

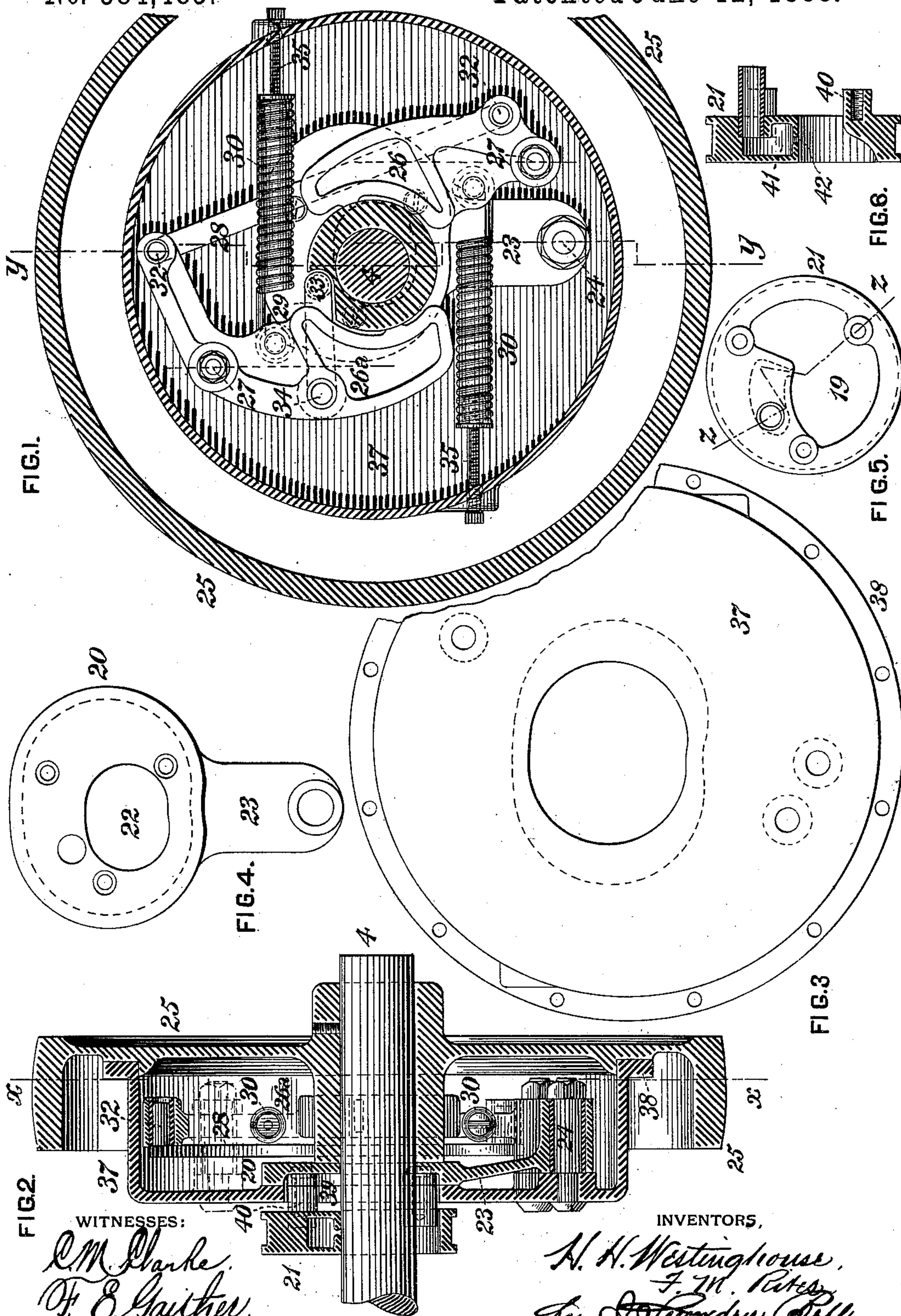
(No Model.)

2 Sheets—Sheet 1.

H. H. WESTINGHOUSE & F. M. RITES.
GOVERNOR.

No. 384,485.

Patented June 12, 1888.



WITNESSES:

E. M. Clarke.
H. E. Gaither.

INVENTORS,

H. H. Westinghouse.
F. M. Rites.
By J. F. Gordon Bell, Att'y.

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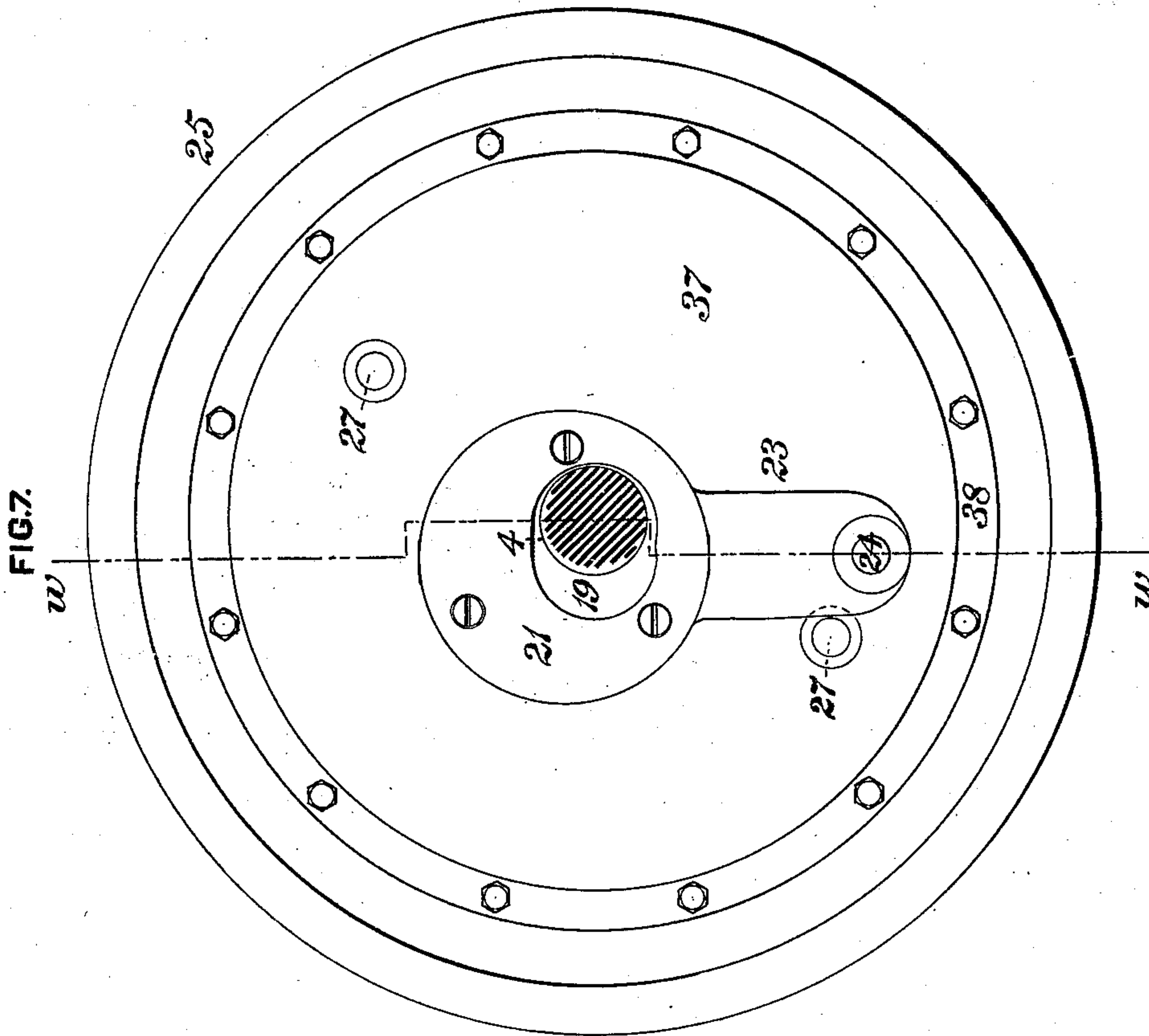
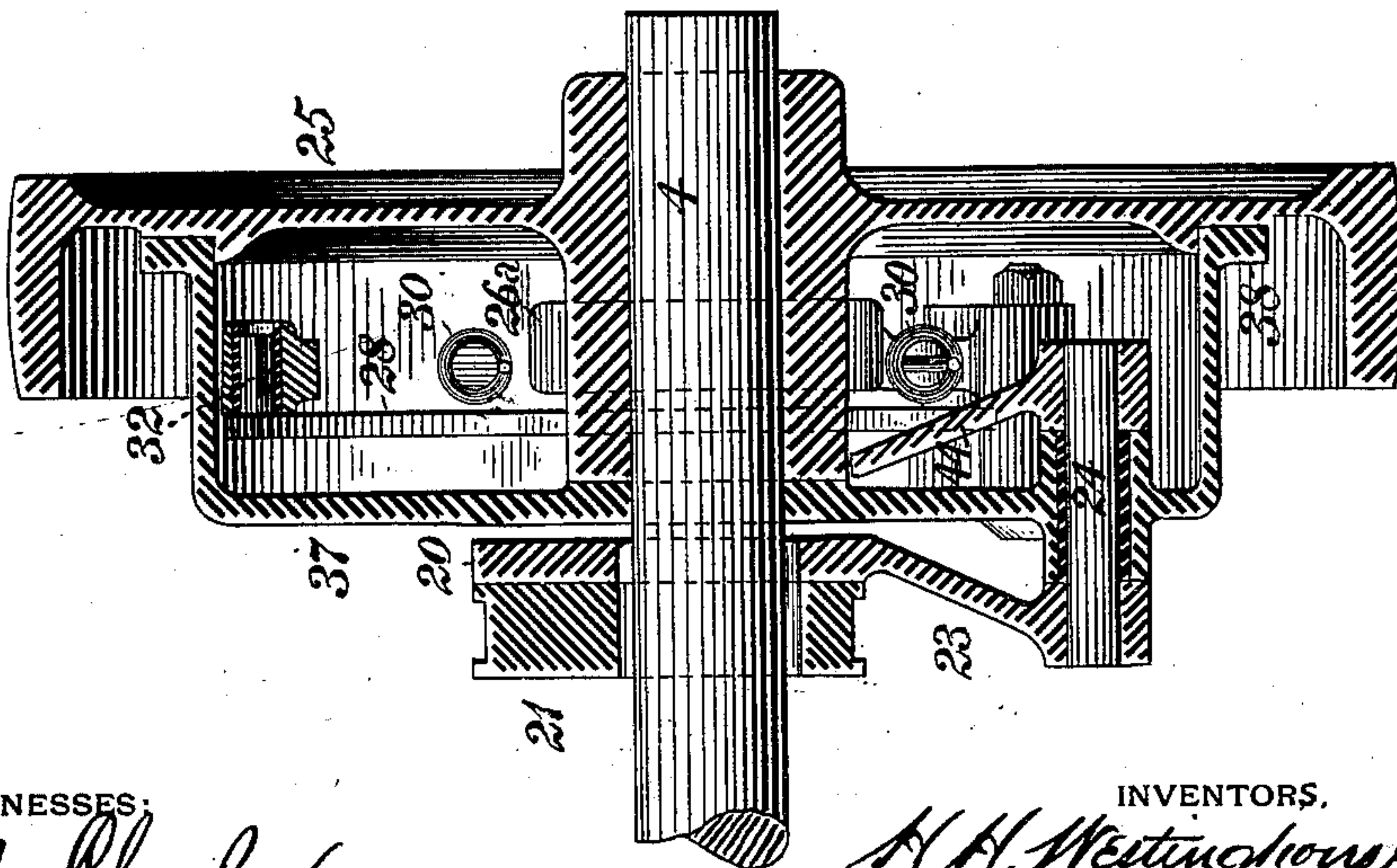


FIG. 8.



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UNITED STATES PATENT OFFICE.

H. HERMAN WESTINGHOUSE AND FRANCIS M. RITES, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE MACHINE COMPANY, OF SAME PLACE.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 384,485, dated June 12, 1888.

Application filed January 19, 1888. Serial No. 261,273. (No model.)

To all whom it may concern:

Be it known that we, H. HERMAN WESTINGHOUSE and FRANCIS M. RITES, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Governors, of which improvement the following is a specification.

Our invention relates to centrifugal governors of the class ordinarily termed "shaft-governors," which are fixed upon the main shaft of an engine and perform their regulating function by effecting variation of position of an adjustable valve-operating eccentric, an instance being exemplified in Letters Patent of the United States, No. 303,085, dated August 5, 1884, to H. Herman Westinghouse and Arthur G. Brown, sundry structural features of which, not forming part of our present invention, are embodied in the governor herein described and shown.

The object of our invention is to afford thorough and effective lubrication in operation without escape or waste of lubricating material, and, further, to enable the weights and the eccentric and its connections to be balanced in such manner as to eliminate the disturbing effect of gravity.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a transverse section through a governor embodying our invention, taken at the line xx of Fig. 2, and looking to the left; Fig. 2, a longitudinal section through the same, taken at the line yy of Fig. 1, and looking to the right; Fig. 3, a view, in elevation, of the inclosing-case as seen from the left; Fig. 4, a view, in elevation, of the carrier or supporting-plate of the eccentric; Fig. 5, a similar view of the eccentric; Fig. 6, a section through the same at the line zz of Fig. 5; Fig. 7, a view, in elevation, illustrating a modification; and Fig. 8, a transverse section at the line ww of Fig. 7.

In the practice of our invention we provide a supporting disk or plate, 25, having a central hub, by which it is secured upon the main or crank shaft 4 of an engine, or upon a coun-

ter-shaft rotated therefrom. The governing mechanism proper, which may be either of the specific construction illustrated or of any other approved form of the same general type, is connected to and has all of its pivotal joints inclosed wholly within a cylindrical case, 37, which is, except as to a central opening, to be presently described, closed at one end and is open at the other end, at which it is secured to the disk 25 by bolts passing through a circumferential flange, 38, abutting against the web of the disk and forming a tight joint around a shoulder thereon. The inclosing-case 37 protects the joints of the governor from the access of dirt and foreign matter, and serves as an oil chamber or receptacle for a bath of lubricating material, which, in the rotation of the governor, is continuously sprayed over the working parts. A continuous and effective automatic lubrication of each and all of the pivotal connections is thereby insured, and escape and waste of oil correspondingly prevented.

The weights or weighted arms 26 26^a, which provide the requisite centrifugal force in operation, are journaled upon pivots 27, fixed in the case 37 adjacent to its periphery and at diametrically-opposite points equally distant from its center, and are coupled one to the other by a link, 28, having pivots 32 upon its ends fitting sockets on the weights 26 26^a, the center of the link-pivot of one weight being located between the pivot 27 of said weight and the free end thereof, and the center of the link-pivot of the other weight being located on the side of its pivot 27 farthest from its free end. Each of the weights is coupled to the case 37 by a spring, 30, screws 35, the heads of which bear against seats in the rim of the case, being interposed to admit of adjustment of the tension of the springs. The valve-operating eccentric 21, which is formed with an opening, 19, through which the shaft 4 passes freely, and with sufficient clearance to admit of the requisite range of lateral movement of the eccentric, is located outside of the case adjacent to an opening, 39, at and around its center, and is bolted to a carrier, 20, located within the casing and provided with a transverse slot or shaft-recess, 22, through which the shaft 4

passes freely, and with clearance for the lateral movement of the eccentric. The carrier 20 is formed integral with or secured to a tail-piece or arm, 23, which is journaled upon a pivot, 24, fixed in the case 37. The carrier 20 fits on one side closely against the inner side of the case around the opening 39, and on the other side fits closely against the hub of the supporting-disk, and thus closes completely the case 37. The eccentric is provided with lugs or sockets 40, which project through the opening 39 of the case and abut against the carrier, the eccentric 21 and carrier 20 being connected by bolts passing through the carrier and engaging the lugs 40 by means of screw-threads formed therein. The carrier is coupled to one of the weights, 26^a, by a link, 29, fitting a pivot, 34, on the weight-arm and a pivot, 33, on the carrier.

Under the above construction all the pivotal connections or parts which require lubrication are inclosed in a tight case, as the central opening of the latter is closed in all positions by the carrier, and the opening of the carrier is correspondingly closed by the hub of the supporting-disk. A reservoir for a constant supply of oil to the working parts is thus provided, and as the oil will subside by gravity to the lower portion of the case when the governor is at rest, and will be projected toward its periphery by centrifugal force when in rotation, any escape and consequent waste of oil is effectually prevented. Oil may be supplied to the case through an opening therein fitted with a proper plug, or may be fed into a chamber, 41, formed in the eccentric, and having a supply opening or channel, 42, in the surface of the opening 19 thereof, so that the oil may be fed into the chamber, from which it will be projected by centrifugal force through the bushing of the pin of the link 29 into the case 37, lubricating the pin in its passage.

In the modification shown in Figs. 7 and 8 the pivot 24 of the eccentric-carrier, in lieu of being fixed in the case 37, as in the former instance, is extended beyond the outer face of the case and fitted to work freely in a socket or bearing, 43, thereon. The tail-piece 23 of the carrier is secured upon the outer end of the pivot 24, and the carrier is bolted directly to the eccentric, the central opening, 19, of which adjoins and conforms in dimensions and contour with the shaft-recess 22 of the eccentric-carrier. The action of the weights and springs is imparted to the eccentric-carrier and connected eccentric through an arm, 44, fixed upon the inner end of the pivot 24, and coupled by a link to the weight 26^a, similarly to the eccentric-carrier first described. The central opening of the case 37, not being required to accommodate the connections of the eccentric and carrier, is in this case made concentric with the shaft, and of no larger diameter than suffices to permit the same to be passed through it, the case being thereby closed at this point by the close contact of relatively-fixed surfaces.

In order to enable the gravity of the eccen-

tric with its carrier, strap, and rod, as well as that of one of the weights, to be counteracted by that of the other weight, so that the disturbing action of gravity upon these members may be avoided, the lever-arms of the weights 26 26^a are made of different lengths, respectively, the greater action of gravity upon one weight being thereby substantially equalized with the lesser action upon the other, supplemented by the gravity of the eccentric and its accessories. To this end the weight-pivots and weights are so located and constructed that when at rest lines joining the centers of the pivots and centers of gravity of the weights shall be parallel with each other and with a line joining the centers of the eccentric and eccentric-carrier pivot, and the lever-arm of the link connecting the weights upon one of the weights, 26^a, being the distance between the centers of the pivots 27 and 32, is made of greater length than the corresponding lever-arm upon the other weight, 26, the ratio of the lever-arms being such as will enable the weight 26, under the influence of gravity, to balance the weight 26^a, together with the aggregate of the unbalanced weight of the eccentric and its connections. The distances between the centers of the weight-pivots and centers of gravity of the weights, which may be either substantially equal or varied in direct ratio, constitute the power-arms of the weights in the action of gravity thereon, and the lever-arms of the connecting-link, which act as resistance-arms, being unequal, as described, it will be seen that by proper proportions of the lever-arms a substantially-perfect balance may be attained.

We claim as our invention and desire to secure by Letters Patent—

1. In a centrifugal governor, the combination of a case adapted to be mounted upon and rotate with a driving-shaft, said case constituting a receptacle for lubricating material, which is closed both endwise and peripherally to prevent escape of the same, a weight pivoted to and within said case, and a movable eccentric located outside of said case and coupled to the weight, substantially as set forth.

2. In a centrifugal governor, the combination of a supporting-disk, a case connected by a tight joint at one end to the disk and having an opening adjoining its center at its opposite end, an eccentric located outside of the case and secured to a carrier pivoted on the case, a weight pivoted to and inclosed within the case, and a link inclosed within the case and connecting the weight and eccentric-carrier, substantially as set forth.

3. In a centrifugal governor, the combination of a supporting-disk, a case connected by a tight joint at one end to the disk and having an opening adjoining its center at its opposite end, a weight and an eccentric-carrier, each pivoted to and inclosed within the case, a link coupling the weight and carrier, and an eccentric secured to the carrier by connections passing through the central opening of the case, substantially as set forth.

4. In a centrifugal governor, the combination of a supporting-disk, a case connected by a tight joint at one end to the disk and having an opening adjoining its center at its opposite end, an eccentric-carrier pivoted to the inside of the case and fitting on one side against the same around the inside of its central opening and on the other side against the hub of the supporting-disk, an eccentric located on the outside of the case and secured to the carrier by connections passing through the opening of the case, a weight pivoted to the inside of the case, and a link coupling said weight to the carrier, substantially as set forth.

5. In a centrifugal governor, the combination of an inclosing-case adapted to be mounted upon a driving-shaft and having an end opening adjoining its center, an eccentric-carrier pivoted to the inside of the case and coupled to a weight also pivoted therein, and an eccentric secured to the carrier through the central

opening of the case, and having an internal oil-chamber provided with a passage communicating with the interior of the case, substantially as set forth.

6. In a centrifugal governor, the combination of a supporting plate or disk, a pair of weights pivoted thereto, a connecting-link coupled at its ends to said weights in such relation to their pivots as to form lever-arms of different lengths on the respective weights, which difference of length is maintained in all positions of the weights, and an eccentric coupled to the weight having the longer connecting-link arm, substantially as set forth.

In testimony whereof we have hereunto set our hands.

H. HERMAN WESTINGHOUSE.
FRANCIS M. RITES.

Witnesses:

W. D. UPTGRAFF,
J. SNOWDEN BELL.