No. 834,647. PATENTED OCT. 30, 1906.

H. TOOMEY.

HOISTING APPARATUS.

APPLICATION FILED MAY 15, 1906.

2 SHEETS—SHEET 1.

Fig: 1,

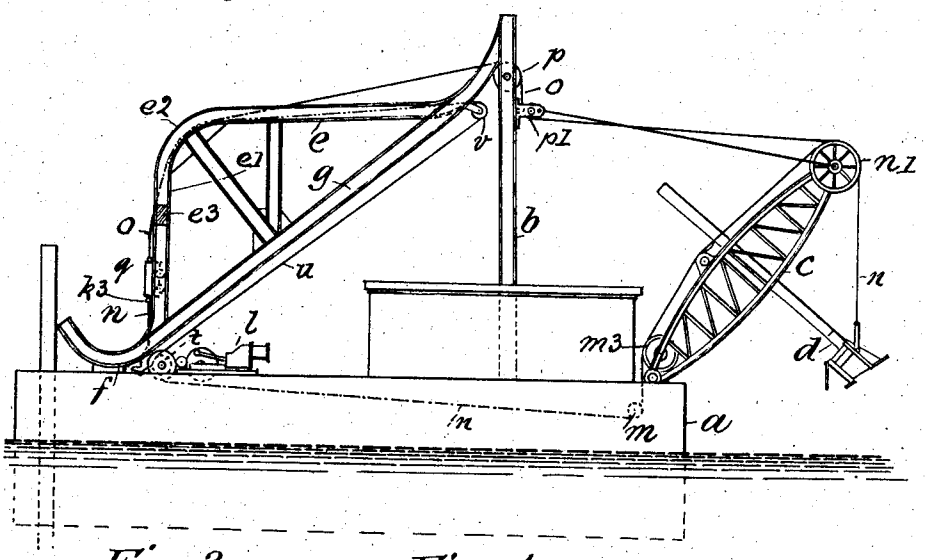


Fig: 3.

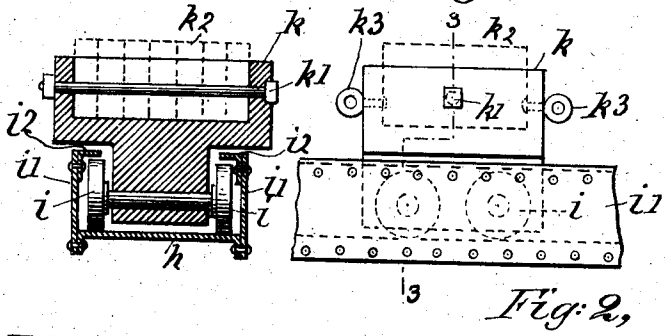


Fig: 4,

Fig: 7,

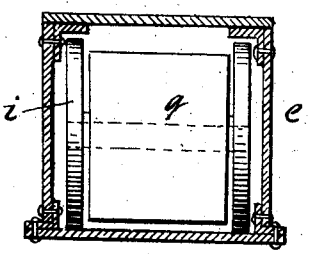
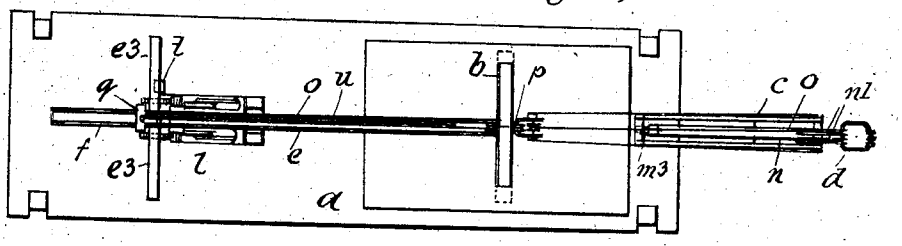


Fig: 2,



WITNESSES

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2 SHEETS—SHEET 2.

Fig: 5,

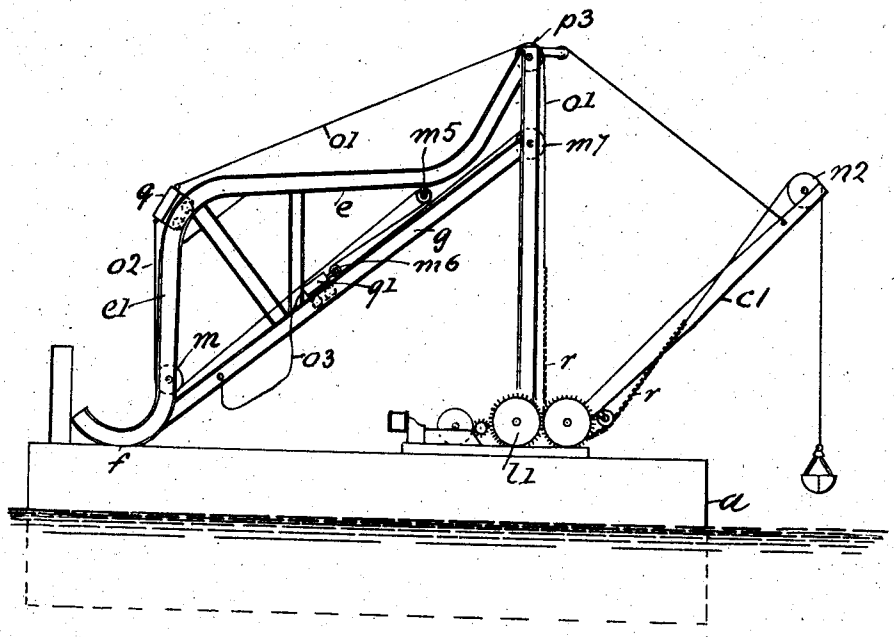
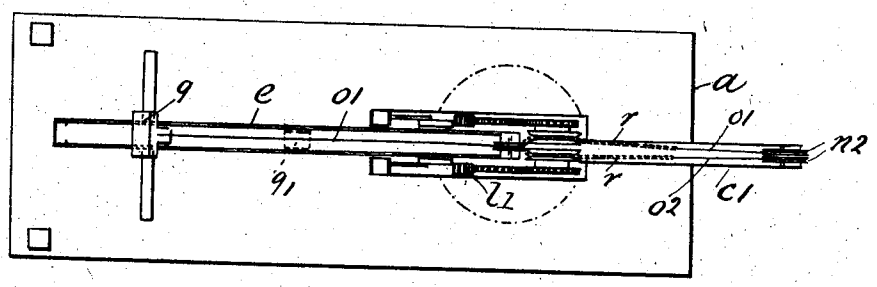


Fig: 6,



WITNESSES

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HOISTING APPARATUS.

No. 834,647. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed May 15, 1906. Serial No. 316,908.

To all whom it may concern:

Be it known that I, HUMPHREY TOOMEY, a citizen of the United States, residing at Guilford, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Hoisting Apparatus, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in hoisting apparatus, and is specifically designed to be used in connection with dredging apparatus, cranes, and other heavy weight-hoisting devices where, as usual, a reacting strain is solely sustained by the drum of the hoisting machinery; and the object of my invention is to provide means of relieving the drum and the therewith connected machinery of the major part of such strain. Another object of my improved apparatus is to facilitate ease in hoisting the suspended material—such as the heavily-weighted dredger or the hoisting-scoops, clam-shell buckets, &c., with their contents—by restricting the hoisting action of the hoisting machinery more to an intermediary revolving and power-distributing agency than to the pulling and weight-sustaining operation to which dredging and hoisting machinery of this class have heretofore been subjected; and I accomplish these and other objects by means of the interposition of traveling counterweights placed in connection with the hoisting-gear and hoisting-ropes, and which device is designed to counterbalance the strain to which hoisting-drums usually are subjected to.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a side elevation of a dredging-scow provided with dipper-scoop and illustrating the counterbalancing device. Fig. 2 is a plan view of the same; Fig. 3, a cross-section on the line 3 3 of Fig. 4; Fig. 4, a side view of the counterbalancing-truck; Fig. 5, a side elevation of a clam-shell-bucket dredge, showing my improvement attached to the hoisting apparatus. Fig. 6 is a plan view thereof, and Fig. 7 a modification of the truck shown in Fig. 4.

As seen in the drawings, in Fig. 1 the scow *a* in dredgers of this class is provided with the heavy **A**-frame *b*, to which the rope or cable transmission is applied and used for swinging the boom *c* and raising and lowering the therewith operated dipper-arm and scoop *d*. Connected with the **A**-frame *b* at its upper terminal is a stationary auxiliary frame *e*, which rests at *f* on the floor of the rearward end of the scow *a* and is fastened thereto. This frame consists of a diagonal member *g*, having at the upper terminal of the **A**-frame *b* and at the bearing *f* near the floor of the scow *a* upwardly-turned end curves, as shown in the drawing. The diagonal member *g* supports a horizontal member *e* and a vertical member *e'*, rounded at their intersection e^2, and they are trussed to the diagonal member *g*. The entire auxiliary frame is supported by side braces e^3, resting on the floor of the supporting-platform of the scow *a*, and forms with the aforesaid **A**-frame *b* a substantial and rigid superstructure and is designed to act as the runway for the counterbalanced heavily-weighted carriage *q*, which is designed to travel over the outward and uppermost edge of the auxiliary frame. This frame is preferably made from channel-bars, plates, and angle-iron riveted together, as illustrated in cross-section in Fig. 3 of the drawings, and is so arranged that the lower channel-bar *h* serves as the support for the wheels *i* of a truck placed thereon, while the side plates *i'* and the top angle-iron i^2 will incase the running-gear of the truck *k* when placed therein and act as a guideway for the travel of this truck over the outer edge of the auxiliary frame, or the construction shown in Fig. 7 may be used, where the entire truck *q* is incased by the main frame *e*. This truck *k* preferably consists of a heavy cast-iron frame which securely journals the shafts of the wheels *i*, and its upper frame may be made solid or partially hollow, and in the latter form serves for the reception of additional weights, which can be securely locked to the truck by means of bolts *k'*, which latter pass through the side of the truck *k* and the therein placed weights k^2. The ends of the truck are provided with swivel-eyes k^3 and serve for the fastening of haulage and tail ropes.

As seen in Fig. 1 and in connection with its scoop-dredger bucket, the hoisting-engine *l* is placed with its drum near the rearward bearing *f* of the auxiliary frame *e*, and the haulage-rope *n*, being fastened to one of the ring-eyes k^3 of the truck, takes several turns around

the drum of the hoisting-engine *l*, passes thence forward, and follows the length of the scow *a* and to the forward end thereof, under the idler *m*, and over the usual pulley m^3 at the toe of the swinging boom *c*, thence over the top pulley *n'* and down to the link of the dipper-scoop, or an endless chain may be employed for this purpose.

A tail-rope *o* connects with the ring-eye on the other end of the counterbalancing-truck *q*, passes upwardly over a number of idlers placed on the connecting-curve of the vertical and horizontal members *e'* and *e* of the auxiliary frame, and thence over a head-pulley *p*, situated in the apex of the A-frame *b*, thence vertically downward and under a swivel-pointed idler *p'*, thence over one of the aforementioned boom-hoisting pulleys *n'*, and also to the link of the scoop *d*. A separate drum *t*, placed on the main drum-shaft, actuates a separate endless rope *u*, fastened also to the balance-weight *q*, and which passes from the drum *t* over a pulley *v*, thence over the curve idlers back to the weight *q*, and is destined to raise this weight when the dipper is lowered.

The idler *p'*, as is usual in apparatus of this kind, is fastened to the A-frame *b* by means of swivel connections, permitting thereby its adjustment and that of the rope *o* to whatever direction the swinging boom *c* may assume in its operation.

It will be apparent that the interposition of the traveling weighted truck *q* and the therewith connected haulage and tail ropes, which latter practically form an endless transmission medium, will cause the drum of the hoisting-engine to be subjected to a double strain in nearly opposite directions, and thereby ease the pull against the hoisting machinery, while at the same time the counterweight *q*, traveling downwardly over the vertical member *e'*, will by means of the rope transmissions *o* assist in hoisting the dipper and its contents. In the downward-directed movement of the dipper *d* the truck *q* will be raised to the level of the frame member *e* and travel over the same. This member *e* is preferably slightly inclined toward the rear end, and the downwardly-directed movement of the scoop-dipper is limited by the length of the travel of the truck over the horizontal frame member *e* toward the upwardly-directed curve near *p*, while the lower curve of the guideway, beginning at *f*, is designed to arrest the outward travel of the truck in case of breakage of the transmission-ropes *n* and *o*.

My improved device when applied to a clam-shell bucket or orange-peel dredger or to a crane fitted with this particular style of buckets, as illustrated in Figs. 5 and 6 of the drawings, is essentially the same as far as the auxiliary frame is concerned; but the latter is preferably provided with two moving counterweights, and the hoisting-gear is located more centrally in order to operate a vertical hoisting cable or chain placed in this position, so as to accommodate itself to the twisting action to which the cable in this class of machinery is subjected by the laterally-swinging motion of the boom *c'*.

Figs. 5 and 6 illustrate my device fitted to a clam-shell dredger having a laterally and vertically swinging boom, and the auxiliary frame *e*, similar to the frame shown in Figs. 1 and 2, is provided, in addition to the counterweight *q*, which travels over the outer edge of the same, with an addditional second traveling counterweight *q'*, which is designed to employ the diagonal frame member for its runway. Furthermore, in this application of my improved device all ropes, cables, and chains act solely as haulage-ropes.

In the operation of this device the hoisting-gear is preferably provided with a hoisting-drum which will receive and transmit its motion to a stud link chain, a class of hoisting-drums which is usually employed on windlasses, and that part of the haulage-rope which passes through the drum is made of a stud link chain, as shown at *r* in the drawings, while the remaining part of the transmission-rope is the usual wire cable best adapted for traveling over pulleys, idlers, &c.

The clam-shell bucket has two ropes which pass over two sheaves n^2, which are situated on the upper terminal of the boom *c'* and are placed side by side thereon. These ropes *o'* and o^2 form a continuation of the stud link chains *r*. The latter pass through the two hoisting-drums of the hoisting machinery L' and upwardly, and one of the same *o'* continues over the top sheaf p^3 and thence to one of the ring-eyes on the counterbalance-truck *q*. The opposite ring-eye of this truck is connected to the rope o^2, passes underneath the idler *m* and over a pulley m^5, which is placed at the upper junction of the diagonal and horizontal members of the auxiliary frame, thence downward again and around a front haulage-pulley m^6, fastened to the front end of the second truck *q'*, thence over the pulley m^7, placed vertically over the hoisting-drum, and passes vertically downward and connects with the second of the stud link chains *r* and is actuated upon by one of the corresponding drums, and its rope continuation travels over the top haulage-pulley n^2 on the swinging boom *c* down to the bucket.

The rearward end of the second counterweighted drum *q'* may be connected by means of a slack rope o^3 to any stud or bolt on the auxiliary frame in order to limit its outward travel over the end curve at *f* in case of breakage of the ropes. Said bolt is preferably provided with an antishock mechanism.

The operation of this device is similar to the one described heretofore with reference to the scoop-dredger. In this instance the

counteracting force against the resisting weight of the bucket is determined by the weight of the two traveling trucks q and q', and it will be seen that in either of these devices the power applied by means of the engine to the drum is more that of a rotative than of a direct-hauling nature, and the strains to which the machinery usually is subjected, where not provided with counterweights, are entirely obviated by the employment of my improved apparatus.

My improvement can also be applied to steam or electrically-operated locomotive-cranes fitted with clam-shell buckets and having revolving platforms. If applied to scows fitted with swinging booms, the latter are revolved by means of any of the well-known devices, such as special donkey-engines, by means of sprocket-gear and link chains, &c.

The advantages accruing to the users of my improved apparatus are manifold and include, aside of those stated heretofore, a saving in steam and fuel, a reduction in the cost of labor, reduced expenses caused by less frequent breaking down of the machinery, and reduced construction cost, because the machinery does not need to be as heavy and cumbersome as used at the present time.

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

1. In a hoisting apparatus, a stationary auxiliary frame designed to serve as the runway of a counterbalancing-weight placed thereon, said counterbalancing-weight being interposed in the hoisting transmission system and forming a part thereof.

2. In a dredging apparatus, a stationary auxiliary frame designed to receive one or a number of counterbalancing-weights and to serve as runways for the same, said counterweights forming a part of the hoisting-gear.

3. In a hoisting apparatus counterbalancing-weights operated by the hoisting-machinery, a stationary frame for said weights to travel upon, a rope or cable haulage system, and means for operating the hoisting system.

4. In a dredging apparatus, counterbalancing-weights designed to operate in conjunction with the dipper or bucket of the dredger, and operated by the hoisting machinery, a stationary frame for said weights to travel upon, a rope or cable haulage system of which said counterbalancing-weights form a connected part therewith, and means for operating the hoisting system.

5. In a hoisting apparatus, a hoisting-engine with drum or drums to operate the therewith connected haulage or hoisting system, an auxiliary stationary frame with counterbalancing-weights traveling therein, said counterbalancing-weights being interposed in the haulage or hoisting system and forming a part thereof and so arranged that the movable counterweights exert a counter and balancing strain against the acting strain of the hoisted object.

6. In a dredging apparatus, a hoisting-engine with hoisting drum or drums to operate a system of transmission ropes, cables or chains for the purpose of lifting objects, movable counterbalancing-weights which travel on an independent auxiliary frame, such counterbalancing-weights being incorporated in the transmission-rope system and actuated by the same and designed to balance by their weight the weight inherent in the hoisted object.

7. In a dredging apparatus the hoisting machinery provided with rope or cable haulage and hoisting system, operating with the view of having the dipper or bucket perform its designated functions as such, one or more counterbalancing-weights, the latter provided with vertical and horizontal runways to travel upon such weights incorporated into and being operated by means of the rope or cable haulage and hoisting system, and being located in the power-transmission system in such a manner so as to balance the strain exerted by the hoisted object against the hoisting machinery.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 25th day of April, 1906.

HUMPHREY TOOMEY.

Witnesses:
F. A. STEWART,
C. E. MULREANY.