(No Model.) 2 Sheets—Sheet 1.

W. G. MILLER.

HOISTING APPARATUS.

No. 602,603. Patented Apr. 19, 1898.

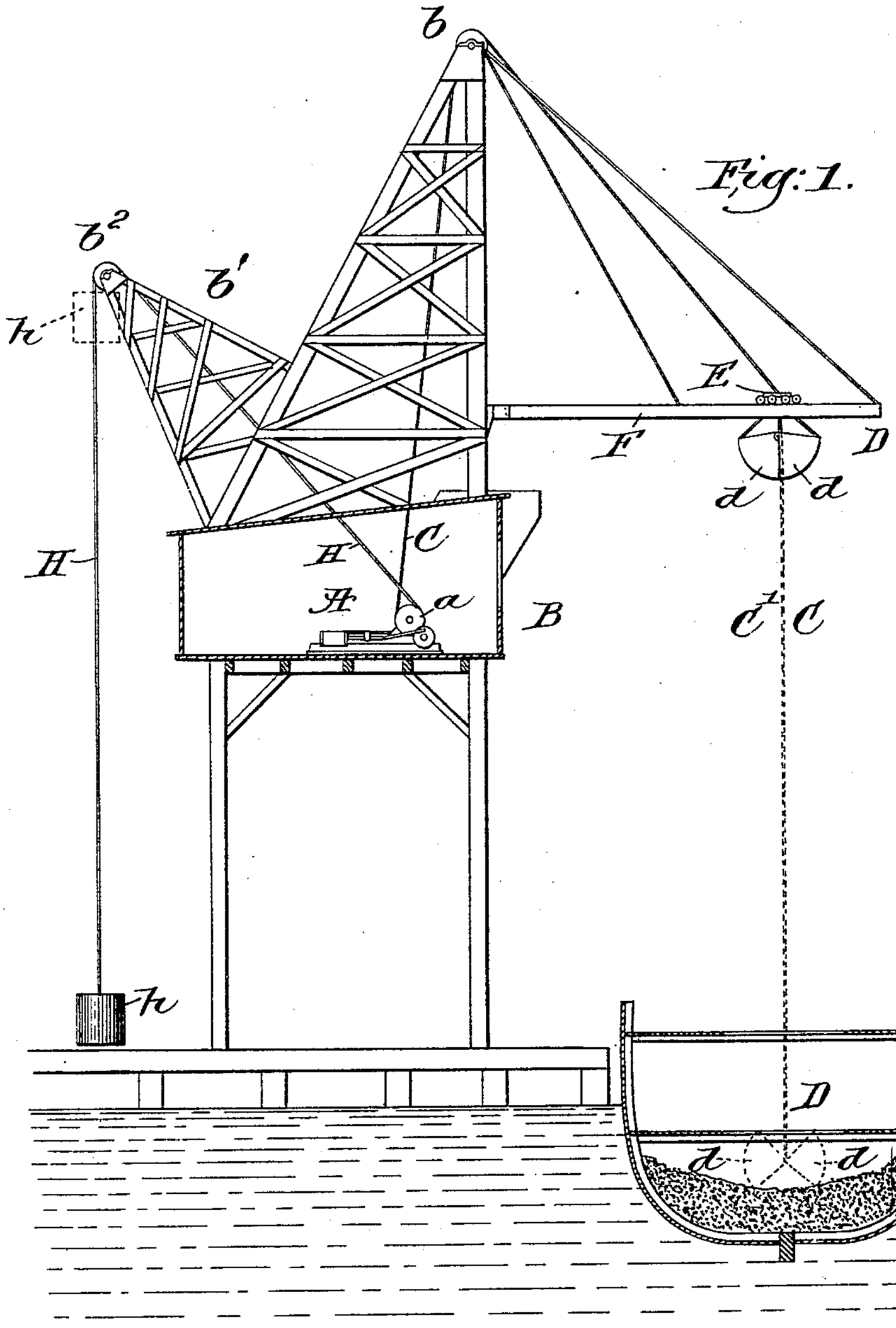

Fig: 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig: 2.

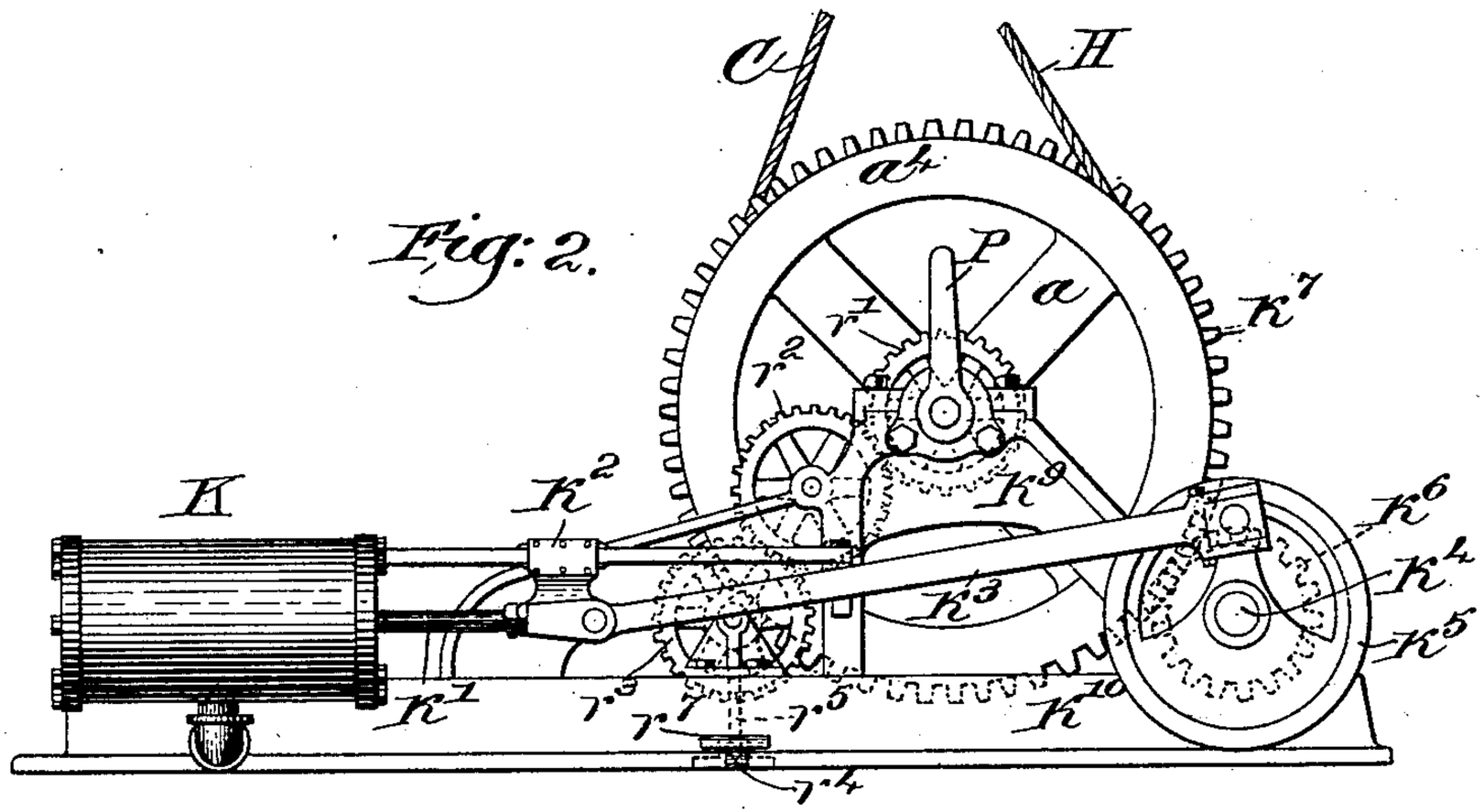
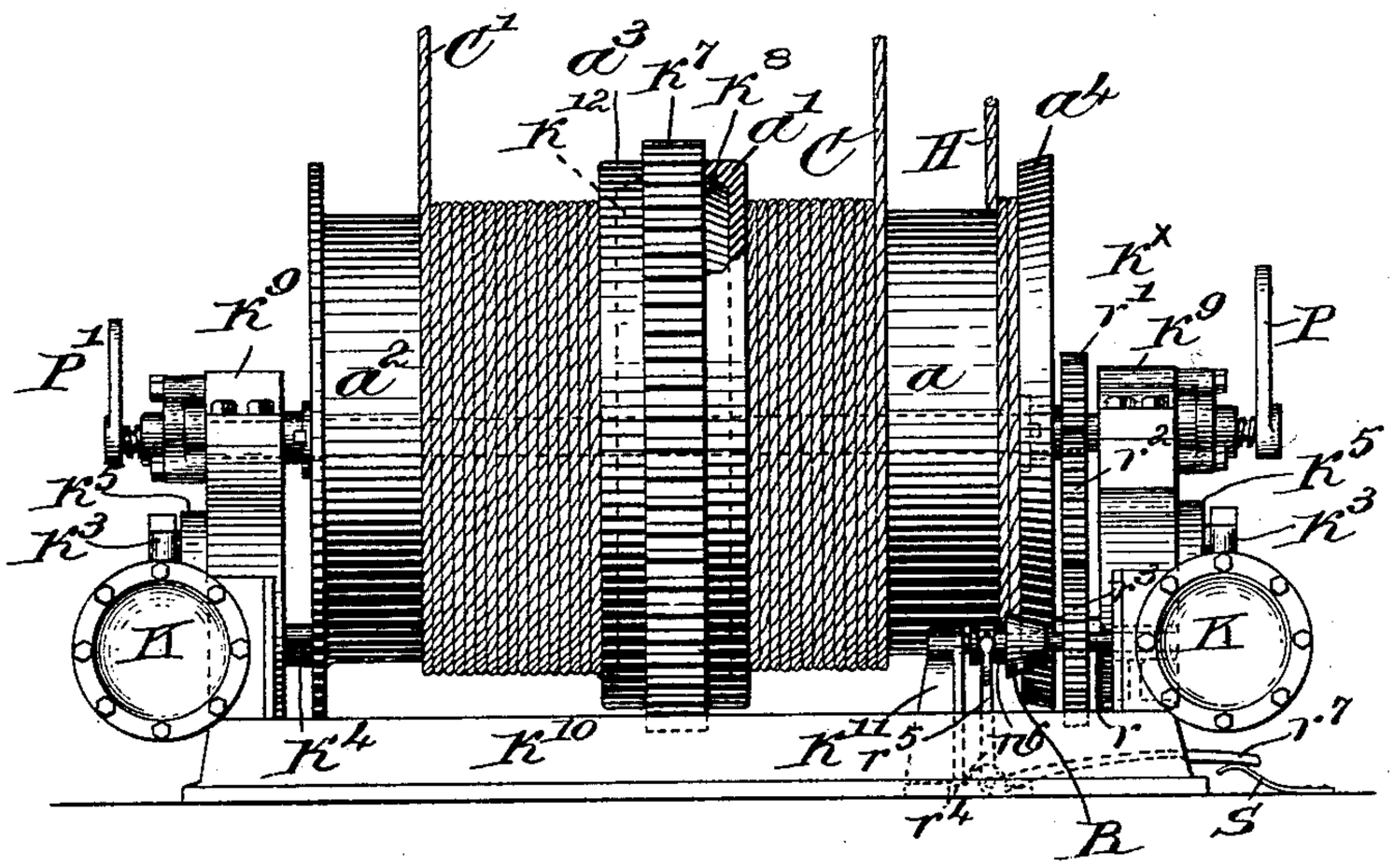


Fig: 3.



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UNITED STATES PATENT OFFICE.

WILLIAM G. MILLER, OF CAMBRIDGE, MASSACHUSETTS.

HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 602,603, dated April 19, 1898.

Application filed June 11, 1897. Serial No. 640,282. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. MILLER, of Cambridgeport, county of Middlesex, State of Massachusetts, have invented an Improvement in Hoisting Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In unloading vessels or other vehicles laden with coal and the like the most common type of apparatus at present employed is that in which a dredge or bipart bucket is lowered from a friction-drum into the mass of coal in a hold or elsewhere, both hauling and closing ropes being allowed to run freely until the bucket has buried itself in the coal, after which the parts of the bucket are drawn together by the closing-rope to inclose a load of coal, and the lifting or hauling drum is then started to raise the bucket to the discharging-point. This method of handling coal possesses considerable efficiency through its simplicity and capability of speed in operation; but great annoyance and expense have been found to result from the practical impossibility of lowering the bucket with sufficient momentum to properly enter the coal without at the same time slackening the friction on the hauling-drum to such an extent that several feet of slack cable runs from the drum after the bucket has struck the coal. When the hauling-drum is started to raise the bucket, this slack is taken up with a run and the violent jerk which ensues upon the tautening of the cable under load is always extremely destructive upon the friction-blocks of the drum and often tears the teeth from the actuating-gear. To eliminate this drawback and to provide an efficient counterweight for this class of hoisting machinery is the object of my present invention, the various features of which will be fully illustrated and described in the accompanying drawings and specification, and set forth in the claim.

In the drawings, Figure 1 is a view in side elevation of hoisting apparatus embodying my invention. Fig. 2 is an enlarged view, in side elevation, of the preferred form of hoisting-engine to be used in said apparatus, illustrating in detail certain features of my invention; and Fig. 3 is a view of the same in rear elevation.

In the preferred embodiment of my invention selected for description and illustrated in the drawings the hoisting-engine A is mounted on a suitable support, shown as the elevated floor of a frame derrick B, of ordinary or desired construction, having the usual top sheaves *b*, (only one of which appears in Fig. 1,) over which sheaves are carried from the engine, side by side, the hoisting and closing cables or other flexible members C C′, operatively connected to the bipart bucket D in well-known manner, after traversing a traveler E, running on a boom F, both of usual or desired construction.

The parts of the apparatus to which reference has thus far been made may be and preferably are, as already indicated, of well-known construction, as also the hoisting-drum *a* of the engine, (best seen in Fig. 3;) but on the latter I have provided, in addition to the hoisting-rope C, another rope or like flexible member H, arranged to be wound upon the drum by rotation of the latter in reverse direction to hoisting movement and carried from the drum over a direction-sheave b^2, suitably supported, as by a frame derrick b', in position to allow clearance for vertical movement of the counterweight *h*, with which the free end of the rope is provided.

The type of hoisting-engine illustrated has two cylinders K, of which the piston-rods k', slides k^2, and connecting-rods k^3 may be of usual or desired construction, and these are preferably both coupled to a single crank-shaft k^4, having fly-wheels k^5 and a spur-gear k^6 to mesh with and drive the main driving-pinion k^7, mounted at the middle of the drum-shaft $k^\times$, which is supported in suitable trunnions k^9 from the base k^{10}.

The pinion k^7 is provided with annular cones k^8 k^{12}, adapted to frictionally coöperate, respectively, with the adjacent cup-like heads a' a^3 of the drums *a* a^2, which are carried by the shaft $k^\times$ and loose thereon, being adapted respectively to be moved independently of each other along the shaft into coöperative engagement with the friction-cones of the

actuating-pinion, suitable devices P P′, of well-known construction, being provided to control the clutching action.

The drum a^2 operates the rope C′ for closing the bucket, while on the drum a, as already stated, are wound the hoisting-rope C and counterweight-rope H, a drum of ordinary width, as illustrated, serving to receive both ropes, since one runs off as the other is wound on. When an engine of ordinary type is thus used without alteration, the counterbalance h may be of sufficient weight to balance a considerable portion of the weight of the bucket D when empty, leaving, however, a sufficient proportion in favor of the bucket to insure the rapid descent of the latter by gravity and its burial in the coal.

In operation the engine is handled as usual, both drums being released from the friction actuating-pinion k^7, permitting the hoisting and closing ropes C C′ to run off as the bucket falls freely from the full-line to the dotted-line position, Fig. 1, and further into the mass of coal. As the bucket draws off the hoisting-rope C the drum a is rotated thereby and the cable H wound on, drawing the counterweight h up into its dotted-line position, and it will be readily seen that the constant strain of the rope H on the drum will effectually prevent the latter from racing and running off slack after the weight of the bucket is taken off it by the burial of the bucket in the coal. In raising the bucket the closing-drum a^2 is first started, and when the parts d of the bucket have been drawn together with the load inclosed, the hoisting-drum a is started at work to wind up the hoisting-rope C, which is already taut, instead of slack, as in apparatus to which my invention has not been applied.

If desired, the weight h may be only so heavy as to prevent slack and its function as a counterbalance to the bucket disregarded; but I prefer to offset a considerable portion of the bucket's weight, as already described, since the saving in power, and consequently in fuel, is very marked, and the life of the friction-clutches is considerably lengthened.

Should it be desirable to even further relieve the strain upon the hoisting-clutch by increasing the counterweight, and should this counterbalancing be carried to such an extent that the bucket has no longer sufficient overweight to keep itself buried in the coal while the closing-rope is being wound up to draw the bucket parts together, some means must be provided to temporarily offset the effect of the counterweight until the hoisting proper is to begin. As a convenient means to accomplish this I have shown in Figs. 2 and 3 mechanism to enable the operator to frictionally rotate the drum a to wind on the rope H and take up the weight of the counterbalance during the closing operation, thus permitting the bucket to resist with its entire weight the tendency of the closing-rope to draw out the bucket from the coal while in the act of closing and with but a partial load.

The mechanism illustrated comprises, essentially, a friction-cone R, carried on an auxiliary shaft r, journaled at one end in one of the frame-trunnions K^9, and at its other in a trunnion K^{11}, a train of gears r' r^2 r^3 serving to enable the auxiliary shaft r to be actuated from the drum-shaft in the same direction as the latter, and a controller for the cone, consisting of a bell-crank lever r^4, being provided, the arm r^5 of the lever coöperating at its upper end with a grooved sleeve r^6 on the shaft r. The latter is mounted adjacent the outer head of the drum a, which is preferably provided with a broad beveled flange a^4, into frictional engagement with which the cone R may be brought by pressing with the foot upon the arm r^7 of the lever r^4, rotation of the auxiliary shaft r then causing the drum a to take up a portion of the rope H. The proportion of rope thus to be taken up may best be judged by experience; but I have found that very slight rotation of the drum a will be sufficient, and it should not be turned so far as to cause excessive slackening of the hoisting-rope C. When the bucket has been closed, the foot is lifted, the lever r^4 released, and a spring s forces it upward, throwing the cone R away from the flange a^4 and leaving the drum a ready to be thrown against the main actuating-pinion k^7, to be driven thereby in the same direction as the drum a^2, for the purpose of hoisting the load.

Having thus fully described my invention, I do not limit myself to the exact construction illustrated, since the same may be varied considerably without departing from the spirit of my invention.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, a driving-shaft provided with a medially-arranged clutch device; drums, one on each side of, and adapted to be actuated by, said device, said drums being each rotatable in both directions on said shaft, independently of one another; a flexible draft member and a flexible tension member, respectively connected operatively to one of said drums and adapted to be wound in opposite directions on and off across the periphery thereof; and means to control the operation of said clutch device.

2. In an apparatus of the class described, a plurality of drums mounted on, and respectively capable of actuation in opposite directions by, a common driving-shaft, each independently of the other, one of said drums having a flexible draft member provided with a load-carrier, and an auxiliary flexible member provided with means to maintain it constantly under tension, said flexible members respectively being connected operatively to

said drum and adapted to be wound in opposite directions on and off across the periphery thereof, substantially as described.

3. In an apparatus of the class described, a power-shaft having a clutch member fixed thereon and rotatable in the same direction therewith, a friction device separate from said shaft but actuated thereby, a drum loosely mounted on said shaft intermediate said clutch member and friction device, and means to cause engagement between the drum and the clutch member to cause rotation of the former in one direction, and means to cause its engagement by the friction device to permit the latter to rotate the drum in reverse direction, substantially as described.

4. In a hoisting-engine, a power-shaft; a drum loosely mounted thereon and having a surface adapted to be frictionally engaged and driven; a clutch on the shaft, and means to cause engagement between said clutch and the driving-surface of the drum to cause rotation of the latter in one direction; an auxiliary shaft driven from the power-shaft and provided with a friction driving-cone, and means to effect engagement between said cone and the friction driving-surface of the drum to cause rotation of the latter in reverse direction, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM G. MILLER.

Witnesses:

JOHN C. EDWARDS,

AUGUSTA E. DEAN.