No. 654,620. Patented July 31, 1900.

F. R. GARVER.

SPEED REGULATOR AND BRAKE FOR CRANES.

(Application filed Aug. 21, 1899.)

(No Model.)

Fig. 1.

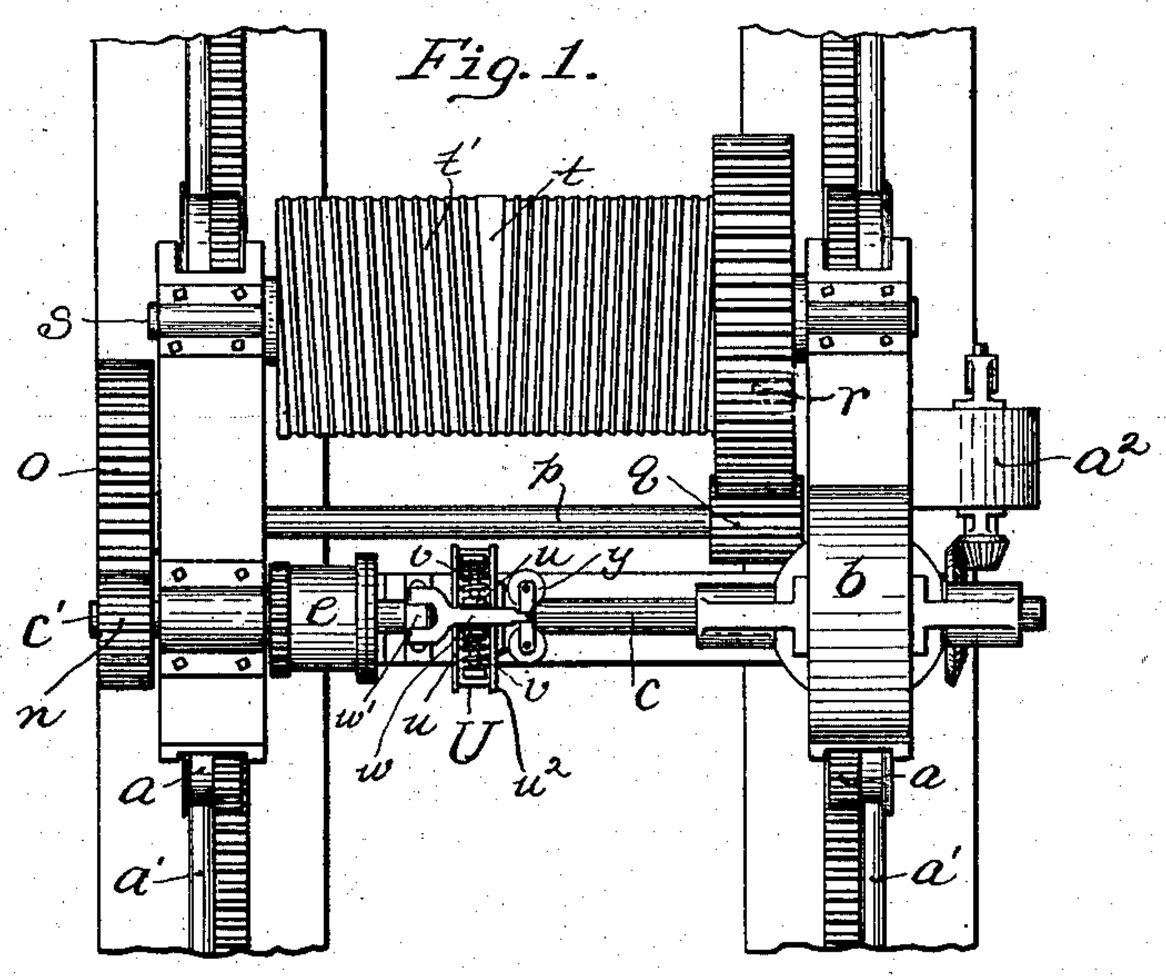


Fig. 2.

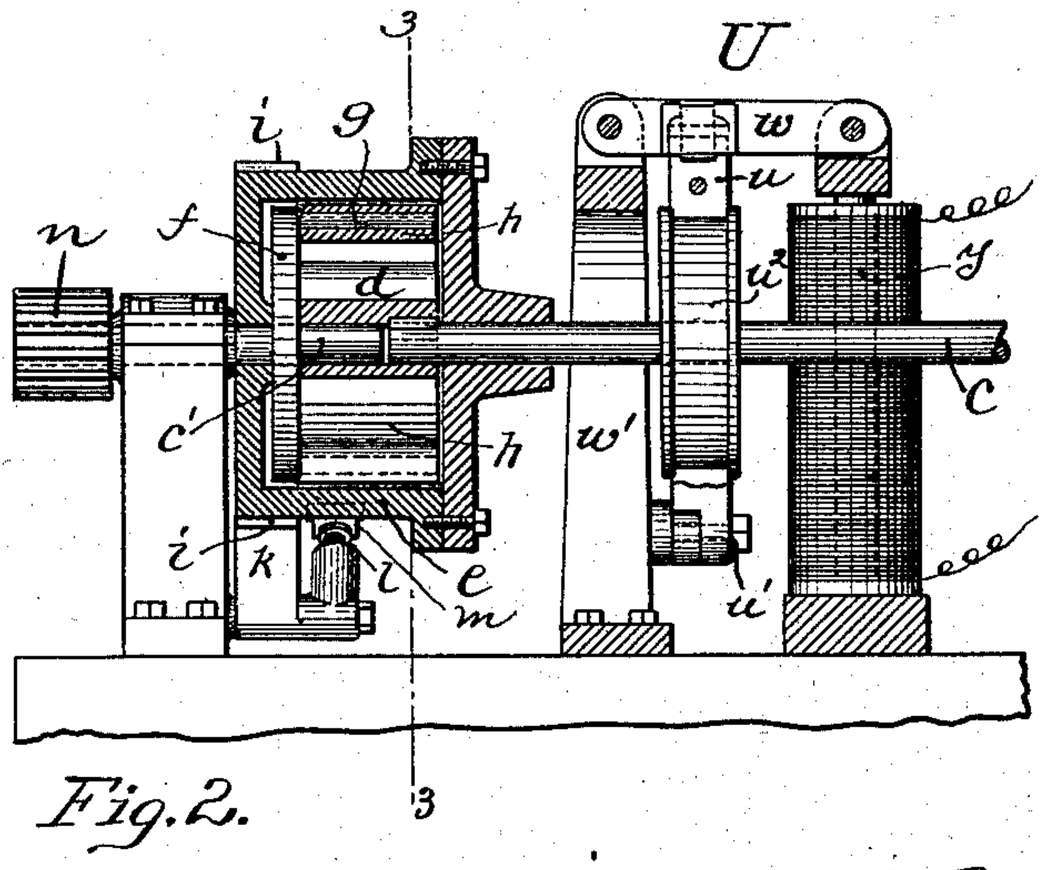
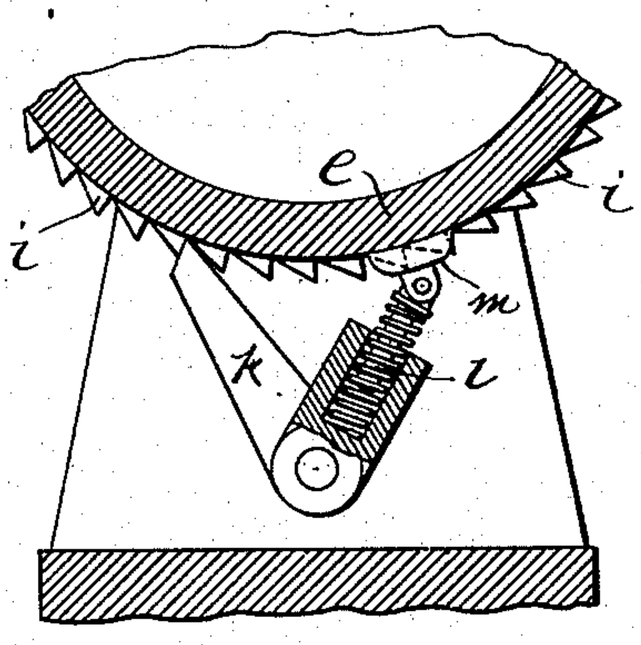


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK R. GARVER, OF PITTSBURG, PENNSYLVANIA.

SPEED-REGULATOR AND BRAKE FOR CRANES.

SPECIFICATION forming part of Letters Patent No. 654,620, dated July 31, 1900.

Application filed August 21, 1899. Serial No. 727,921. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. GARVER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Speed-Regulators and Brakes for Cranes; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to speed-regulators and brakes for cranes, elevators, &c.

The object of my invention is to provide a simple and efficient device to be applied to cranes, elevators, &c., for automatically regulating the speed of a body being lowered, so that if said body acquires too-great speed said device will of itself check its descent and reduce its rate of speed.

To these ends my invention comprises, generally stated, in conjunction with suitable apparatus for raising and lowering an object, a two-part power-driven shaft, a brake-cylinder loosely mounted on said shaft, a clutch member keyed to one part of said shaft within said cylinder, a disk keyed to the other part of said shaft within said cylinder, and one or more swinging brake-shoes carried by said disk, the construction and arrangement being such that when a load is being hoisted the clutch member will force said brake-shoes into contact with the cylinder and power will be transmitted from said shaft to the hoisting mechanism, but when said load is being lowered said cylinder will be locked and said brake-shoes will be free to move by centrifugal force into contact with the cylinder to check the speed of the descending object.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view of suitable hoisting mechanism with my invention applied thereto. Fig. 2 is an enlarged sectional view of the brake-cylinder and its connections with the power-shaft. Fig. 3 is a section on line 3 3, Fig. 2. Fig. 4 is an enlarged sectional detail view of the means for locking the brake-cylinder against rotation.

Like letters indicate like parts in each of the figures.

I will describe my invention in connection with electric cranes, to which it may be applied to great advantage, although I do not wish to limit the sphere of my invention by this particular application of it.

In the drawings, Fig. 1 represents a plan view of a trolley for an electric crane, said trolley in itself, however, forming no part of my invention. This trolley has the wheels a, which travel on the overhead tracks a', and said trolley is operated by the motor a^2.

Mounted on the trolley-frame is a suitable electric motor b, with the shaft c driven thereby. Keyed or otherwise secured to the shaft c is the clutch member d, located within the brake-cylinder e, which is loosely mounted on the shaft c and the shaft c'.

Secured to the shaft c' is the disk f, located within the cylinder e. Studs or pins g project out from the disk f diametrically opposite to each other. Mounted to swing freely on said studs g are the brake-shoes h, which are curvilinear in form and adapted to engage the inner walls of the cylinder e.

On the circumference of the cylinder e is the ratchet-face i, with which a pawl k, pivoted to the trolley-frame, is adapted to engage. Mounted on the same pivot as the pawl k is the arm l, which has the spring-actuated friction-shoe m, adapted to bear against the cylinder e.

On the outer end of the shaft c' is the pinion n, which meshes with the gear-wheel o on the shaft p. A pinion q on the opposite end of shaft p meshes with the gear-wheel r on the shaft s, which supports the hoisting-drum t with the winding grooves t' formed therein.

Upon the motor-shaft c is the brake U, which is of the ordinary style used in connection with electric cranes, and said brake forms no part of my invention. It is composed of the divided collar or band u and is adapted to encircle the band-wheel u^2. Springs v act normally to close said collar around said band-wheel. A lever w, mounted on the standard w', is adapted to force the sections of the collar u apart, and said lever is operated by the solenoid y.

The operation of my improved speed-regulator and brake is as follows: When the load is to be raised, the shaft c is rotated by the motor b in the direction of the arrow, Fig. 3. The clutch member d will move around in

the same direction and force the brake-shoes *h* into contact with the inner walls of the cylinder *e*. A frictional clutch is thus formed between the shafts *c* and *c'*, and the latter will be rotated in the same direction as the former. Just as soon as the cylinder *e* begins to rotate the pawl *k* will drop to the position shown in Fig. 3, while the arm *l* will also take the position illustrated in the same figure. Power is thus transmitted to the shaft *p* and thence to the hoisting-drum *t*. When the load has been raised the required height, the motor *b* is stopped, and the solenoid *y* releases the lever *w* and permits the springs *v* to clamp the collar around the shaft *c*, thus preventing rotation of said shaft in the opposite direction by the weight of the load held in suspension. Before the collar *u* becomes fully effective, however, the weight of the suspended load will rotate the shafts *c* and *c'* and the cylinder *e* in the opposite direction sufficiently to move the shoe *m* and the pawl *k* from the positions indicated in Fig. 3 to the positions indicated in Fig. 4 by reason of the engagement of the shoe with the cylinder, thus locking the cylinder against any further reverse rotation. When it is desired to lower the load, the shaft *c* is released from the brake U, and the motor *b* is reversed. The shaft *c* being thus reversed, the clutch member *d* is moved into engagement with the pivoted ends of the shoes *h*, as indicated in broken lines in Fig. 3. Assuming that the electric motor *b* is of the series type, such as is usually employed in this relation, it will tend to run at the speed imparted to the shaft *c'* by the descending load. If the weight of the load and the distance through which it travels in its descent are such as to rotate the shaft *c'* at any considerable speed, the centrifugal force exerted upon the shoes *h* will throw them outward against the inner periphery of the stationary cylinder *e*, and thus check the speed. The degree of this braking action will obviously depend upon the speed of rotation of the shaft, and consequently it will be impossible for the descending load to attain a dangerous or undesirable speed. If the motor *b* should be stopped or reversed, the clutch member *d* would obviously move into engagement with the inner faces of the shoes *h* and force their outer faces into engagement with the drum, and thus prevent any further descent of the load; but this action of the part *d* will not take place so long as the motor is running freely in the direction of rotation imparted to the shaft *c'* by a descending load. The braking effect incident to my construction when operating as described, being dependent upon the speed, is applied so gradually that no sudden strain is thrown upon the drum or any other parts of the lowering mechanism.

I do not wish to limit myself to the exact construction illustrated, as that may be varied according to the kind of apparatus to which it is to be applied and the conditions of its use.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with suitable hoisting and lowering apparatus, of a power-driven shaft, a second shaft in alinement therewith, a cylinder loosely mounted on said shafts, clutch mechanism for connecting said shafts embodying a swinging brake-shoe carried by said second shaft within the cylinder, and means for preventing the rotation of said cylinder during the lowering operation, substantially as set forth.

2. The combination with suitable hoisting and lowering apparatus, of a power-driven shaft, a second shaft in alinement therewith, a cylinder loosely mounted on said shafts, clutch mechanism for connecting said shafts embodying a curvilinear swinging brake-shoe carried by said second shaft within the cylinder, and means for preventing the rotation of said cylinder during the lowering operation, substantially as set forth.

3. The combination with suitable hoisting and lowering apparatus, of a power-driven shaft, a second shaft in alinement therewith, a cylinder loosely mounted on said shafts, clutch mechanism for connecting said shafts embodying a disk carried by said second shaft within said cylinder and provided with a swinging brake-shoe, and means for preventing the rotation of said cylinder during the lowering operation, substantially as set forth.

4. The combination with suitable hoisting and lowering apparatus, of a power-driven shaft, a second shaft in alinement therewith, a cylinder loosely mounted on said shafts, clutch mechanism for connecting said shafts embodying a disk carried by said second shaft within said cylinder and provided with a stud and a swinging brake-shoe on said stud, and means for preventing the rotation of said cylinder during the lowering operation, substantially as set forth.

5. The combination with suitable hoisting and lowering apparatus, of a power-driven shaft, a second shaft in alinement therewith, a cylinder loosely mounted on said shafts, a clutch member carried by said power-shaft within said cylinder, swinging curvilinear brake-shoes carried by said second shaft, said clutch member being arranged to move said brake-shoes into contact with the cylinder when the power-driven shaft is held stationary or rotated in opposition to the load, substantially as set forth.

6. The combination with suitable hoisting and lowering apparatus, of a power-driven shaft, a second shaft in alinement therewith, a cylinder loosely mounted on said shafts, clutch mechanism for connecting said shafts embodying one or more swinging brake-shoes carried by said second shaft and a clutch member carried by said power-driven shaft, and means for holding said cylinder stationary when lowering a load, said brake shoe or shoes being actuated by centrifugal action to con-

trol the movement of a descending load, substantially as set forth.

7. In a hoisting and lowering apparatus, the combination with two shafts arranged end to end, of a cylinder loosely mounted on the adjacent ends of said shafts, a swinging brake-shoe supported by one of said shafts adjacent to the inner periphery of the cylinder, a clutch member rigidly mounted on the other shaft in position to engage said brake-shoe and move it into engagement with the cylinder for hoisting, and means for holding the cylinder stationary for lowering a load, said brake-shoe being actuated by centrifugal force to control the movement of a descending load.

In testimony whereof I, the said FRANK R. GARVER, have hereunto set my hand.

FRANK R. GARVER.

Witnesses:

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