2 Sheets—Sheet 1.

T. A. WESTON.

Speed-Governor and Friction-Brake for Machinery.

No. 212,337. **Patented Feb. 18, 1879.**

Fig 1.

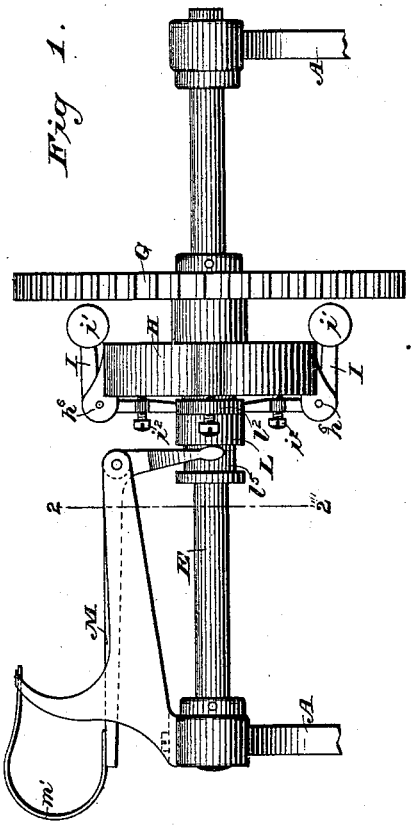


Fig 4.

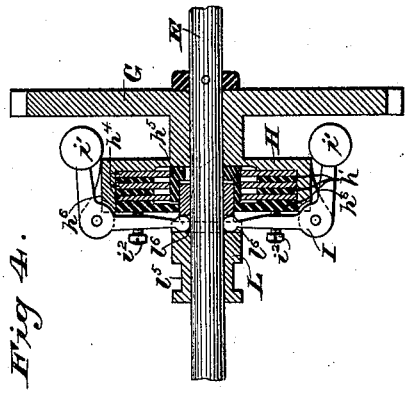
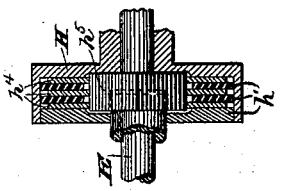


Fig 6.



WITNESSES

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2 Sheets—Sheet 2

T. A. WESTON.

Speed-Governor and Friction-Brake for Machinery

No. 212,337. **Patented Feb. 18, 1879.**

Fig 2.

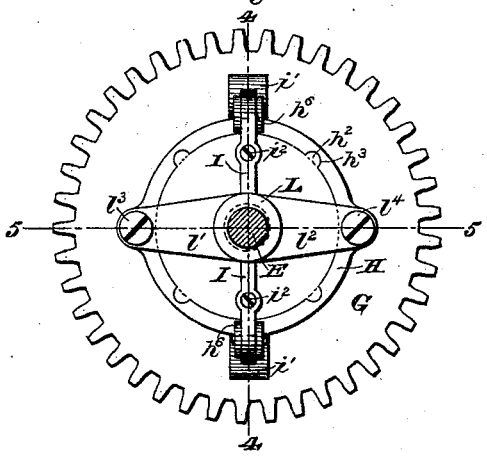


Fig 3.

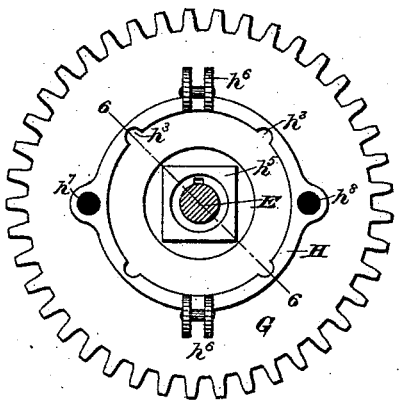
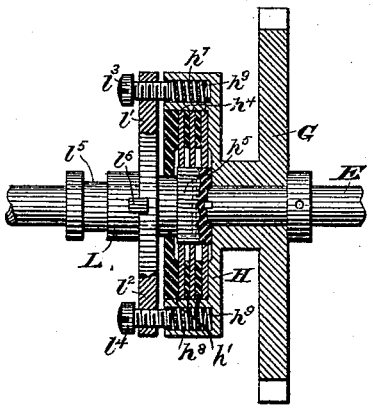


Fig 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

THOMAS A. WESTON, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE LOCK MANUFACTURING COMPANY, OF SAME PLACE.

IMPROVEMENT IN SPEED-GOVERNOR AND FRICTION-BRAKE FOR MACHINERY.

Specification forming part of Letters Patent No. **212,337**, dated February 18, 1879; application filed August 20, 1878.

To all whom it may concern:

Be it known that I, THOMAS A. WESTON, of Stamford, in the county of Fairfield and State of Connecticut, have invented certain Improvements in Automatic Friction-Brake Clutches for Machinery, of which the following is a specification:

My invention relates to that class of speed-regulators in which centrifugal force and frictional resistance are prominent elements—as, for example, in the invention of James White, civil engineer, described and illustrated in his "Century of Inventions," pages 364 and 365, Plate 46, Fig. 2, published at Manchester, England, A. D. 1822; and it further relates to a new method of operating automatically, by centrifugal force, frictional driving clutches or couplings, for driving shafting or machinery.

The accompanying drawings represent my improvements as applied to a hoisting-machine to regulate and control automatically the rotatory motion of the shafts and gearing; but they are also applicable to limit the velocity of any power-driven shafting whatsoever, or to transmit power to any shaft, wheel, or pulley under the automatic regulation of the centrifugal weights or levers.

In the accompanying drawings, Figure 1 is a side elevation of my improved automatic friction-brake clutch. Fig. 2 is an elevation on the line 2 2, Fig. 1. Fig. 3 is a similar view to Fig. 2, but with the centrifugal arms, connecting-sleeve, and outside disk removed. Fig. 4 is a sectional view of the governor and attached parts, taken through the line 4 4, Fig. 2. Fig. 5 is a section of the latter, taken through the line 5 5, Fig. 2. Fig. 6 is a sectional view of the governor, brake-drum, and contained parts, taken through the line 6 6, Fig. 3.

A A are side frames or supports to the shaft E, upon which is placed loosely the wheel G, the rotatory velocity of which is controlled by its attached drum H, containing frictional disk-coupling described in the specification of my Letters Patent of the United States dated March 3, 1868, No. 75,227, the said coupling being operated by the centrifugal arms I and other connected parts, hereinafter described.

The friction-disks are in two series, placed alternately. The series h^1 has lugs h^2, to engage with and slide in corresponding slots h^3 on the drum H. The series h^4 is fitted to slide upon the hub h^5, fixed to the shaft E.

When the disks are not pressed together each series is free to revolve independently of the other, the drum H and shaft E being then disconnected and free from each other; but when the disks are pressed into frictional contact their mutual friction may be made to transmit rotatory motion either from the drum to the shaft or from the shaft to the drum; or the said friction may be used simply to retard the independent rotation of one or the other of the said parts, for the purposes and in the manner hereinafter set forth.

The centrifugal arms or crank-levers I are pivoted between lugs h^6 upon the drum H, and have weights i^1 at their outer ends. Their inner ends are fitted into and embraced by mortises l^6 in the sliding sleeve L, as shown in Figs. 4 and 5. This mutual connection of the arms in the sleeve L places them in equilibrium at all points in their rotation. Set-screws i^2 in the said arms serve to adjust their pressure equally upon the disks h^1 h^4.

The sleeve L has two arms, l^1 l^2, the ends of which carry guide-pins l^3 l^4, sliding into holes h^7 h^8 in the drum H, whereby the sleeve and drum are mutually connected to revolve together. Springs h^9 within the said holes serve to push back the pins l^3 l^4, and so aid in freeing the disks from external pressure. The said pins are screw-threaded in and through the arms l^1 l^2, so that they may be screwed in upon the springs h^9, to compress them more or less and vary their resistance to the inward motion and pressure of the sleeve and centrifugal levers upon the disks and the consequent velocity at which the governing or driving action begins to take effect.

The lever M likewise may be employed to resist and regulate the centrifugal or governing action by placing the spring m' beneath its long end, to lift it and cause its forked end to check or pull backward the sleeve L and connected levers I from their pressure upon the disks. The lever M may be further employed to withdraw the governing action positively at

any desired moment, either by hand or by any suitable automatic arrangement; or it may be employed to couple frictionally the disks, and thereby the drum H and its shaft, if desired. The groove at l^5 on the sleeve L, embraced by the forks or short end of the lever M, is made wider than the ends of the said forks, so that the said lever can be set in a neutral position, where its forks are midway between and out of contact with the sides of the groove, leaving the sleeve free to follow the movements of the centrifugal arms.

The operation is as follows: As part of a train of gearing in a hoist or other machine the rotatory speed of which it is desired to control, the wheel G carries with it in its revolutions the drum H, disks h^1, arms I, and sleeve L. When the limit of speed is passed by which sufficient centrifugal force is generated in the weighted arms I to carry radially outward their weighted ends and press inward the sleeve L and overcome the springs h^9, then the inner ends of the arms I, by means of the set-screws i^2, press the outer disk inward upon the disks within the drum H, producing friction upon their sides proportionate to the energy of the centrifugal force. The said frictional adhesion or resistance to relative motion then occurring between the disks h^1 of the drum and the disks h^4 will be absorbed upon the shaft-disks h^4, should the shaft E be fixed and stationary.

The apparatus in this case forms simply an automatic brake, which absorbs any surplus speed and energy in the wheel G or machine carrying it by direct friction of the rotatory disks upon the stationary ones. It is obvious, however, that the friction thus produced and spent in the effort to rotate an immovable shaft may be utilized to drive that shaft, and through it perform work of any desired kind. Thus the rotatory motion of the said shaft may, by common appliances, be employed to move the sluice-gate of a water-wheel, the throttle-valve or expansion-gear of a steam-engine, to drive a pump, or perform other required work, for absorbing the surplus energy and speed of a windmill, turbine, or other motor.

One advantage of my improved automatic governor is, that very small centrifugal weights, moving through a minute angle or space, are capable of instantly developing the full power of a shaft by means of my friction-disk coupling, the whole power of such shaft being then available during the whole time the centrifugal weights remain in the driving position.

With my invention, therefore, the centrifugal force is simply the indicator to determine when and for what time a frictional coupling or brake, of any desired power whatsoever, shall exercise its full force, and thus absorb the surplus speed and energy of the motor by work or resistance of any desired kind capable of being performed by the said friction-coupling and its shaft.

In the drawings, the drum H and disks h^1 are represented as first receiving the driving power; but, if desired, the shaft E and disks h^4 may be made the drivers by transferring the centrifugal arms I and connections to a disk-wheel keyed to the said shaft so as to rotate with it, and through the weighted levers couple the disk-coupling and drive the drum H and wheel G, for like purposes for which in the drawings the wheel G is represented as the driver.

I claim as of my own invention—

1. In an automatic friction-brake clutch, the combination of frictional disks and an automatic centrifugal operating device, substantially as described.

2. In an automatic friction-brake clutch, the combination of a friction driving-clutch, an automatic centrifugal device for operating the same, and the lever M, substantially as described.

3. In an automatic friction-brake clutch, the combination of a friction driving-clutch, an automatic centrifugal operating device, and the adjusting-springs h^9 or their equivalents, substantially as described.

4. In an automatic friction-brake clutch, the combination of a friction driving-clutch, the levers I, adjusting-screws i^2, and sleeve L, substantially as described.

5. In an automatic friction-brake clutch, the combination of a friction driving-clutch, the levers I, adjusting-screws i^2, sleeve L, and lever M, substantially as described.

In testimony whereof I have hereunto subscribed my name.

THOS. A. WESTON.

Witnesses:
WM. J. PEYTON,
MARCUS S. HOPKINS.