No. 740,688. PATENTED OCT. 6, 1903.

J. B. O'DONNELL, DEC'D.

E. M. O'DONNELL, ADMINISTRATRIX.

GOVERNOR.

APPLICATION FILED FEB. 9, 1903.

NO MODEL.

Fig. 1.

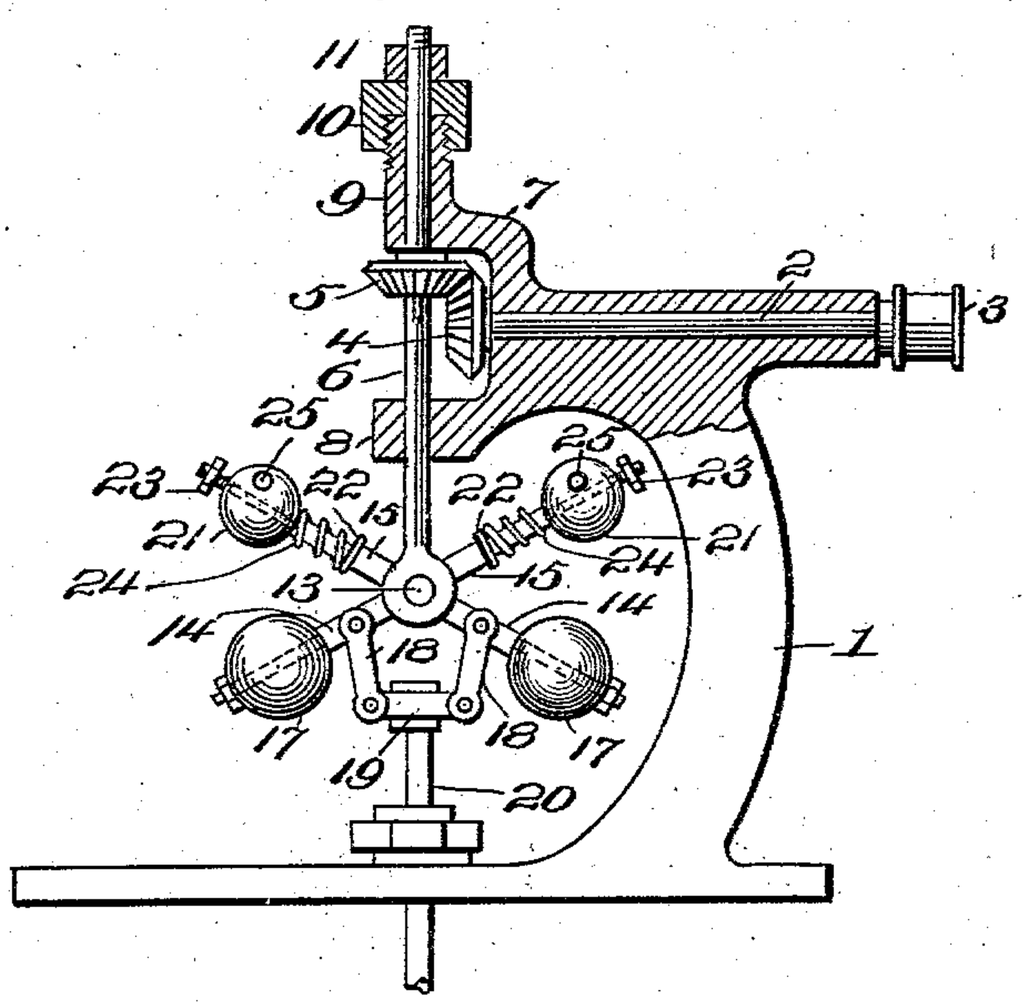


Fig. 3.

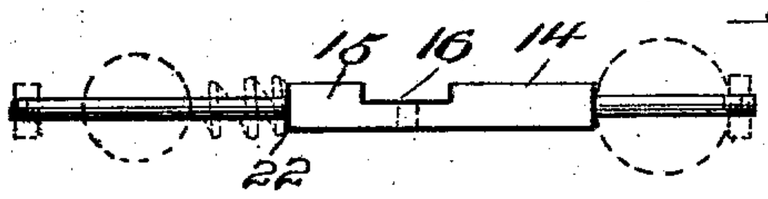


Fig. 5.

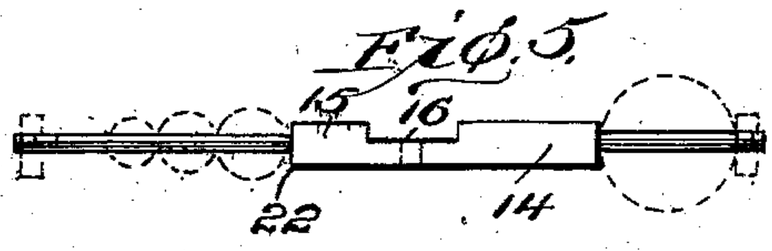


Fig. 2

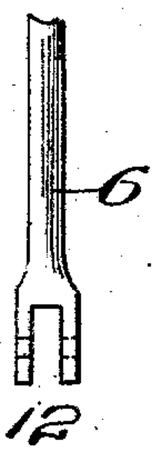
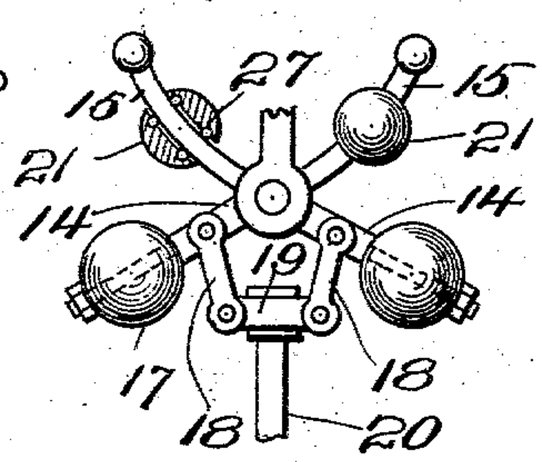


Fig. 4.



Witnesses
J. M. Fowler Jr.
F. C. Ledoux.

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Administratrix of
John B. O'Donnell Dec'd
Inventor
By H. A. Spencer, Attorney

No. 740,688. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

ELLA M. O'DONNELL, OF KANSAS CITY, MISSOURI, ADMINISTRATRIX OF JOHN B. O'DONNELL, DECEASED, ASSIGNOR OF ONE-FOURTH TO JAMES R. POLLARD, OF KANSAS CITY, MISSOURI.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 740,688, dated October 6, 1903.

Application filed February 9, 1903. Serial No. 142,599. (No model.)

To all whom it may concern:

Be it known that JOHN B. O'DONNELL, late a citizen of the United States, who resided at Kansas City, in the county of Jackson and State of Missouri, invented certain new and useful Improvements in Governors, of which the following is a specification.

The said invention relates to improvements in centrifugal speed-regulators or governors for steam or other engines whereby the supply of steam or other motive agent employed in operating the engine is automatically increased or diminished; and it relates especially to a governor having the usual pivoted arms which carry the revolving balls or weights extended upward beyond the pivotal point of said arms, said upward extensions of said arms being provided with sliding balls or weights adapted to be thrown outward by centrifugal force when the speed of the engine increases, so as to act as counterweights to overcome the inertia of the main balls and secure a more prompt and sensitive action of the latter in cutting off or lessening the supply of steam or other motive agent or, on the other hand, when the speed of the engine falls or tends to fall below the desired normal to reverse such action. Said upper balls or counterweights may be mounted so as to slide freely in either direction on the upward extensions of the governor-arms accordingly as they are influenced by centrifugal force or gravity, or springs may be employed in connection with such upper balls, such springs tending to resist the action of centrifugal force and to aid gravity, so as to make their action still more sensitive and responsive.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of a steam-governor furnished with the device. Fig. 2 is an edgewise view of the end of the rotating vertical shaft or spindle in which the governor-arms are pivoted. Fig. 3 is a detached view of one of the governor-arms, including its upward extension. Fig. 4 is an elevation of the device, showing a modified form of the upward extensions of the governor-arms. Fig. 5 is a detached view showing a plurality of counterweights on the upper governor-arms.

1 indicates the main standard or support for the device; 2, the shaft actuated by the pulley 3 in the usual manner; 4 and 5, the miter-gears; 6, the governor-spindle, passing loosely through and rotating with the gear 5, also passing through an upper extension 7 and a lower extension 8 of the standard 1. The part 7 carries a threaded sleeve 9, engaging a threaded hand-wheel or nut 10, which bears against a collar 11, fixed on the spindle 6, so that by the rotation of the nut 10 the spindle may be raised or lowered without disturbing the gears and while they are in motion, if desired.

The spindle 6 is forked at its lower end, as shown at 12 in Fig. 2, and within said fork the governor-arms are mounted on a common pivot-pin 13, passing transversely through said fork or in any preferred manner. Said arms each consist of a lower portion 14 below the pivotal point 13 and an upper portion 15, extending upward above said pivot. Said arms are provided with recesses 16, engaging each other near their pivotal points, where they pass through the yoke 12 of the spindle. To the lower portions of said arms are fixed the main balls or weights 17, and said lower arms are also connected by the pivoted links 18 to the cross-head 19, which supports and actuates in the usual manner the valve-rod 20, extending downwardly into a valve-chamber. (Not shown.)

On the upper portions 15 of the governor-arms are mounted the sliding balls or weights 21. Said upper arms 15 may be cylindrical, rectangular, or of any desired form in cross-section and are preferably provided with shoulders 22 to limit the downward movements of the sliding balls 21 and caps or nuts 23 on their upper ends to prevent said balls from sliding off the arms at any time unless it is desired to remove them. In the operation of the engine when it tends to run too fast the sliding balls 21 are thrown outward by the operation of centrifugal force, and thus tend to counterbalance the weight of the main balls 17, overcoming the inertia of the latter, and thereby raising the valve-rod 20 and diminishing the supply of steam sooner than it would be effected by the operation of the main

balls 17 alone. On the other hand, when the speed of the engine is below or tends to fall below the desired normal the sliding balls 21 remain in or move toward their lower positions, permitting the main balls 17 to occupy a like position or expediting them in so doing. The result in both cases is greater sensitiveness and regularity in the closing or opening of the valve in response to variations which may occur in the running of the engine.

In Fig. 1 springs are shown interposed between the shoulders or stops 22 and the sliding balls 21, said springs being attached at their ends to the arms 15 and to said balls, so that the latter move outwardly against the stress of said springs and move inwardly, being aided by the springs, more quickly than if drawn by gravity alone. It is obvious that said springs might be placed on the arms 15 outside the balls between the latter and the nuts 23, but in that case not attached to the balls 21, and their action would be the same.

Instead of one counterweight on the upper arms 15 a series of them, as shown in Fig. 5, may be provided, the smaller ones being outside and yielding first to centrifugal force, while the larger and inner ones yield first to gravity. Another expedient in the same line consists in making the upper balls 21 hollow, with openings into them, as shown at 25 in Fig. 1, and placing within the cavities loose balls 26 of different sizes, which are free to move outwardly within the hollow sphere, the smaller moving outwardly first and the larger yielding first to gravity, thus adding still further to the delicacy of action of the balls 21 as counterweights.

In Fig. 4 the upper arms 15 are shown extending upward in a curved line. With this form of the arms and with the form shown in Fig. 1, if desired, the upper balls 21 may be provided with roller-bearings, as shown at 27, to facilitate their movements.

In Figs. 1 and 4 the governor is shown as mounted below the miter-gears 4 5; but it is obvious that it might be mounted above the gears in the more usual manner and operate in substantially the same way, suitable connections with the valve-rod 20 being provided.

The means shown in the drawings for connecting the governor with a supply-valve, consisting of the links 18, cross-head 19, and valve-rod 20, are not essential elements of the invention intended to be set forth herein, and any other preferred and appropriate means for the purpose may be substituted for those shown.

Having described said invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. A centrifugal speed-regulator comprising a rotatable spindle, a pair of pivoted arms driven by said spindle, said arms having lower and upper portions, on either side their pivotal points, a valve-rod and suitable connections between said lower arms and said valve-rod, fixed weights on said lower arms and sliding weights on said upper arms, substantially as set forth.

2. In a governor, the combination of revolubly-driven centrifugal arms, said arms having lower and upper portions, on either side their pivotal points, weights on said lower arms, sliding weights on said upper arms, and means operated by said arms for actuating a supply-valve, substantially as set forth.

3. In a governor, the combination of a pair of revolubly-driven centrifugal arms pivoted on a common pivot, said arms having lower and upper portions, on either side their pivotal points, fixed weights on said lower arms, sliding weights on said upper arms, and means for connecting said arms with a supply-valve, substantially as set forth.

4. In a governor, the combination of a pair of rotating pivoted arms, said arms having lower and upper portions, on either side their pivotal points, fixed weights on said lower arms, sliding weights on said upper arms, springs arranged to resist the centrifugal movement of said sliding weights and assist the action of gravity on said weights, and means for connecting said governor with a supply-valve, substantially as set forth.

5. In a governor, the combination of a rotatable spindle, pivoted centrifugal arms revolubly driven by said spindle, means operated by said arms for actuating a supply-valve, said arms having lower and upper portions, on either side their pivotal points, weights on said lower arms and sliding weights on said upper arms, said sliding weights containing cavities, and a plurality of smaller weights of varying sizes disposed loosely within said cavities, substantially as set forth.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

ELLA M. O'DONNELL,
Administratrix of the estate of John B. O'Donnell, deceased.

Witnesses:
J. B. O'DONNELL, Jr.,
H. EARLEY.