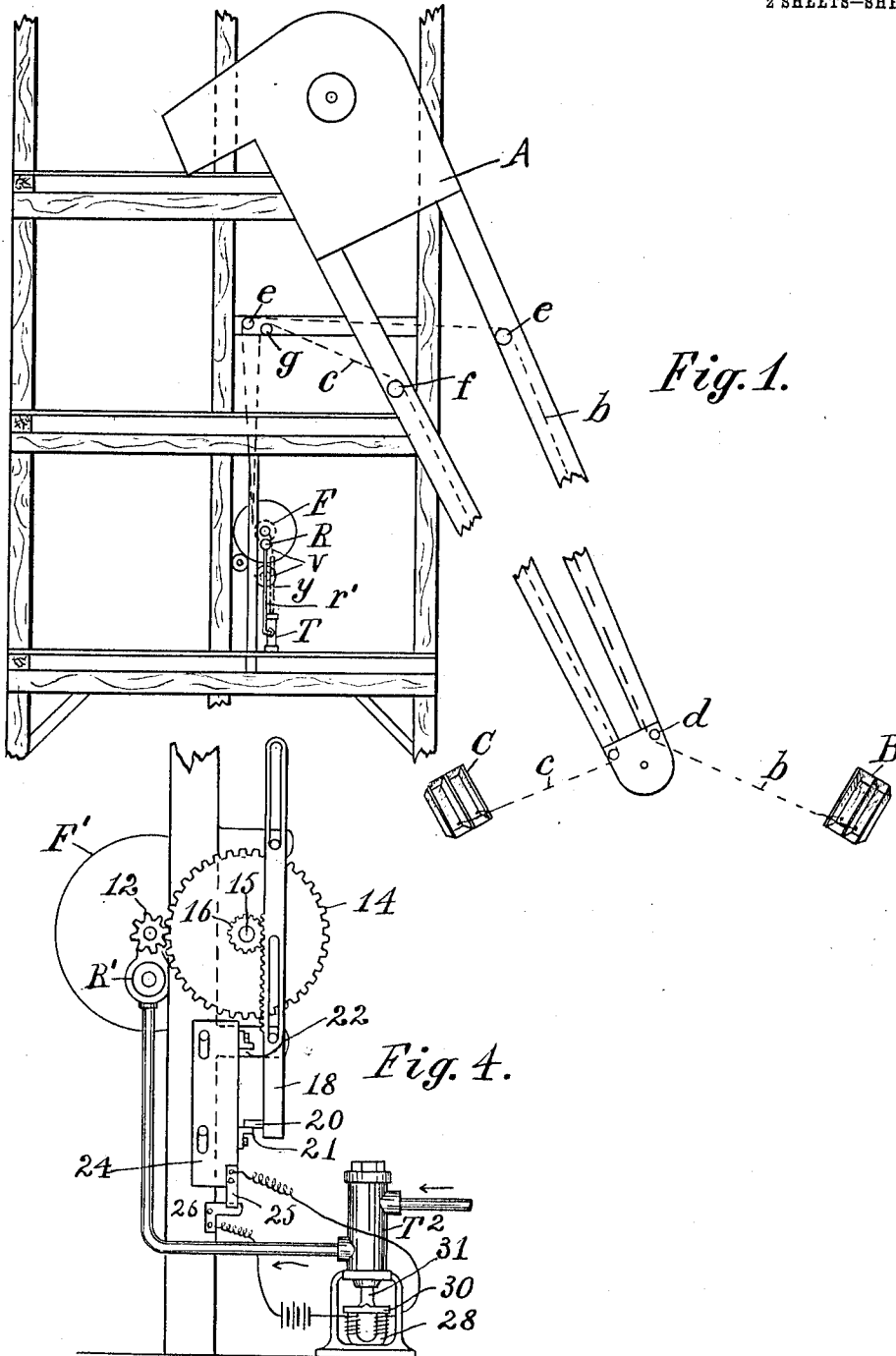


J. G. WESTBROOK.
 DEVICE FOR AUTOMATICALLY CONTROLLING THE MOTION OF MACHINES.
 APPLICATION FILED JUNE 9, 1909.

1,020,066.

Patented Mar. 12, 1912.

2 SHEETS—SHEET 1.



Witnesses:
 H. V. Brown,
 Walter N. Harris

Inventor.
 James G. Westbrook
 by Walter Brown
 his attorney

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Fig. 2.

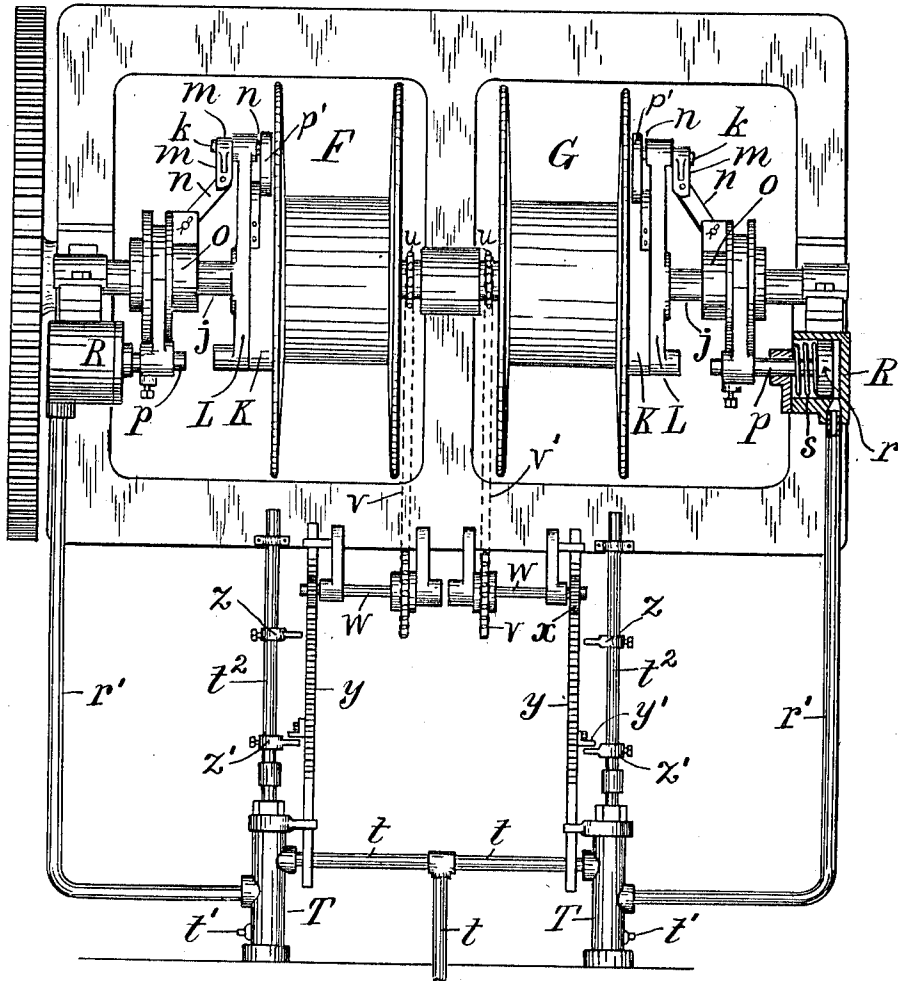
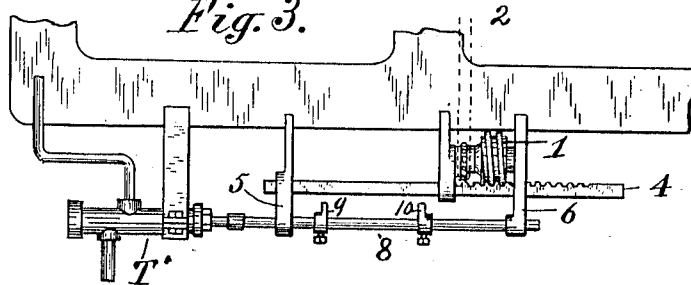


Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES G. WESTBROOK, OF OGDENSBURG, NEW YORK.

DEVICE FOR AUTOMATICALLY CONTROLLING THE MOTION OF MACHINES.

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Specification of Letters Patent.

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Application filed June 9, 1909. Serial No. 501,179.

To all whom it may concern:

Be it known that I, JAMES G. WESTBROOK, a citizen of the United States of America, and a resident of the city of Ogdensburg, in the county of St. Lawrence, State of New York, have invented certain new and useful Improvements in Devices for Automatically Controlling the Motion of Machines, of which the following is a specification.

This invention relates to improvements in devices for automatically controlling the motion of machines.

The invention is especially adapted for controlling the drums which operate the ropes of grain shovels in the holds of vessels, but I also intend to apply it generally to the automatic control of machines.

Essentially the device comprises, with other parts, a reciprocating element which I term a "rack", although it is not necessarily provided with teeth, and this rack is operatively connected with the machine, or machine element, which is to be controlled, and is arranged to stop, start, reverse, etc., the said machine or machine element. Said device may also operate either through such agencies as fluid valves, or electric circuits, and in the accompanying drawings I show several such applications without however intending to limit myself to the precise details of any of them.

Referring to the said drawings to aid the description, Figure 1 is a broken diagrammatical view of an elevator leg and two shovels, other parts being omitted. Fig. 2 is an elevation on large scale of two drums for operating shovel ropes, and indicating my invention applied to controlling the motion of said drums through fluid valves, and strap friction. Fig. 3 is a diagrammatical representation of a modification of certain parts. Fig. 4 is a diagrammatical representation of my invention applied to the opening and closing of an electric circuit and thereby to the operation of a control valve.

Referring to Figs. 1 and 2, A being an elevator and B—C shovels in the hold of a vessel, for moving the grain to the foot of the elevator leg, so as to be caught by the traveling buckets and lifted as is now well understood, said shovels B—C are usually operated by the respective ropes *b c*, suitably guided around sheaves as *d, e, f, g*, and to their respective winding drums F, G,

seen in Fig. 2. The arrangement of the said drums, shovels and ropes is such that when the drums revolve in one direction they wind up the said ropes and thereby draw the shovels which are held in to the grain by shovel operators toward the elevator legs, thus feeding the grain to the elevator buckets. When the shovels have arrived at their proper position, the drums must stop and then the men carry the shovels back to a point in the hold, distant from the elevator leg, unwinding the ropes and thereby revolving the drums in the reverse direction, said drums now being released from their frictions so as to revolve freely. When the operators have carried the shovels to the proper position the drums must again wind the ropes up, so as to again draw the shovels toward the elevator leg, and so on continuously; and the purpose of my invention, as applied to shovel apparatus, is to automatically control the said drums and the control is preferably effected in the following manner: Each of said drums F, G is loose on shaft *j*, and is provided with a hub or flange on which is loosely mounted a friction strap K. Said friction straps K are arranged in a well known manner to be tightened on and slackened off from the flanges of their respective drums by pivotally connecting one end of each friction strap to an arm *p'* fixed on an axle *h* turning in an arm or bar L keyed on shaft *j* and counter balanced to balance the mechanism. The other end of said axle *h* has an arm *m* fixed thereon and pivotally connected with the link *n* of a toggle, and the other end of each said strap K, is connected to said arm L. The outer end of the link *n* of said toggle is pivotally connected with a collar *o*, sliding on its shaft *j*. Said collar *o* is reciprocated by the piston rod *p* of piston *r* in cylinder R. Said piston *r* is actuated in one direction by compressed air or other fluid admitted to the cylinder R by pipe *r'* and in the other direction preferably by a spring *s*; and the admission and release of the air or other fluid is controlled by a suitable valve T, having ports and a balanced piston so arranged that in one position of the valve piston the air or other operating fluid will be admitted from pipe *t*, which is connected with a suitable source of supply to pipe *r'*, and to said cylinder R, thereby impelling

said piston *r* in a direction to operate said toggle *m n* and set said friction strap *K* on the flange of its respective drum *F* or *G*. In the other position of said valve plunger, the said pipe *r'* is put into communication with the exhaust *t'*, so that the pressure in cylinder *R* is released, and spring *s* then moves piston *r* in the opposite direction, whereby the toggle is actuated to slack off the friction strap *K* from the flange of its respective drum, and said drum is then free to be revolved in the reverse direction as the men draw the shovel back from the elevator leg. Of course the valve *T*, cylinder *R* and piston *r*, with the necessary piping and ports could be arranged so that the air or other fluid would actuate said piston *r* in both directions. Various strap frictions being well known, it is sufficient to say, that one end of the strap *K* is secured to a suitable part of the apparatus, as to the arm *L*, in any suitable manner, and the other end of said strap *K* is pivotally connected with an arm *p'* fixed on the said axle *k*, and said arm *m* also fixed on said axle *k* is pivotally connected with the link *n* of said toggle. Therefore, when either of said pistons *r* is actuated by the admission of fluid pressure to its respective cylinder, said axle *k* is rocked and said strap *K* is tightened on its respective winding drum flange, and when either said exhaust is opened the spring *s* of that cylinder, actuating the corresponding piston in the opposite direction, causes the strap to be slackened off the flange of its winding drum. No further description of the details of construction of the strap frictions, valves or other connected parts is necessary, since the same are not *per se* any part of this invention.

The proper motions of the valve *T* are preferably accomplished in the following manner: On a head of each drum *F G* is fixed a chain wheel *u*, which is operatively connected with a larger wheel *v* by a chain *v'*; the shaft *w* of said wheel *v* having fixed thereon a pinion *x*, meshing with a reciprocating rack *y* suitably guided and provided with an adjustable lug *y'* adapted to engage adjustably lugs *z—z'* on the stem *t'* of said valve *T*. The relative proportions of the several chain wheels and pinions are such that a rack of practicable length will provide for the greatest travel of its shovel; and it will be evident that the lugs *z—z'* can be so adjusted with respect to the lug *y'* of said rack *y*, that the plunger of said valve *T* will be actuated to regulate the admission and release of air or other fluid to and from cylinder *R*, to actuate the said toggle *m—n* so as to throw on or slack off the friction strap of the appropriate winding drum *F* or *G*, at the proper instant for drawing the shovel toward the elevator leg or permitting it to be carried back by the shovel operators.

Referring to Fig. 3, a worm 1 is indicated as driven by a chain 2 from a pinion on one of the winding drums *F* or *G*, not shown in Fig. 3, and said worm 1 meshes with a reciprocating rack 4 having through bored arms 5, 6 which slide freely along valve stem 8, and by engaging adjustable lugs 9, 10 on said stem shift valve *T'* at the proper instant, and thereby control the drum frictions in the manner hereinbefore explained.

Referring to Fig. 4, a pinion 12 on a drum *F'*, which drum is loose in its shaft, meshes with a gear 14, on the shaft 15 of which is a pinion 16, meshing with a reciprocating rack 18, suitably guided by slots and pins, and provided with a lug 20 adapted to engage adjustable lugs 21, 22 of a slide 24 suitably guided and having an insulated brush 25 which in one position of said slide 24 contacts with a contact 26 and closes an electric circuit through an electromagnet 28, (or other suitable motor) for attracting an armature 30 on valve stem 31 of valve *T'*, and thereby regulating the admission of air or other fluid to and from the cylinder *R'* to operate the drum frictions. When an electromagnet is employed to actuate said valve stem 31 in one direction, a spring may be arranged in the valve to actuate it in the other direction, and it is evident that an electromagnet or motor may be actuated or controlled for many purposes by means of a make and break, the motion of which is controlled by a member of the apparatus to be controlled, the making and breaking of the electric circuit in turn controlling said apparatus and my invention is intended to cover all such cases, as well as cases wherein a fluid such as air or water or other fluid effects the control. Of course there may either be one shaft common to several winding drums as indicated in the accompanying drawings, or there may be a separate shaft for each drum.

Now having described my improvements, I claim as my invention.

1. In apparatus for operating grain shovels the combination with a winding drum of a reciprocating rack operatively connected therewith, a friction device to control said winding drum, and a valve to control said friction device adapted to be actuated by said rack, substantially as described.

2. In apparatus for operating grain shovels the combination with a winding drum of a reciprocating rack operatively connected therewith, a friction device to control said winding drum, and a valve to control said friction device adapted to be actuated by said rack, and adjustable devices for regulating the connection of said rack with said valve, substantially as described.

3. In apparatus for operating shovels, the

combination of a shovel, a cable for operating said shovel, a winding drum for winding said cable, a driving shaft for said winding drum, a friction device for connecting
5 said winding drum with and disconnecting it from said shaft, a fluid motor for operating said friction device, a valve for controlling the operating fluid, and a reciprocating rack operatively connected with said winding drum for actuating said valve, substantially as described. 10

Signed at Ogdensburg this 1st day of June 1909.

JAMES G. WESTBROOK.

Witnesses:

T. J. HOUSTON,

C. M. BROWNLOW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."