

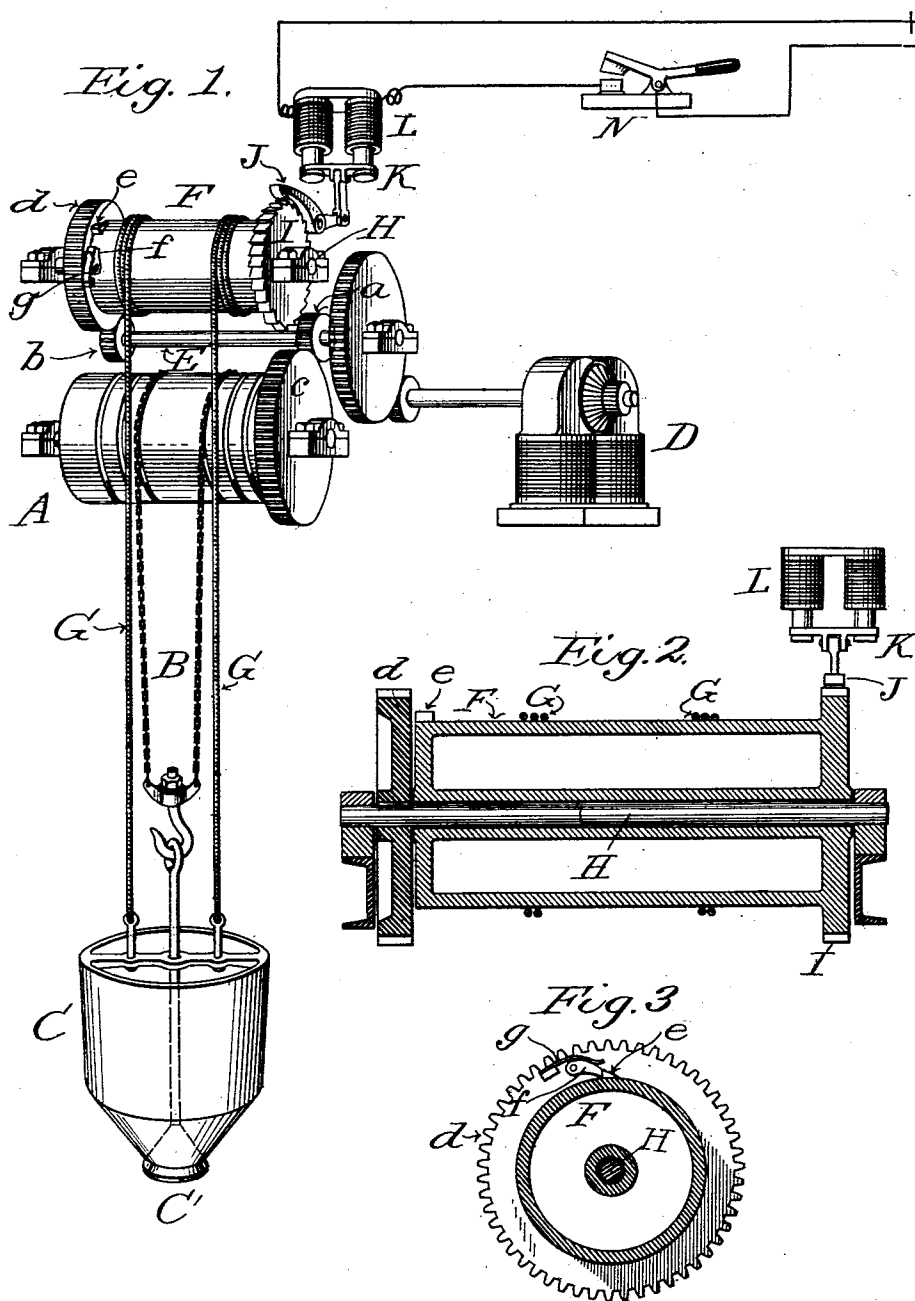
(No Model.)

H. SAWYER.

DISCHARGING MECHANISM FOR BUCKETS, TONGS, &c.

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UNITED STATES PATENT OFFICE.

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DISCHARGING MECHANISM FOR BUCKETS, TONGS, &c.

SPECIFICATION forming part of Letters Patent No. 573,708, dated December 22, 1896.

Application filed August 8, 1896. Serial No. 602,168. (No model.)

To all whom it may concern:

Be it known that I, HARRY SAWYER, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Discharging Mechanism for Buckets, Tongs, &c., of which the following is a specification.

My invention pertains to hoisting machinery, and particularly to mechanism for discharging coal-buckets, opening tongs and grapples, and performing like operations.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a diagrammatic perspective of the operative parts, the supporting-frame-work and other parts not necessary to a proper understanding of the invention being omitted. Fig. 2 is a longitudinal sectional view of the trip-drum and its actuating gear-wheel; Fig. 3, a transverse sectional view of said drum, looking toward said gear-wheel.

In the drawings, A indicates the main or hoisting drum, here represented as carrying two parts of chain or cable B, from or by which is suspended the discharge device, bottom, or bell C' of a carrier C, (a coal-bucket in the present instance.) The hoisting-drum A is turned by a motor D through the medium of a shaft E and suitable gearing, which latter will or may vary according to the character of the motor employed and other considerations. I have represented and prefer to employ an electromotor for this purpose, but do not restrict myself to its use.

F indicates a supplemental drum designed to take up and to pay out the trip chain or cable G, here represented as having two parts, in the same manner as the hoisting-chain. The use of two parts of cable is in both cases purely optional, but is adopted in illustrating the invention for the reason that by winding simultaneously toward or from the mid-length of the drum they maintain the load or carrier at a medial point between the ends of the drum at all times and prevent turning.

Suspended by or from cables G is a shell C, which constitutes the body of the bucket or carrier.

The drum F may, for convenience, be designated the "trip-drum," and it is driven at

the same surface speed as the hoisting-drum A and by the same motor, suitable intermediate gearing being provided for that purpose. In the example given a single shaft E is interposed between the motor-shaft and the drums and is furnished with two pinions *a* and *b*, which mesh, respectively, with the driving gear-wheels *c* and *d*, the former secured to or cast upon the hoisting-drum A and the latter keyed or otherwise made fast upon the shaft H of drum F, said drum being loose upon shaft H, as shown in Fig. 2.

Drum F is formed or furnished with a lug *e* in the form of a ratchet-tooth, and gear-wheel *d* is provided with a pawl or dog *f*, which engages with said lug when the cables are being wound on the drums, but which recedes from and may in some cases ride backward over the lug when the load is being discharged. The pawl *f* is thrown toward the drum by a spring *g*.

I indicates a ratchet-wheel cast integral with trip-drum F or made fast thereto in any convenient manner, its teeth being set in the same direction as the single tooth or lug *e* above mentioned.

At a suitable point, preferably above the ratchet-wheel I, there is arranged a pawl J, which is here represented as of hook form, pivoted at a point between its ends to any suitable support and having its tail connected by a link with the armature or core-plate K of an electromagnet or solenoid L, as shown in Fig. 1. Under the arrangement shown and preferred in use the movable magnet-core is made to act as a counterweight and to depress the tail of the pawl J, thereby normally lifting and holding its nose out of engagement with the teeth of ratchet-wheel I. When the electromagnet or solenoid is energized, however, the core is drawn in or the armature is attracted, the tail of the pawl is lifted, and its hook is caused to engage the ratchet-wheel I, and thus to hold the drum F against rotation in a direction to pay off the cable G. Should it happen from any cause that the gear and drum F be rotated in a direction to wind on the cable G, the teeth of ratchet-wheel I would merely ride beneath and lift the pawl J, overcoming the force of magnet L in so doing. On the other hand,

if during engagement of the ratchet-wheel by the pawl J shaft E should turn gear *d* in the reverse direction its pawl *f* would merely draw away from lug or tooth *e*, leaving the drum F at rest, and if this rotation of the gear be continued the pawl *f* would merely ride back over the long inclined face of the lug or tooth without effect thereon.

The apparatus being thus constructed, its operation is as follows, it being understood that the cables G are normally a little slack and that the bottom of the bucket C rests upon the bell C', thus closing the bucket: With the parts in this relation the bucket may be filled, hoisted, and lowered or transferred, as desired, and in the same manner as though not provided with dumping mechanism. When it is desired to dump the bucket, the operator closes the switch N, thereby completing the circuit of electromagnet or solenoid L, energizing the same and causing its armature or its core to be lifted and to throw the hook-pawl J into locking engagement with the ratchet-wheel I, thus locking the drum F against rotation in a direction to discharge or pay off the cable. With the drum F thus locked the hoisting-motor may be run in the lowering direction, thus permitting the bell C' to drop away from the lower end or mouth of the bucket C and permitting the load to be discharged while the bucket hangs suspended by the cables G from the trip-drum F. Gear-wheel *d* and shaft H, being free to turn independently of drum F in the lowering direction, may rotate freely while said drum remains at rest. When the contents of the bucket are discharged, the hoisting-motor may be again run in the hoisting direction, thus bringing the bell C' back into the bucket C and closing it, immediately after which the pawl *f*, carried by the gear-wheel *d*, will engage the lug or tooth *e* of drum F, and if the hoisting be continued the trip-cables G will be wound up at the same rate of speed as the hoisting-cable B.

As pointed out, the hoisting-motor cannot drive or turn drum F in the lowering direction. When lowering is commenced, this drum will not at once start to move, but will commence to rotate as soon as enough of the weight of the bucket comes upon the drum to overcome the friction of said drum upon its shaft H. The movement in the lowering direction while the trip-drum is locked to dump the bucket need be only a fraction of a revolution of the main hoisting-drum and gear *d*, which operates the supplemental drum, so that the pawl *f* need never make a complete revolution and pass over the lug *e*. Should this, however, happen through the carelessness of the operator or other cause, no accident will result. It will merely be necessary for him to go to the trolley or other support upon which this mechanism is mounted and lock or hold pawl *f* out of engagement, while the unnecessary overtravel

in the lowering direction is reversed and taken up and the pawl *f* is carried back over the lug.

It is not necessary to keep the switch N closed after the hook-pawl J is carried into engagement with the ratchet-wheel I, as said pawl will be retained in engagement by the undercut or hooking form of the ratchet-teeth until the bucket is again closed, when the pawl will drop out of engagement through gravity.

The invention herein set forth is more particularly designed for use in connection with cranes or hoisting machinery, and especially in connection with the hoisting mechanism of a traveling bridge-crane.

It is evident that various modifications may be made without departing from the spirit of the invention above set forth, as, for instance, by transposing the hoisting and trip chains from one to the other drum; by driving drum A positively in one direction only; by making gear *d* loose and drum F fast upon shaft H; by arranging the electromagnet to act against the weight of pawl J or in opposition to a spring tending to hold the pawl out of action, and in various other ways that will readily suggest themselves to the skilled mechanic.

As before suggested, the bucket is merely illustrated as a type of carrier, and may stand for tongs, ladle, or other carrier, the trip-cable in such cases serving, as required, to open and close the tongs, to withdraw a locking bolt or brace, or to perform like operations. No claim is made to the specific form of bucket herein shown.

In practice the hoisting mechanism may be provided with the usual brakes, magnetic, metallic, or both, which, however, are not involved in the present invention, and hence need not be described in detail or further referred to.

Having thus described my invention, what I claim is—

1. In combination with a carrier and with discharging devices applied thereto, a hoisting-drum; a trip-drum; cables connecting said drums with the carrier and with the trip mechanism; a motor connected with and serving to drive the hoisting-drum positively in hoisting direction; gearing interposed between the trip-drum and the motor and serving to drive said drum positively in a hoisting direction, but to disconnect therefrom when run in a lowering direction; and means for positively locking the trip-drum against rotation in the lowering direction.

2. In combination with a carrier and a closing device therefor, hoisting-drum A provided with gear-wheel *c*; motor D; shaft E geared to said motor and provided with pinions *a*, *b*; shaft H; gear *d* and drum F carried by said shaft one fast to and the other loose upon the shaft; ratchet-wheel I connected and movable with drum F; cable G extending from drum F to the closing device of the carrier; pawl J adapted to engage the ratchet-wheel

I; electromagnet L for actuating said pawl; and a switch in circuit with the electromagnet and serving to control its action, substantially as set forth.

5 3. In combination with bucket C provided with bell C'; hoisting-drum A provided with cable B and gear-wheel *c*; motor D; shaft E geared to said motor and provided with pinions *a b*; shaft H having gear *d* fixed upon
10 it; drum F loosely mounted upon shaft H and provided with ratchet-wheel I; cable G extending from drum F to bell C'; pawl J adapted to engage said ratchet-wheel; elec-
15 tromagnet L for actuating said pawl; and a switch in circuit with the electromagnet and serving to control its action, substantially as set forth.

4. In a hoisting apparatus the combination

with a load-carrier and a trip therefor, of a hoisting-drum and a trip-drum; a single motor 20 for driving both drums positively in a hoisting direction; a connecting device between one of the drums and the driving power, whereby the driving power is caused to connect positively with said drum in turning in 25 the hoisting direction, but is free to disconnect therefrom when turning in the opposite direction; and means for holding said drum against rotation in the discharging direction while permitting the other to turn backward. 30

In witness whereof I hereunto set my hand in the presence of two witnesses.

HARRY SAWYER.

Witnesses:

J. G. EMERY, Jr.,
THOMAS C. AKIN.