W. R. CAIN.

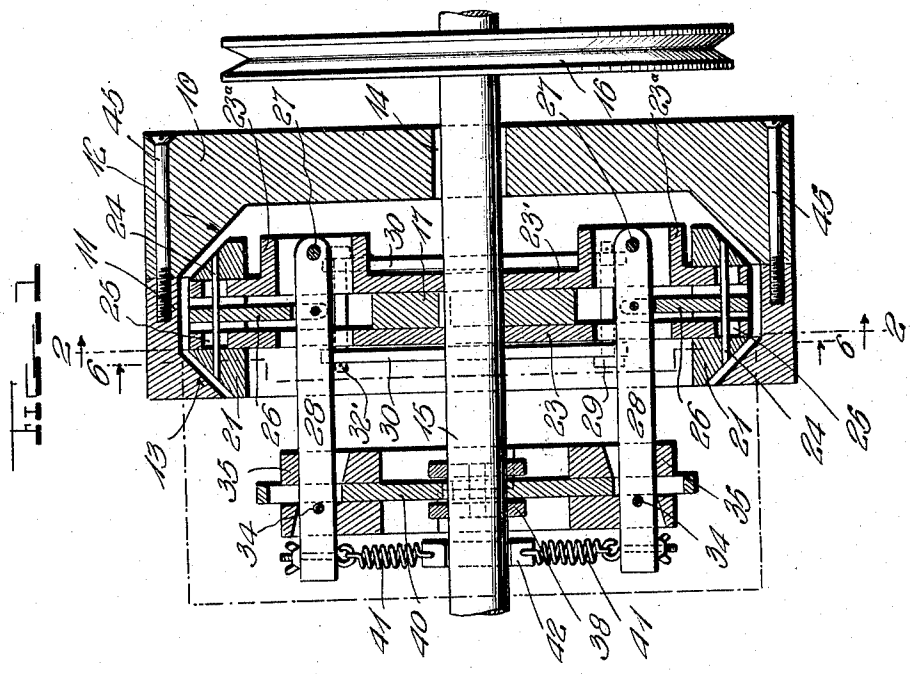
MACHINE BRAKE.

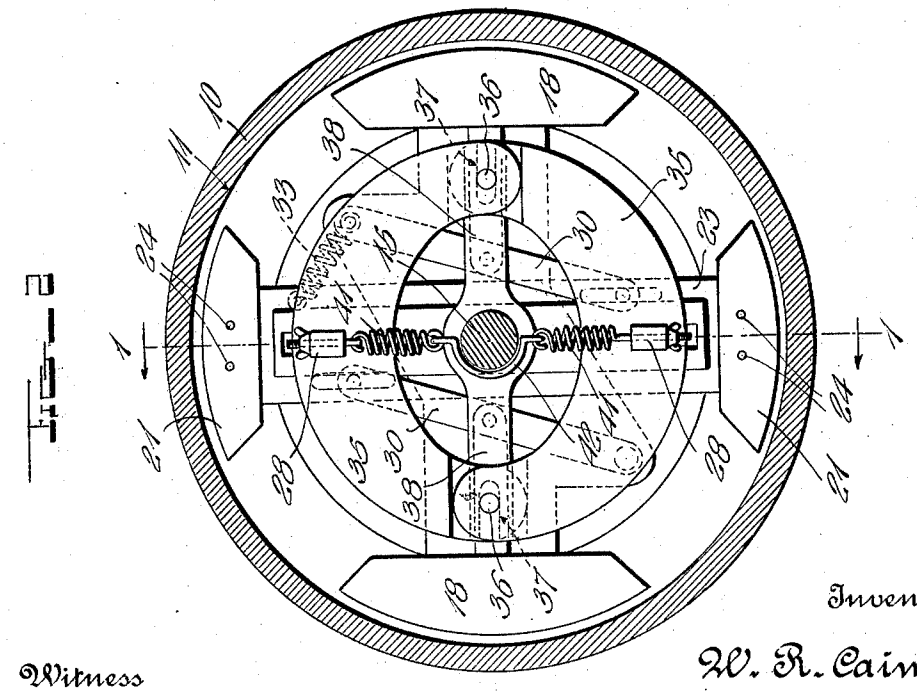
APPLICATION FILED JULY 29, 1918.

1,303,460.

Patented May 13, 1919.

3 SHEETS—SHEET 1.





Witness

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3 SHEETS—SHEET 2.

FIG. 3

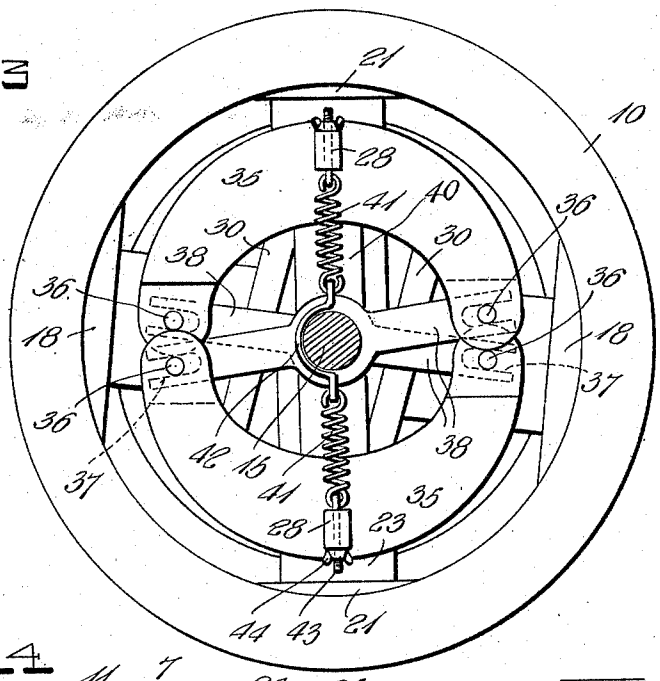


FIG. 4

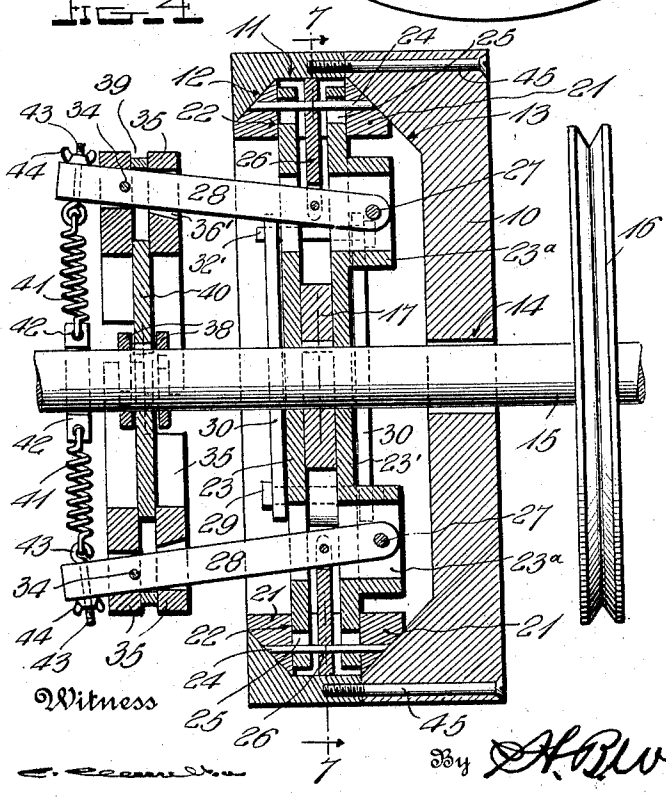
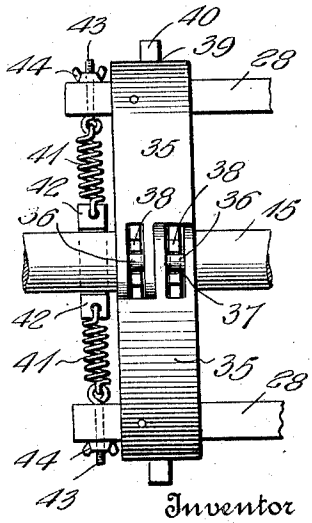


FIG. 5



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3 SHEETS—SHEET 3.

Fig. 7

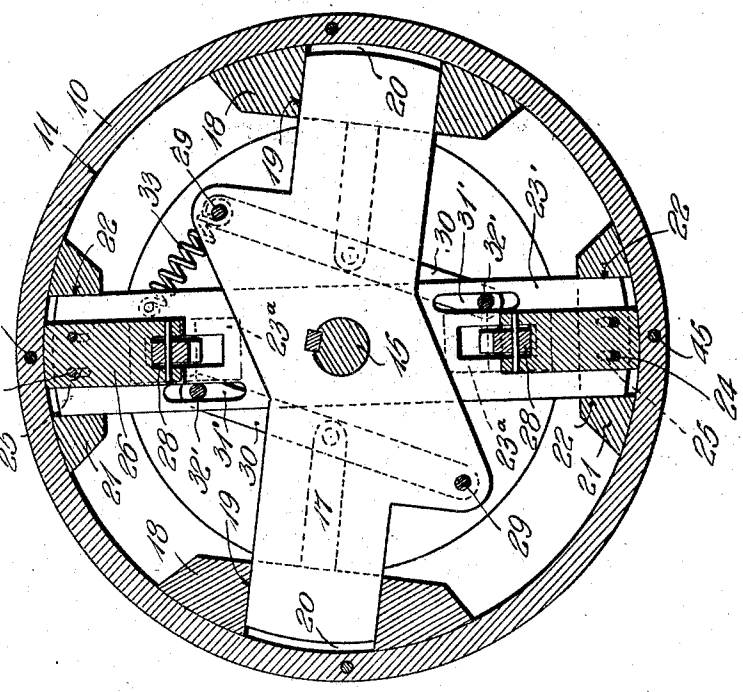
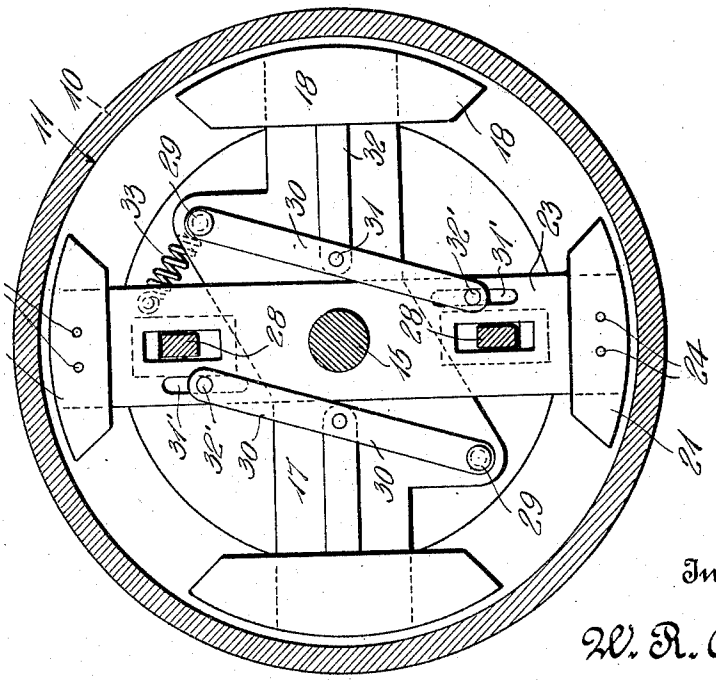


Fig. 6



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UNITED STATES PATENT OFFICE.

WESLEY R. CAIN, OF PORT JERVIS, NEW YORK.

MACHINE-BRAKE.

1,303,460. Specification of Letters Patent. Patented May 13, 1919.

Application filed July 29, 1918. Serial No. 247,292.

To all whom it may concern:

Be it known that I, WESLEY R. CAIN, a citizen of the United States, residing at Port Jervis, in the county of Orange and State of New York, have invented certain new and useful Improvements in Machine-Brakes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machine brakes, and it relates more particularly to an improved brake which I prefer to term a gravity regulator, because of its characteristics which are disclosed in the following description.

The main object of this invention is to accumulate units of resistance or breaking effect at a rate similar to the rate of acceleration of falling bodies, and to apply such accumulation for the purpose of regulating the speed of falling or descending elevator cars, etc.;

Another object of the invention is to utilize the braking effect of one set or pair of brake-shoes for bringing other brake-shoes into effective braking position;

Another object is to obtain a very great braking effect by the use of comparatively light centrifugal weights;

Another object is to provide elastic means to counteract the centrifugal force of the weights, and tensioning means to regulate the degree of such counteracting of the centrifugal force; and

To provide a device of this character which is thoroughly practical, efficient, positive in operation and entirely automatic;

Other objects and advantages may become apparent to persons who read the following details of description in connection with the accompanying drawings in which:

Figure 1 is a view taken substantially along the line 1—1 of Fig. 2;

Fig. 2 is a view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is an end elevation of the device in its operative condition;

Fig. 4 is a view similar to Fig. 1 except this latter figure shows the parts in their operative relations, while Fig. 1 shows them inoperative;

Fig. 5 is a fragmental detail in side elevation;

Fig. 6 is a transverse sectional view along the line 6—6 of Fig. 1, the parts being in their inoperative relation; and—

Fig. 7 is a transverse sectional view along the line 7—7 of Fig. 4, the parts being in their operative relation.

Referring to these drawings in detail, in which similar reference characters correspond with similar parts throughout the several views, my improved brake or gravity regulator comprises a stationary body 10 which is formed with an internal annular frictional surface 11. This frictional surface preferably comprises a cylindrical portion and two frusto-conical portions 12 and 13. The body 10 is snugly apertured at 14 to allow a rotary shaft 15 to extend therethrough and freely rotate therein. The shaft 15 may be supported by any ordinary bearings (not shown), and driving and driven transmission members of any kind may be secured to said shaft, one of such members being indicated at 16. Upon the shaft 15 is keyed or otherwise secured a rotor 17 which carries a brake-shoe 18 at each of its opposite ends, each brake-shoe 18 being apertured at 19 to receive the rectangular end of the rotor. This rotor is in the shape of a bar and extends into proximity with the frictional surface 11, but is spaced from said frictional surface as indicated at 20.

Other brake-shoes indicated at 21, are apertured at 22 for the reception of a second rotor. This second rotor comprises two bars 23 and 23′ which are disposed on opposite sides of the rotor 17 and are pivoted on the shaft 15 so as to have a slight rotary movement with relation to the rotor 17. The bars 23 are held against movement longitudinally of the bar 15 by means of the rotor 17 and the shoes 21 into which they extend.

Each of the shoes 21 is provided with apertures extending parallel with the shaft 15, and through these apertures extend pins 24 which also extend through apertures 25 in the bars 23 and 23′. Fulcrums 26 are each apertured to receive the pins 24 and are secured thereby to respective shoes 21. The apertures 25 are in the form of slots which allow radial movement of the shoes 21 along the rotor bars 23 and 23′.

The bar 23′ is provided with apertured extensions 23ª to which are pivotally connected at 27 two levers 28 which are adapted to bear upon the fulcrums 26 so as to press the brake-shoes 21 into contact with the frictional surface 11.

The rotor 17 is provided with pivots 29 to which are secured two pairs of levers 30 as more clearly disclosed in Figs. 6 and 7. Each of the levers 30 is pivotally connected at 31 to a fulcrum 32 which is secured to one of the brake-shoes 18. The bars 23 and 23′ are slotted at 31′ for the reception of pins 32′ which are slidable laterally of themselves and longitudinally of slots 31′. Each of these pins 32′ connects the corresponding ends of the bars 30 of one pair, so that each pair of bars 30 may properly be considered a unitary lever.

One or more springs 33 are connected by suitable means to the rotor 17 and to one of the bars 23 or 23′ which constitute the other rotor. This spring 33 normally holds the rotors substantially at right angles to one another, or in such position that the four brake-shoes have their centers substantially 90 degrees apart; but when the brake-shoes 21 have frictional engagement with the frictional surface 11 and are thereby retarded, the continued rotation of the rotor 17 changes the angular relation of these rotors, against the tension of the spring 33, and the levers 30 are thereby swung into the position shown in Fig. 7, and the fulcrums 32 are thereby caused to press the brake-shoes 18 into frictional engagement with the frictional surface 11, thereby greatly increasing the frictional resistance subsequent to the primary application of resistance by the brake-shoes 21. The greater the resistance effected by the brake-shoes 21, the greater the resistance effected by the brake-shoes 18.

In order to automatically actuate the levers 28 when the rotor's speed has reached a predetermined rate, each of the levers 28 is movably connected at 34 to a weight 35, these weights being apertured at 36′ for the reception of the lever 28. The weights 35 are each preferably semi-circular or crescent shaped, and each is provided with a pin or pivot 36 which extends through a slot 37 in one end of a lever 38. There are two of the levers 38, and these levers are of counterpart construction and pivotally mounted on the shaft 15. Each of the levers 38 has both ends bifurcated to form the slots 37; and one end of each lever 38 engages with a pivot 36 in one of the weights 35, while the other end of this lever engages a pin 36 of the other two weights, as clearly disclosed in Fig. 3. It will be seen, therefore, that the weights 35 are allowed to move along the same diametral line, in opposite directions, while being held by the levers 38 against rotary movement with relation to one another, thereby assuring the perfect balancing of the weights with relation to the shaft 15.

Each of the weights 35 is apertured at 39 to receive a guide rotor 40 which is keyed or otherwise secured against rotation on the shafts 15. This rotor is disposed between the levers 38 and coöperates with the weights 35 for preventing axial movement of the levers 38, while the latter are held against axial movement by the pins 34; it being understood, however, that there is sufficient play at the pivotal connections 34 and 27 to allow the comparatively slight swinging movement of the levers 28. The ends of the weights 35 are reduced to substantially one half the width of the major part thereof, and these reduced portions of the weights are in lapped relation to one another as disclosed in Fig. 5, so that the corresponding radial surfaces of these weights are disposed in the same radial plane. These weights being of counterpart construction, it will be seen that they interlock so as to prevent radial movement of their ends with relation to one another.

The weights 35 and levers 28 are normally held in the inoperative position shown in Figs. 1, 2 and 6 by means of springs 41, connecting link 42 and eye-bolts 43, the latter being provided with thumb nuts 44 for the purpose of tensioning the springs 41 so as to increase or diminish the resistance against the centrifugal force of the weights 35 and thereby vary the speed at which the levers 28 will be actuated to move the shoes 21 into their operative position for frictionally engaging the surface 11.

Although I have shown the stationary member 10 in two sections and secured together by means of screws 45, it is to be understood that any other form of securing means may be employed or that the member 10 may be formed integrally if it be found expedient to thus form it.

The operation of the device is as follows: When the predetermined rate of speed has been reached, the weights 35 are moved outward by the centrifugal force, the levers 28 are thereby swung outward, the fulcrums 26 are pressed by the levers, and the shoes 21 are thereby frictionally engaged with the surface 11. This surface being stationary retards the movement of members 23 and 23ª, and these members operate through the medium of the levers 30 and fulcrums 32, to press the shoes 18 into frictional engagement with the surface 11. When the speed has fallen below the predetermined rate, the weights 35 are retracted by means of the springs 41 and levers 28, the latter swinging inward and releasing the fulcrums 26, whereupon, the shoes 21 are released from their frictional engagement, and the springs 33 return the shoe-carrying rotors to the inoperative position shown in Figs. 1, 2 and 6.

Although I have described this embodiment of my invention very specifically, it is to be understood that this invention is not limited to these exact details, but I may make minor changes within the scope of the inventive idea disclosed in the foregoing description and following claims.

What I claim as my invention is:

1. The combination of an annular frictional surface, a rotor concentric with said frictional surface, brake shoes carried by said rotor and movable into and out of frictional engagement with said annular surface, a second rotor rotatable with the first mentioned rotor and also capable of an independent rotary movement relative to the first mentioned rotor, brake shoes carried by the second rotor, and means operatively connecting the first mentioned rotor to the brake shoes of the second rotor in such relation that the frictional engagement of the first mentioned brake shoes effects a rotary movement thereof relative to the second mentioned brake shoes and thereby moves the latter into engagement with said frictional surface.

2. The combination of an annular frictional surface, a rotor concentric with said frictional surface, brake shoes carried by said rotor and movable into and out of frictional engagement with said annular surface, a second rotor rotatable with the first mentioned rotor and also capable of an independent rotary movement relative to the first mentioned rotor, brake shoes carried by the second rotor, means for moving the first mentioned brake shoes into contact with said annular frictional surface, and means operatively connecting the first mentioned rotor to the brake shoes of the second rotor in a manner to effect movement of the second brake shoes into frictional engagement with said annular frictional surface after the first mentioned brake shoes have frictionally engaged the said frictional surface.

3. The combination of an annular frictional surface, a rotor concentric with said frictional surface, brake shoes carried by said rotor and movable into and out of frictional engagement with said annular surface, a second rotor rotatable with the first mentioned rotor and also capable of an independent rotary movement relative to the first mentioned rotor, brake shoes carried by the second rotor, weights mounted for rotary and centrifugal movements about an axis alined with the axis of said rotors, levers extending substantially parallel with said axis and each operable by the centrifugal force of one of said weights to effect frictional engagement of the first mentioned brake shoes with said annular frictional surface, and means whereby the first mentioned rotor effects frictional engagement of the shoes of the second rotor with said annular frictional surface after the first mentioned shoes have frictionally engaged with said annular frictional surface.

4. The combination of a rotary shaft, a guide rotor mounted on and secured against movement relative to said shaft, a pair of weights rotatable with said guide rotor and movable radially relative thereto and guided thereby, a pair of levers each mounted for rotary movement on and relative to said shaft, means movably securing each of said levers to both of said weights, a second pair of levers each operable by one of said weights, an annular frictional surface, and a pair of brake shoes movable by said second levers into frictional engagement with said frictional surface.

5. The combination of a rotary shaft, a guide rotor mounted on and secured against movement relative to said shaft, a pair of weights rotatable with said guide rotor and movable radially relative thereto and guided thereby, a pair of levers each mounted for rotary movement on and relative to said shaft, means movably securing each of said levers to both of said weights, a second pair of levers each operable by one of said weights, an annular frictional surface, a pair of brake shoes movable by said second levers into frictional engagement with said frictional surface, an elastic element effective to resist movement of said second levers, and means for tensioning said elastic element.

6. The combination of a rotary shaft, a guide rotor mounted on and secured against movement relative to said shaft, a pair of weights rotatable with said guide rotor and movable radially relative thereto and guided thereby, a pair of levers each mounted for rotary movement on and relative to said shaft, means movably securing each of said levers to both of said weights, a second pair of levers each operable by one of said weights, an annular frictional surface, a pair of brake shoes movable by said second levers into frictional engagement with said frictional surface, a second pair of brake shoes, a third pair of levers, and means controllable by the first said pair of brake shoes for causing said third pair of levers to move said second pair of brake shoes into frictional engagement with said annular frictional surface.

7. The combination of a rotary shaft, a guide rotor mounted on and secured against movement relative to said shaft, a pair of weights rotatable with said guide rotor and movable radially relative thereto and guided thereby, a pair of levers each mounted for rotary movement on and relative to said shaft, means movably securing each of said levers to both of said weights, a second pair of levers each operable by one of said weights, an annular frictional surface, a pair of brake shoes movable by said second levers

into frictional engagement with said frictional surface, a second pair of brake shoes, a third pair of levers, a guide for the first said pair of brake shoes, and a guide for the second said pair of brake shoes, one of said guides being movable with relation to the other and around said shaft, said third pair of levers being movably connected to each of said guides and to the second pair of brake shoes in such relation that the frictional engagement of one of said pairs of shoes with said frictional surface causes the other pair of shoes to frictionally engage said frictional surface.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WESLEY R. CAIN.

Witnesses:
CHARLES O. YOUNG,
EDWARD P. JONES.

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