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HOISTING APPARATUS.

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Fig. 1.

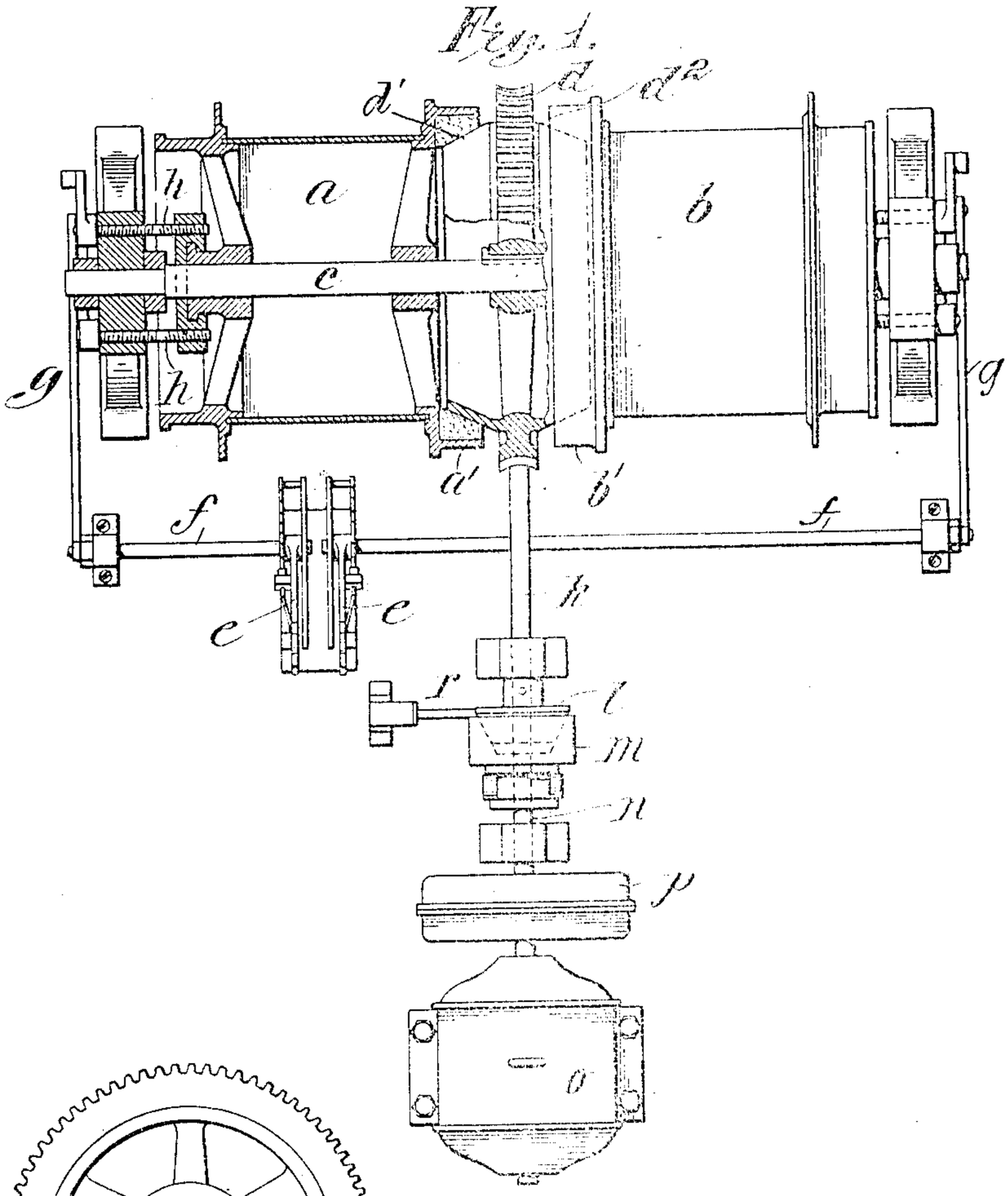
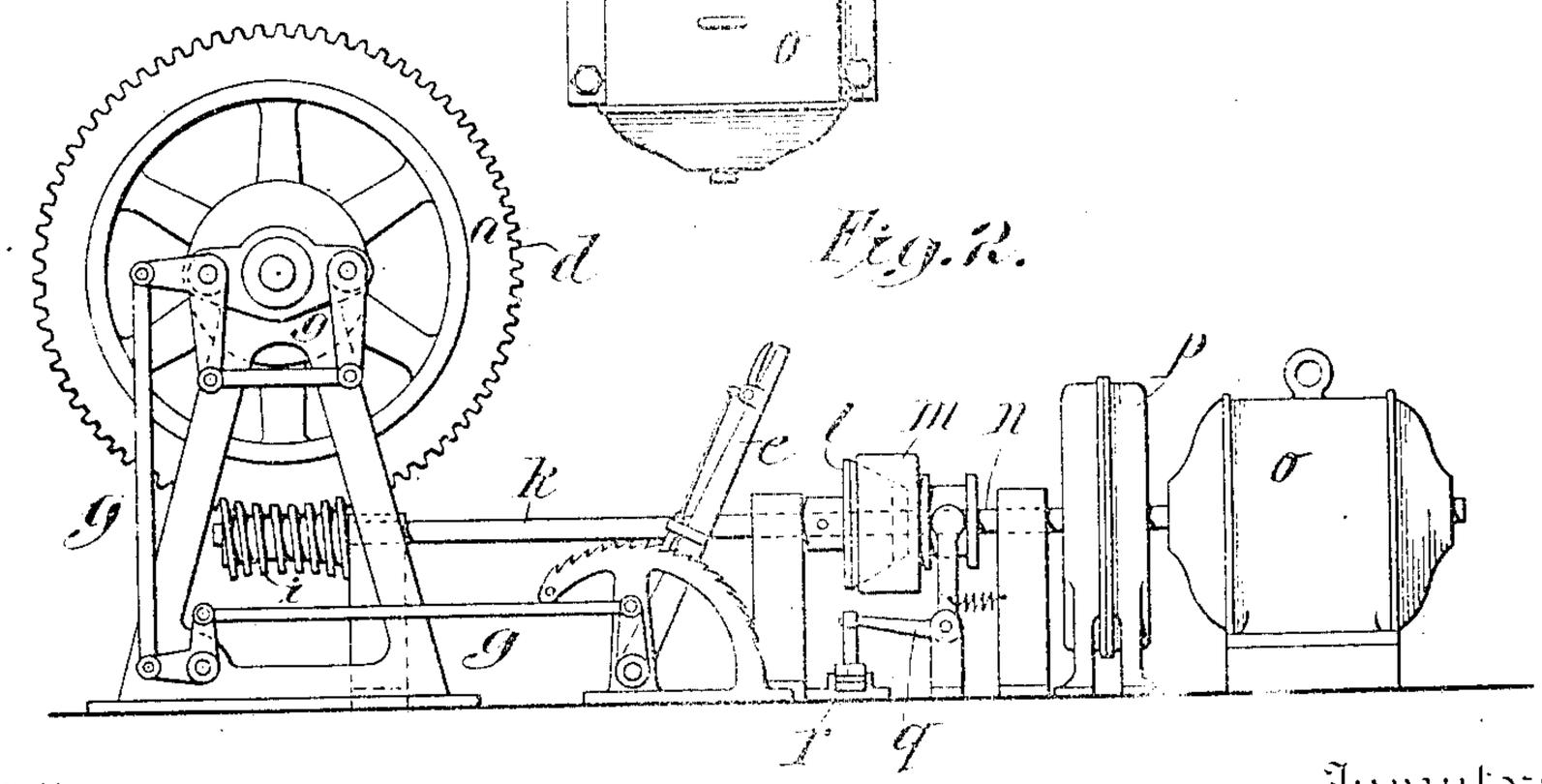


Fig. 2.



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HOISTING APPARATUS.

No. 819,140. Specification of Letters Patent. Patented May 1, 1906.

Application filed January 20, 1905. Serial No. 241,915.

To all whom it may concern:

Be it known that we, WILLIAM F. HUNT and ROBERT JEFFRIES ROBERTS, citizens of the United States, residing in West New Brighton, in the borough of Richmond, of the city of New York, in the State of New York, have invented certain new and useful Improvements in Hoisting Apparatus, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to hoisting apparatus of the general character of that commonly employed for discharging coal and other like purposes in which two drums are provided for winding and unwinding the ropes which raise and lower and also control the opening and closing of the shovel or scoop. Such hoisting apparatus is commonly driven by a steam-engine and is controlled by three levers, one, usually a foot-lever, controlling the throttle of the steam-engine, and the other two controlling the friction-clutches through which the two drums are driven from the engine. The desirability of substituting electricity as the motive power in many installations of this character is obvious; but it has thus far proved impracticable for most installations because of the great cost of installing an efficient motor control by which it shall be possible to vary the power of the motor, as the power of the steam-engine is controlled by throttling, so that the load may be started slowly and its movement controlled as desired. It is impracticable to rely simply upon the usual friction-clutches for the two drums because of the excessive heating which would be developed, the motor running continuously.

It is the object of the present invention to render practicable the application of the continuously-operating motor, such as an electric motor, to the operation of such hoisting apparatus while avoiding the difficulties and objections above referred to and without requiring further increase in the number of controlling-levers. It is undesirable to increase the number of controlling-levers, for the reason that three levers are all that can be properly managed by one operator.

In accordance with the invention each hoisting-drum is driven through its own friction-clutch or equivalent variable driving means from the transmission mechanism, and between the transmission mechanism and the motor is a third friction-clutch or equivalent variable driving means. By the interposition in this manner of two friction-clutches between the motor and each drum it is possible to divide the total slip between the two friction-clutches so that the amount of heating in either clutch is not excessive. The use of a friction-clutch between the motor and the transmission mechanism, however, deprives the apparatus of the resistance which is offered by the steam-engine in a steam-driven apparatus for purposes of braking when the drums are stationary or are permitted to rotate in a reverse direction, since the friction-clutch between the motor and the transmission mechanism must be wholly disconnected at such times. As already stated, it is impracticable to add a separate brake for the transmission mechanism to be controlled by the operator, and it therefore becomes necessary to give the transmission mechanism such a character that it will automatically resist backward movement. Obviously this may be accomplished by different means, one convenient form of such means being represented in the accompanying drawings, in which a practical embodiment of the invention is illustrated for purposes of explanation of the nature thereof.

In the drawings, Figure 1 is a view, partly in plan and partly in horizontal section, of a hoisting apparatus which embodies the invention. Fig. 2 is a side elevation of the same.

In the embodiment of the invention which is illustrated in the drawings the two drums *a* and *b*, having the hoisting-ropes wound about them, are represented as mounted loosely upon a common shaft *c*. The latter is shown as supporting also a worm-wheel *d*, which may have secured thereto or formed therewith two friction-clutch members *d'* and *d²*, which coöperate, respectively, with the corresponding clutch members *a'* and *b'* of the drums *a* and *b*. Each drum is adapted to be moved into or out of engagement with the common gear *d* through the friction-clutch by a controlling-lever *e*, acting through a rock-shaft *f*, a system of links and levers *g*, and screws *h*, as usual in hoisting apparatus of the character to which the invention relates.

The two friction-clutches or other variable driving means for the two drums are driven by a transmitting mechanism which comprises in the embodiment of the invention illustrated the worm-wheel *d* above mentioned

and a worm *i* upon a shaft *k*, these parts constituting a convenient form of transmitting mechanism which is non-reversible in the sense that it resists backward movement from the load. The shaft *k* carries one member *l* of a friction-clutch or other variable driving means, the other member *m* of which is keyed upon the shaft *n*, driven by the motor or source of power *o* through a reducing-gear *p*. The movable clutch member, which in this instance is shown as the member *m*, is represented as controlled through a lever *q* from a foot-lever *r*, which is conveniently placed with relation to the hand-levers *e*, so that one operator can control all three of the clutches as the conditions of operation may require.

In the operation of the apparatus, it being understood that the motor *o* is running continuously, the operator, pressing upon the lever *i*, throws in the clutch *l m* and imparts motion to the transmitting mechanism. Then by operation of the levers *e* one or the other, or both, of the drums *a* and *b* are made to rotate at speeds which are determined by the engagement of the clutches *a' d'* and *b' b²*. If it is desired to stop the movement of the shovel, the clutch *l m* is opened and both clutches *a' d'* and *b' b²* are closed, the resistance necessary to hold the drums *a* and *b* from rotation under the tension of the load being furnished by the transmitting mechanism which, as previously indicated, is of such a character as to prevent movement in a reverse direction. Such unwinding of either or both hoisting-ropes as may be necessary is permitted by releasing one or the other, or both, of the drum-clutches, and it will be obvious that by proper manipulation of the clutches any desired movement may be imparted to the shovel. Furthermore, as already pointed out, the motor may be allowed to rotate continuously, no undue heating of any clutch is necessarily occasioned under any conditions of operation, and the whole apparatus is under the control of a single operator through three controlling-levers.

It will be obvious that various changes can be made in details of construction and arrangement without departing from the spirit of the invention.

We claim as our invention—

1. The combination, in a hoisting apparatus, of a source of power, two hoisting-drums, independent variable driving means interposed between the source of power and the drums respectively whereby either of said drums may be driven independently of the other, a third variable driving means interposed between the source of power and the first-named variable driving means, and means for preventing the reverse rotation of the first-named variable driving means, substantially as described.

2. The combination, in a hoisting apparatus, of a source of power, two hoisting-drums, independent clutches interposed between the source of power and the drums respectively whereby either of said drums may be driven independently of the other, a third clutch interposed between the source of power and the first-named clutches, and means for preventing the reverse rotation of the first-named clutches, substantially as described.

3. A hoisting apparatus comprising two drums, a non-reversible transmitting mechanism, clutches interposed between the drums and the transmitting mechanism, a motor, a clutch interposed between the motor and the transmitting mechanism, and means to control said clutch, substantially as described.

4. A hoisting apparatus comprising two drums, a non-reversible transmitting mechanism having a gear common to both drums, clutches interposed between said gear and said drums, a motor, a clutch interposed between said motor and the transmitting mechanism and means to control said clutches, substantially as described.

5. A hoisting apparatus comprising two drums, a worm-gear common to both drums, independent clutches interposed between said gear and said drums whereby either of said drums may be driven independently of the other, a worm-shaft, a motor, a clutch interposed between the said motor and the worm-shaft and means to control said clutches, substantially as described.

This specification signed and witnessed this 18th day of January, A. D. 1904.

WM. F. HUNT.
ROBERT JEFFRIES ROBERTS.

In presence of—
W. B. GREELEY,
M. A. BRAYLEY.