controllers to successively actuate said switches according as the motors are to be accelerated or retarded. Current-limit relay coils may also be arranged in the connection to reduce the current between and at successive switches to a predetermined quantity. The raising and lowering of the two-rope bucket, for instance, in a closed condition, is accomplished in a machine of this kind, by a specially driven drum known as the "hoist-drum," the traverse of the bucket along the track by a similar drum and motor, and, the winding and unwinding of the so-called shell, or sustaining rope, by still a third drum and motor. Each of these various apparatus and elements of the entire equipment, also serve as instrumentalities for subordinate functions, either in combination, one with another, or by variations of their individual modes of action, with the result that, under present methods, the operator is often called upon for a degree of energy and exertion for the various manipulations required which it is highly desirable to reduce.

It is the object and purpose of my present invention to provide a form of lever arrangement for operating the master controllers of one or more motors, of magnetic or air-controlled hoisting and conveying machine equipments of the above type, so that a plurality of the movements required to complete a trolley's cycle are brought within a single grasp on the lever, and, the movements to be taken care of during the process by the other hand of the operator are reduced to a minimum.

This arrangement is illustrated by said drawings, wherein the same parts are designated by the same letters, in every instance, and, Figure 1 represents the various electrical and mechanical parts and connections of said hoisting and conveying machine, Fig. 2, an elevation of the master controllers, and their lever, in normal operative place, Fig. 3, a plan view of the same, Fig. 4, a sectional view on the lines x, x, of Fig. 2, Fig. 5, a like view on the lines y, y, of Fig. 2, and, Fig. 6 a fragmentary portion of the lever where one of its contactors is disengaged.

It is thought the device will be readily understood by those familiar with the art to which it pertains without representations of the hoisting and conveying machine with which it is associated. Such machine, in this case, is assumed to be of the two-rope grab-bucket type, D being the bucket itself.

A and A′ are, respectively, the hoist, and shell drums therein, in their regular positions on a driving shaft S, the drum A being keyed thereon and the drum A′, loose. M is a motor adapted to operate said shaft, through a train of gears a, b, c and d. M is provided with a solenoid brake s actuated by reason of electrical contacts, effected—as indicated—either from the lever handle L or the controller C. M′ is a corresponding motor, for the shell-drum A′, operated through a train of gears a', b', c', d', and, is likewise provided with a solenoid-brake s', actuated, similarly as s, from either said lever handle L or the controller C′. A friction clutch U is provided for the loose shell-drum A′. It is governed by a solenoid s^2, in an electric circuit controlled by the lever L′. A third motor M^2 is shown for racking

the bucket-trolley along its track. It is provided with a special controller C^2 and proper circuit connections, and mechanism.

Subordinate circuits, with their manifest functions, are indicated in Fig. 1 with solenoid interruptions s^3 and s^4 therein, actuating the solenoids s and s' in order to close the circuits t and t', whenever it is desired to start the motors M or M′ independently of each other and without deflecting the lever L. The current that is to pass through t' when its circuit is completed by pressing the button W′, as hereinafter explained, need only be large enough to energize the solenoid s' and put enough torque in the motor M′ to wind up the slack-rope preliminary to raising the load.

C and C′ are master controllers of the usual type for the circuits, respectively, T and T′. They are arranged parallel to each other with their spindles projecting through the tops into horizontal beveled pinions P and P′. Said controllers are supported in an upright position on and by a sub-base or casting B, which also carries on its lower portion, terminal contact posts O O and O′ O′, in the circuits, respectively, T and T′. These circuits, or circuit systems, T and T′, as indicated in Fig. 1, each includes a series of rheostat resistances, v, v^1, v^2, v^3, and v^4, that are cut out, in succession, by corresponding relay switches f^1, f^2, f^3, and f^4, according as contactors u^1, u^2, u^3, and u^4, which are provided for the purpose, are severally energized. By this means, as will be manifest, the master controller will regulate the motor-currents, and effect the gradual, instead of instantaneous, introduction of their full force. The current which passes through the circuit T′ should be ample to enable the motor M′, to actuate the drum A′ and thereby pick up or assist in raising the bucket with its full load. These posts are shown as arranged in positive and negative pairs beneath and somewhat to the rear of their corresponding controllers. Extending upwardly from B, and at right angles one to the other, are two pairs of bearing point m, m, and n, n, the former of which carry a transverse pin p and the latter the pins p' p', in the same plane as p. The pin p projects beyond its bearings and at one end is shouldered down and threaded to receive a nut k, and has firmly affixed thereto arms E and E′ that reach upwardly between and are fastened to two parallel curved cross-bars F and F, above. The arm E′ has a downwardly extending flange or plate-like piece E^2 at right angles to the pin p with outwardly protruding ears e, e, at the lower corners.

Loosely or pivotally hung on the pin P, and exteriorly of E′, is a pair of oppositely related legs l and l' between and against which a compression-spring h is located. The nut k keeps the pair in place. Said legs are prolonged, below the pin p, to a point between the posts O O and O′ O′ and are there pivoted, respectively, with contact-plates g and g', cross-wise in front of said posts. The pin p is shown as, preferably, rectangular in section through the portion between the bearing supports m, m, and with a hole therethrough transversely of its length and in the same plane as p' p'. The curved bars F F are notched at the middle point of their tops. An upright open casting V is situated between the master controllers C and C′, in pivotal engagement at its lower end with the pins p' p' on opposite sides of the pin p. At corresponding sides of its upper end are beveled racks R and R′ in mesh, respectively, with beveled pinions P and P′. Centrally of the casting and projecting upwardly through a rectangular aperture H therein is a vertically disposed lever L. Said lever is forked at its lower end to straddle and engage the ends of a pin p^2 that occupies the transverse hole in the pin p above referred to. A safety catch w is provided to engage with said notches in the bars F and switches, as indicated by W W′, are conveniently located in the handle of the lever L for circuits t and t' respectively.

A cycle of the trolley, and the accompanying bucket-operations, are effected, in an arrangement as above described, by first moving the lever L, on its pivotal bearings m on the base B, off its center path to the left as the drawing is viewed in Figs. 2 and 6 (thereby breaking circuit connection between the contact plate g', and the posts O′ O′) and, at the same time, throwing said lever forward a notch and thereby revolving the controllers C and C′, through the pinions P P′ into contacts. As will be seen the brake for the hoisting motor M will thus become released and the motor be started. Its speed may now be increased by a further movement of the lever L between the bars F, and, in order to take up the slack of the secondary or shell-rope around the drum A′, during the process, the subsidiary circuit that energizes the solenoid switch at s^4, should be closed by pressing the button at W′ in the lever's handle, so that the brake to the motor-shaft of M′ will lift, and the motor itself develop a torque. As the drum A revolves the bucket will close around its grab, whereupon the lever L is thrown back around its bearings m to the center of its path. By returning the lever L to its central path or position the plate g' and the post O′ are brought into contact and the circuit T′ through the controller C′ is thereby completed. At this stage, the office of the circuit t' being finished, the button W′ may be released and the circuit broken. Both motors will now run at the same speed and

the two ropes will be correspondingly wound in on their drums. When the bucket has reached a certain height and while both drums are still revolving the controller C^2 is actuated and the trolley racked. During this movement the bucket will reach the end of the hoist when the lever L is to be brought back to its vertical position and the power shut off. The trolley, in the meantime is traveled along its track by any suitable means until the dumping point is vertically below and the trolley is stopped. The lever L is thrust backwardly, in its central path, on the lowering side of the quadrantal bars F, which will result in the lifting of the brakes on the shafts of the motors M and M′, and allow the reverse revolution of said shafts, under control of assumed dynamic brakes, and the simultaneous unwinding of the ropes and lowering of the bucket to the dump-pile below. When the bucket has been lowered to the desired distance, the load is discharged by throwing the lever L off its center path, to the left, breaking the circuit T′ at O′ O′. This operation simultaneously stops the motor M′ and allows the brake situated at s^2, to set, against the motor's shaft and the shell-drum A′ will stop and the bucket proper will consequently be held in mid air. The motor M still keeps on and the rope it controls will continue running off the drum A and the bucket-jaws are thus free to open, and let the load drop out. The lever L is now again brought back to its vertical position and all motion of the motors will cease. To raise the open bucket the solenoid s^2 is energized, by throwing the lever L′ forward; this will bring the clutch U into engagement with the drum A′, and equalize the motors M and M′. The lever L is again thrust forward, in its center path, to start both motors whereupon both the hoist and shell-ropes will be taken in at the same speed. After the bucket is brought up to its trolley the lever L is brought back to a vertical, and the trolley is racked back toward the filling point by reversing the controller C^2 and, when near such filling point thrusting the lever L backwardly in its center path to allow the bucket to descend under dynamic brake control, to the pile below. When the bucket reaches the pile, the racking controller C^2 is closed by reversing the lever L′, the circuit which energizes the solenoid s^2, is broken, the clutch U thrown out of engagement with the drum A′, and the cycle of the trolley finished.

Although the idea as set forth in the foregoing descriptions, calls for a special relation of the controllers and particular forms of their actuating levers, it will be manifest that such idea may be embodied in other relations, and forms and equally be within the invention as I desire to claim the same. Thus, for instance, instead of the controllers being side by side, they may be arranged end to end on a common shaft having a single pinion that meshes with the gear of a two-way or duplex lever, or, the controllers may be arranged in pairs, with gearing between their pinions actuated by a lever that has contact engagement with both circuits when in normal or central position and the necessary contrary movement, off its central position, to make and break such contacts.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a hoisting and conveying machine provided with an electrically operated grab-bucket on the same, a plurality of systems of rheostat resistances therein, having switches in the path of the current therethrough, master controllers for actuating said switches, and suitable lever-mechanism for rotating the controllers, when moved in one direction and making and breaking contacts, with the controller circuits, when moved crosswise of said direction, substantially as shown and described.

2. Means for operating a plurality of master controllers comprising the combination of a suitable gearing for simultaneously rotating said controllers and a two-way or duplex hand-lever for actuating said gearing when moved, in one direction, and of making and breaking a contact with the circuits of said controllers when moved crosswise of said direction, substantially as shown and described.

3. A means for operating master controllers comprising the combination of a hinged frame-work or housing between the same provided with racks that mesh in with pinions on the cylinders of said controllers, a two-way, or duplex lever, within said housing for actuating the same about its hinges, said lever being in contact with and a part of the controller circuits when in the center path of said actuating movement one way, and, out of contact with one or the other of said circuits when and according as it is moved cross-wise of said path on its other way, substantially as shown and described.

EUGENE G. DEUCHER.

In the presence of—
L. P. Lipps,
W. L. Westcott.