

No. 725,591.

PATENTED APR. 14, 1903.

J. T. ROSSITER.
SPEED GOVERNOR.

APPLICATION FILED JULY 16, 1901.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 2.

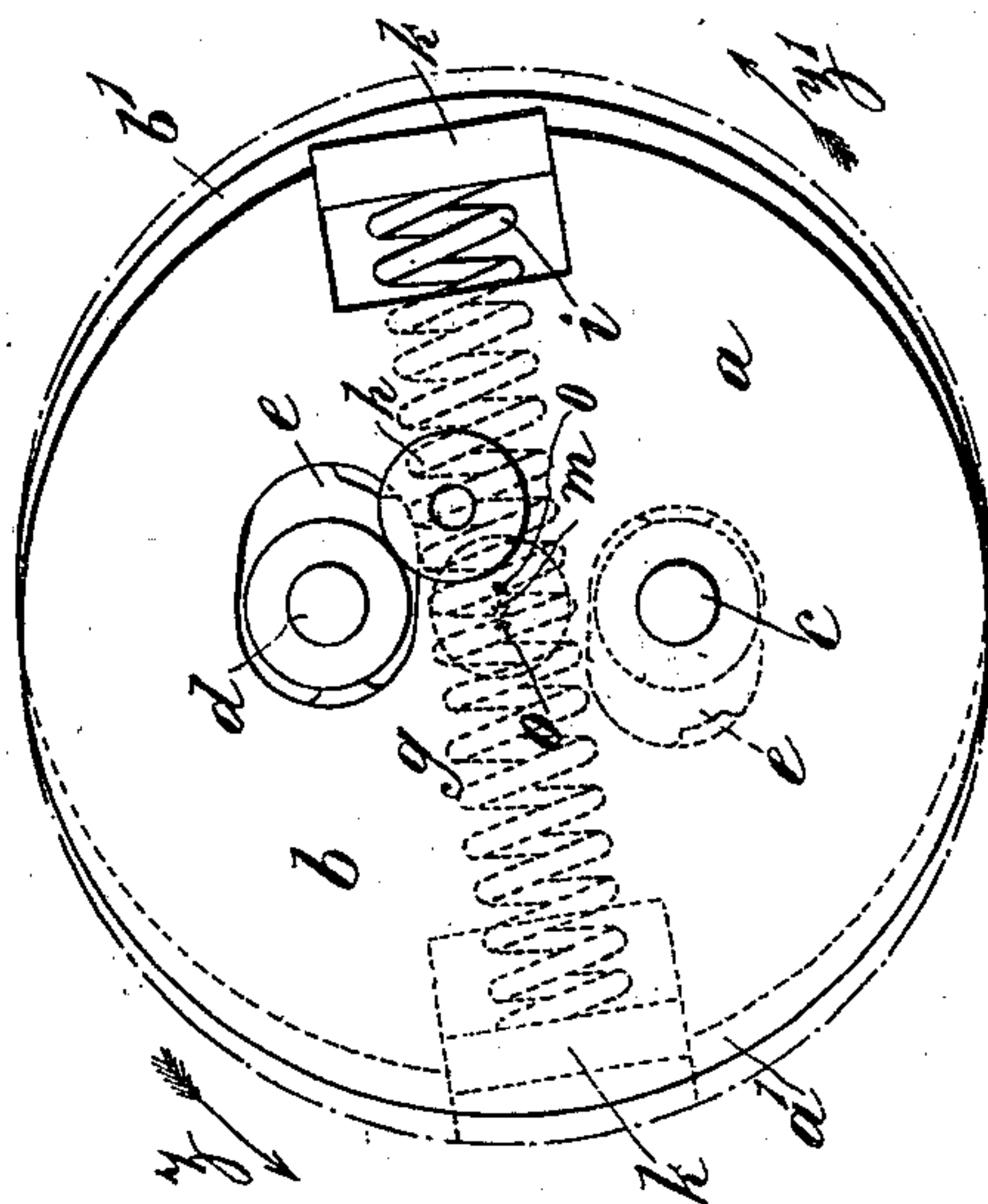
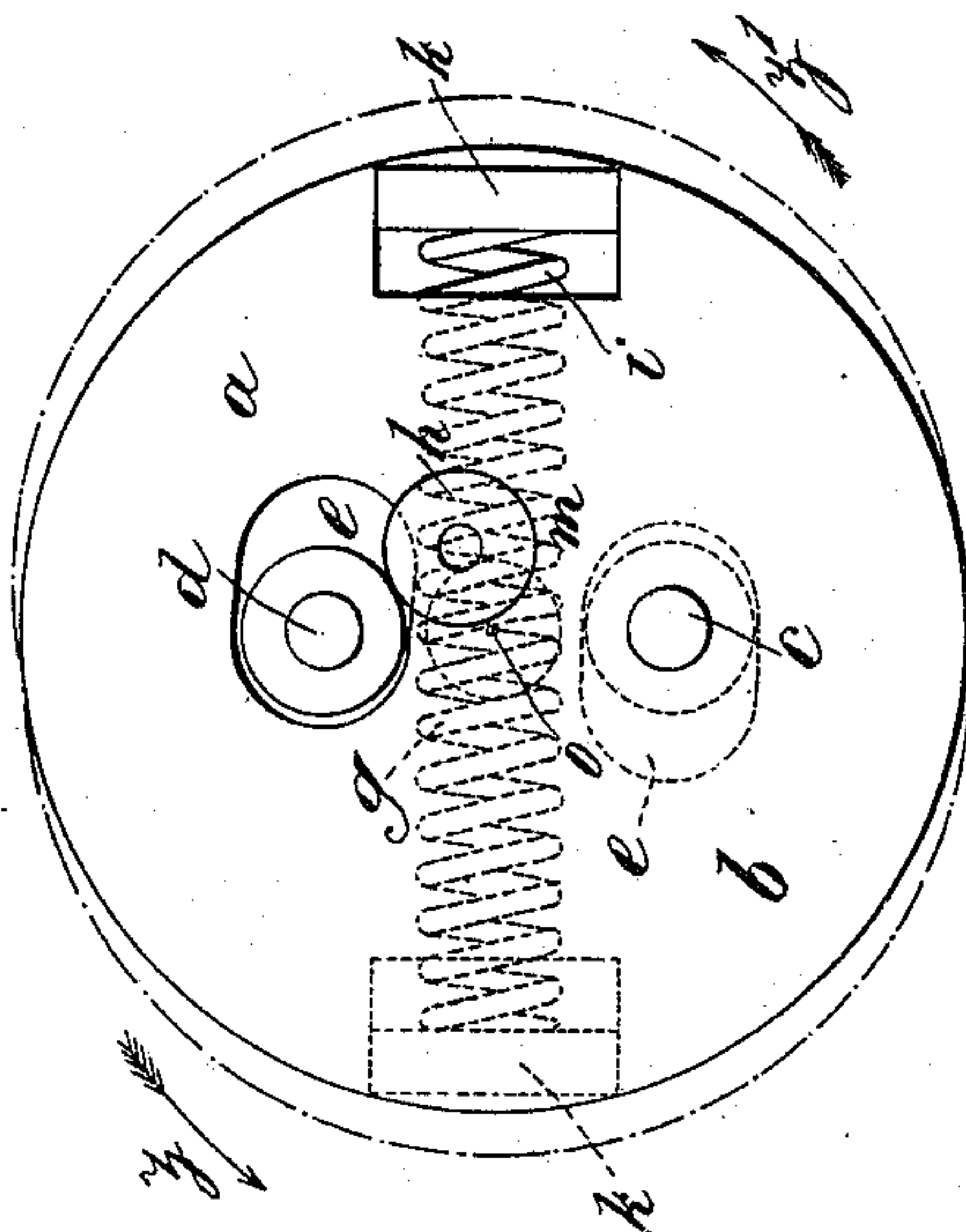


Fig. 1.



Witnesses .

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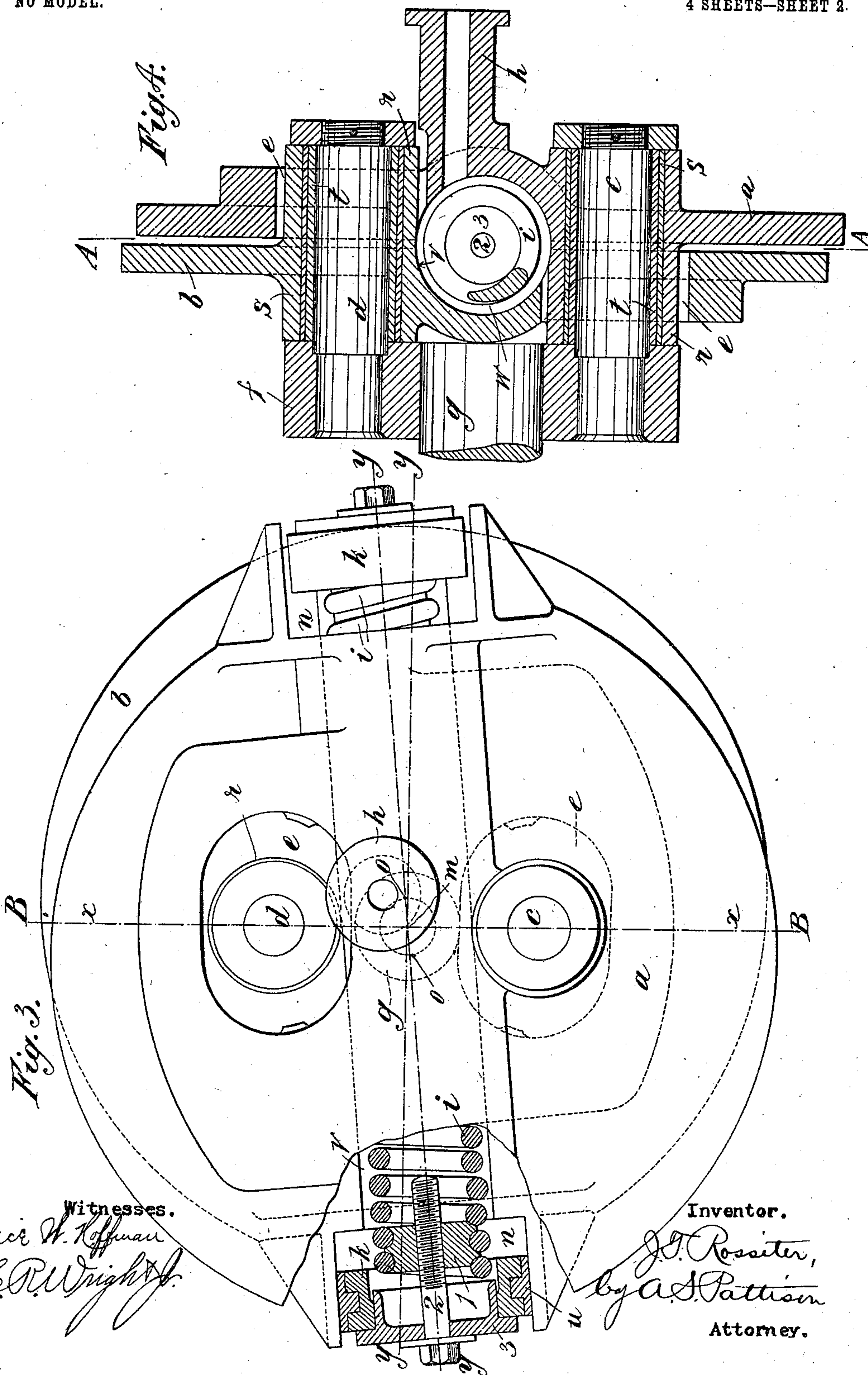
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4 SHEETS—SHEET 2.



Witnesses.

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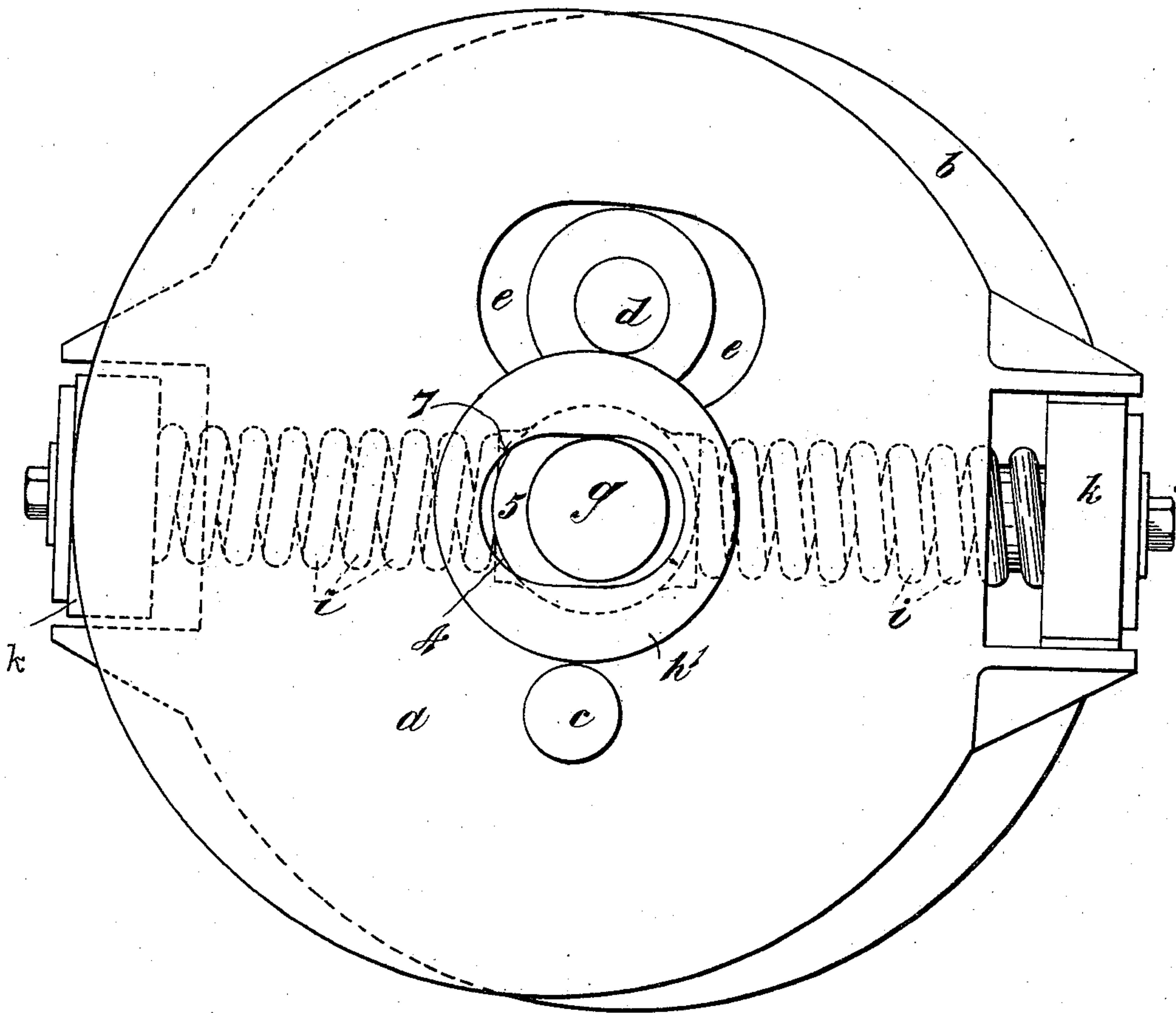
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4 SHEETS—SHEET 3.

Fig. 5.



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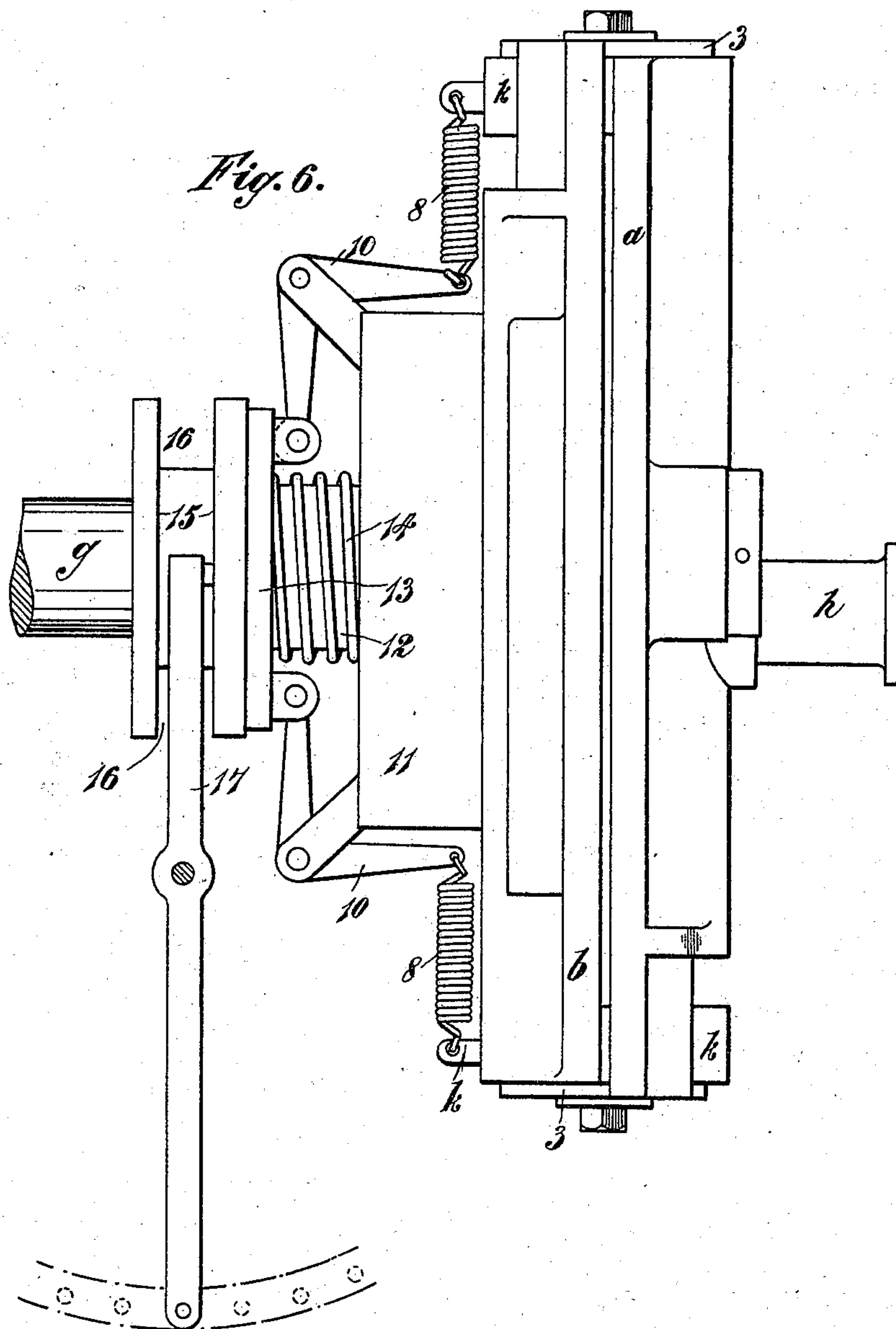
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NO MODEL.

4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

JAMES THOMAS ROSSITER, OF CHISWICK, ENGLAND.

SPEED-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 725,591, dated April 14, 1903.

Application filed July 16, 1901. Serial No. 68,455. (No model.)

To all whom it may concern:

Be it known that I, JAMES THOMAS ROSSITER, a subject of the King of Great Britain and Ireland, residing at Chiswick, in the county of Middlesex, England, have invented Improvements in Speed-Governors, of which the following is a specification.

This invention has reference to a speed-governor of simple construction, capable of easy adjustment, and possessing great sensitivity, inertia, and range and wherein the forces due to the centrifugal action of the governor-weights and to a spring or springs practically balance each other with regard to the points of suspension of the weights, so as to eliminate friction as far as possible and obviate any liability of the weights to stick on the said points of suspension, the construction of the said governor, moreover, being such that it is practically balanced about its center of rotation, so that when revolving rapidly it will transmit little or no vibration to the engine to which it is applied.

The invention consists in novel features of construction and in certain combinations and arrangement of parts, all as hereinafter fully described, and pointed out in the claims.

In the accompanying illustrative drawings, Figures 1 and 2 are diagrams showing speed-governors according to this invention. Fig. 3 is a side elevation, partly in transverse section on the line A A of Fig. 4, and Fig. 4 is a section on the line B B of Fig. 3, showing a constructional form of such a governor. Fig. 5 is a similar view to Fig. 3, showing a modified arrangement. Fig. 6 is an end view of a governor according to this invention with adjusting mechanism for varying its action.

In a governor according to this invention the centrifugal and inertia weights are formed by two disks *a* and *b*, that are arranged parallel to one another and each of which is mounted to turn to a limited extent upon a pin *c* or *d*, that extends through a slot *e* in the opposite disk, the two pins *c* and *d* (hereinafter called "suspension-pins") being arranged at diametrically opposite sides of the center of the governor and fixed to a carrier *f*, adapted to be rotated by a shaft or spindle *g*, (hereinafter called the "driving-shaft,") that is driven by the engine or other device whose speed is to be governed, one of the

disks—viz., *a*—being provided with means, such as an eccentrically-arranged pin *h*, Figs. 1 to 4, or with an eccentric *h'*, Fig. 5, or being otherwise adapted or arranged to actuate levers or other mechanical connections for controlling the valve or valves of the said engine or a suitable part of other mechanism whose speed is to be controlled. The two disks *a* and *b* are connected together by a spring *i*, Figs. 1, 2, 3, and 4, or by two springs *i i*, Fig. 5, and each of them is provided at one side of the center line *xx*, passing through the center *m* of rotation of the governor and of the suspension-pins *c* and *d*, with a starting-weight and at the opposite side of such center-line with a radial guideway *n*, in which works a laterally-projecting part *k* on the opposite disk, the starting-weight on one disk being arranged at the opposite side of the said center line to that at which the starting-weight on the other disk is arranged and the radial guideway in each disk being arranged opposite the starting-weight on the opposite disk. The center of gravity of each disk is arranged to fall on the center line *yy* of the disk passing through the oppositely-arranged starting-weight and radial guideway *n* of that disk and so as to be on that side of the center *o* of the said disk that is nearest to the starting-weight, the centers of gravity of the two disks being at opposite sides of the center *m* of rotation of the governor. One of the projections *k* fits its guideway *n* so as to slide therein and limit turning movement of one disk relatively to the other. The other projection *k* works loosely and idly in its guideway, such projection and guideway being provided for the purpose of obtaining a balance of the two disks about the center of rotation of the governor.

The construction and arrangement of the disks *a* and *b* may be such, as shown in the diagram Fig. 1, that when the governor is in the full-load or least-speed position (shown in full lines) the centers *o* of the two disks *a* and *b* will coincide with the center *m* of the governor-shaft, in which case each disk is provided with an enlargement or extension of sufficient weight to act as the starting-weight and which may consist of the laterally-projecting part *k*, which extends into the radial guideway of the opposite disk, or the

construction and arrangement of the disks may be such, as shown in the diagram Fig. 2, that when the governor is in the full-load position (shown in full lines) the centers *o* of the two disks *a* and *b* will not quite coincide with the center *m* of the governor-shaft, in which case the uncovered and therefore unbalanced crescent-shaped portions *a'* *b'* of the two disks will serve, in conjunction with the laterally-projecting parts *k*, as the starting-weights. The arrangement in each case is such that in the full-load or least-speed position of the governor the centers *o* of the two disks *a* and *b* are either concentric with the axis of the driving-shaft, Fig. 1, or as nearly concentric with such axis as the construction adopted will allow, Figs. 2, 3, and 4; but in moving into the no-load or greatest-speed position (shown in dotted lines in Figs. 1 and 2) the two disks *a* and *b* will turn, respectively, in the directions indicated by the arrows *z* and *z'*, through part of a revolution on their respective suspension-pins *c* and *d* against the action of the spring or springs *i*, the two disks moving outward in opposite directions from the axis *m* of the governor, owing to the centrifugal force of the starting-weights *k* and the eccentricity of the disks with regard to the driving-shaft *f*, thereby putting tension on the connecting spring or springs and bringing the center of the eccentric-pin *h*, Figs. 1 to 4, or eccentric *h'*, Fig. 5, when such is used, nearer to the center *m* of the governor or otherwise operating the levers or other mechanical devices used for controlling the speed of an engine or other mechanism. During the relative motions of the disks *a* and *b* the projection *k* on each disk works in the guideway *n* in the opposite disk, that projection which fits its guideway serving to keep the relative motions of the two disks equal, so that the center lines *y y* of such disks are caused to nearly coincide with each other in every position of the disks between the limits of motion imposed thereon by the suspension-pins *c* and *d*, which act as stops to the slotted portions of the disks through which they extend.

By the construction described the centrifugal forces of the two disks *a* and *b* are balanced with regard to the suspension-pins *c* and *d*. In the full-load position the centrifugal force exerted on the connecting spring or springs *i* will be that due to the two starting-weights, while in the no-load position the centrifugal force exerted on the spring or springs *i* is that due to the starting-weights and those portions of the two disks which are out of balance owing to the eccentricity of the disks to the center of rotation of the governor.

It will be seen from the drawings that only a comparatively small portion of the weight of the disks acts centrifugally against the pull of the spring or springs *i*, while the whole of the weight of both disks is available as an inertia weight to drive or control the valve-

gear operated by the governor. The pull of the spring or springs *i* is balanced with regard to the suspension-pins *c* and *d*, and the centrifugal force of the disks *a* and *b* always acts in the direction of the axis of the spring or springs.

In the particular construction of governor shown in Figs. 3 and 4 each disk *a* and *b* is formed at one side of its axis with a perforated boss *r* to receive its suspension-pin *c* or *d* and at the diametrically opposite side of its axis with the slot *e* to receive the suspension-pin *d* or *c* of the opposite disk and the boss *r*, in which the said pin is located, the length of the slot being such as to limit the turning movement of the disk on its suspension-pin to the required amount. To reduce friction, each boss *r* has fixed in it a steel bush *s*, and the corresponding suspension-pin is fitted with a steel sleeve *t* free to turn on the pin. The governor is shown in its mid-position.

The guideway *n* in each disk is in the form of an open-ended slot, and lateral extensions *k*, which also serve as part of the starting-weights, extend from the inner sides of the disks. One of the lateral extensions *k* is provided with a slipper *u* to fit the radial guideway *n* in the opposite disk for the purpose hereinbefore described, the other projection *k* being free to oscillate sidewise to a small extent in its guideway, as well as endwise therein. Each of the disks *a* and *b* is also formed on its inner side with a concave recess *v*, that extends diametrically across the disk from the extension on one side thereof to the radial guideway *n* on the opposite side and which, in conjunction with the corresponding concave recess *v* on the inner side of the opposite disk, forms a cylindrical or nearly cylindrical cavity or tunnel *w* for a coiled spring *i*, that has one end adjustably connected to the extension or starting-weight *k* on one disk and its other end adjustably connected to the extension *k* on the opposite disk. The connection between the spring and each lateral extension may advantageously be made by connecting each end of the spring to a nut 1, that is threaded on a screw-bolt 2, the head of which bears against the outer side of a cover 3, that fits into and bears against the outer side of the adjacent extension *k*. By this construction the tension of the spring *i* can be readily varied when desired. The two suspension-pins *c* and *d* are fixed to a disk-like carrier *f*, secured to one end of the driving-shaft *g* at the outer side of the disk *b*, and the outer side of the disk *a* is provided with an eccentric-pin *h* for operating the valve mechanism of the engine or other apparatus to be controlled.

When it is desired that the driving-shaft *f* shall pass through the governor, the central portions of the two disks *a* and *b* are slotted, as shown at 4 in Fig. 5, to accommodate the shaft, and two springs *i* are provided that have their inner ends attached to a boss 5 on

the said shaft and their outer ends attached to the respective starting-weights k , as before. In this case the disk a is provided with an eccentric h' , having a slot 7 therethrough of sufficient size to accommodate the driving-shaft g and allow of the required oscillating movements of the disk upon its suspension-pin c .

To enable the governor to be adjusted in order to adjust the speed of the engine or other device controlled thereby while running, the said governor may be provided with a supplementary spring or springs attached to one or both disks, the tension on the spring or springs being adapted to be altered by hand through suitable mechanical devices. In Fig. 6 the governor is provided with supplementary springs 8, one of which is connected at its outer end to the starting-weight k on the disk a and the other is connected at its outer end to the starting-weight k of the disk b . The inner ends of these springs are each connected to one arm of a bell-crank lever 10, pivoted to a ring 11, with sleeve 12 fast on the driving-shaft g , and the other arm of which is connected to a ring 13, that is mounted to slide on the sleeve 12 and between which and the ring 11 a coiled spring 14 is interposed.

15 is a sleeve that acts against the ring 13 and is formed with an annular groove 16, into which extends the forked end of a hand-lever 17. The arrangement is such that by operating the hand-lever 17 the effect of the supplementary springs 8 can be varied and the action of the governor adjusted to suit requirement while the governor is running.

Governors according to this invention can be used as shaft-governors for operating and controlling the slide-valves of engines or as throttle-valve governors or in conjunction with other speed-controlling mechanism.

It will be evident that various changes may be made in the details of construction of my governor without departing from the spirit and scope of the invention so long as the relative arrangement of the parts shown in the drawings or the mode of operation described in the specification is preserved.

What I claim is—

1. A governor comprising a rotary carrier, unbalanced bodies pivoted eccentrically to said carrier and arranged side by side so as to overlap one another and the axis of said carrier, means acting diametrically and approximately at right angles to a line jointing the pivotal centers of said bodies to pull the said bodies together, means for limiting turning movement of one body relatively to the other, and a shifting device arranged to be actuated by one of said bodies.

2. A governor comprising a rotary carrier, unbalanced bodies arranged side by side so as to overlap one another and the axis of said carrier and pivoted eccentrically to said carrier at two diametrically opposite points thereof so as to tend to move apart in an approxi-

mately diametrical direction relatively to said carrier under the action of centrifugal force, elastic means acting diametrically across the center of said carrier between said pivots to pull the said bodies together, means for limiting turning movement of one body relatively to the other, and a shifting device carried by one of said bodies.

3. A governor comprising a rotary carrier, unbalanced bodies arranged side by side so as to overlap one another and the axis of said carrier and pivoted eccentrically to said carrier at two diametrically opposite points thereof so as to tend to move apart in an approximately diametrical direction relatively to said carrier under the action of centrifugal force, one of said bodies having near its periphery a lateral projection arranged to work in a radial guideway in the adjacent body, elastic means acting to pull said bodies together, and an eccentric device carried by one of said bodies.

4. A speed-governor comprising a rotary carrier, two disk-like bodies arranged to overlap each other and the center of said carrier and pivoted eccentrically thereto at diametrically opposite points thereof located within the contour of both bodies, said bodies having their centers of gravity at opposite sides of and near to a plane passing through their pivots, means for limiting turning movement of said bodies relatively to each other, elastic means connecting said disks together and tending to prevent them moving apart, and a shifting device arranged to be actuated by one of said bodies.

5. A speed-governor comprising a rotary carrier, two disk-like bodies arranged side by side, so as to more or less overlap each other, pins fixed to said carrier at diametrically opposite points and upon which said bodies are eccentrically mounted so as to turn apart in opposite directions across the center of motion of said carrier, said pins being located within the contour of both bodies and said bodies having their centers of gravity located at opposite sides of a plane passing through their pivots, means carried by one of said bodies and engaging the other and adapted to limit turning movement of one disk relatively to the other, elastic means connecting said bodies and located diametrically between them, and an eccentric device carried by one of said bodies.

6. A speed-governor comprising two plates arranged side by side so as to more or less overlap one another, two suspension-pins each journaled in one plate and extending through a slot in the opposite one, a rotary carrier for said pins, and a spring connecting the two plates and tending to prevent them moving apart, and a shifting point arranged to be actuated by one of said plates.

7. A speed-governor comprising two plates arranged side by side so as to more or less overlap one another, two suspension-pins each journaled in one plate and extending

through a slot in the opposite one, a rotary carrier for said pins, a spring connecting the two plates and tending to prevent them moving apart, means for limiting turning motion of one plate relatively to the other, and an eccentric device actuated by one of said plates.

8. A speed-governor comprising two plates arranged side by side so as to more or less overlap one another, two suspension-pins each journaled in one plate and extending through a slot in the opposite one, a rotary carrier for said pins, a spring arranged diametrically across the governor and connecting the two plates and tending to prevent them moving apart, means for limiting turning motion of one plate relatively to the other, and an eccentric device carried by one of said plates.

9. A speed-governor comprising a rotary carrier, two suspension-pins fixed thereto at opposite sides of the center of motion thereof, two disks arranged side by side so as to more or less overlap one another and each mounted to turn upon one of said suspension-pins and formed with a slot for the reception of the other pin, said disks having starting-weights located at opposite sides of the center of motion of said carrier, a spring connecting said disks and tending to hold them together, and an eccentric device actuated by one of said disks.

10. A speed-governor comprising a rotary carrier, two suspension-pins fixed thereto at opposite sides of the center of motion thereof, two disks arranged side by side so as to more or less overlap one another and each mounted to turn upon one of said suspension-pins and formed with a slot for the reception of the other pin, said disks having starting-weights located at opposite sides of the center of motion of said carrier, a spring connecting said disks, means for limiting turning movement of one disk relatively to the other, and an eccentric device actuated by one of said disks.

11. A speed-governor comprising a rotary carrier, two suspension-pins fixed thereto at opposite sides of the center of motion thereof, two disks arranged side by side so as to more or less overlap one another and each mounted to turn upon one of said suspension-pins and formed with a slot for the reception of the other pin, said disks having starting-weights located at opposite sides of the center of motion of said carrier, a spring arranged diametrically across the governor and connecting said disks, means for limiting turning movement of one disk relatively to the other, and an eccentric device carried by one of said disks.

12. A speed-governor comprising a rotary carrier, two suspension-pins fixed thereto at opposite sides of its center of motion, two disks each formed with a bearing through which one of the pins extends, with a slot

through which the other pin extends, with a lateral extension on its inner side, and with a radial guideway, the said bearing, extension, slot and guideway being arranged around the center of the disk in the order mentioned and about ninety degrees apart, and the two disks being reversely arranged so that the extension on each comes opposite to and enters the guideway in the other, elastic means connecting said disks tending to prevent them turning on their suspension-pins, and a shifting device arranged to be actuated by one of said disks.

13. A speed-governor comprising a rotary carrier, two suspension-pins fixed thereto at opposite sides of its center of motion, two disks mounted one on each pin and embracing the other pin and each having a starting-weight at one side of the suspension-pins, the starting-weight on one disk being arranged opposite to that of the other disk, a spring device arranged diametrically across the governor between said disks and connecting said disks together, means for limiting turning motion of one disk relatively to the other, and a shifting device actuated by one of said plates.

14. A speed-governor comprising a rotary carrier, two suspension-pins fixed thereto at opposite sides of its center of motion, two disks mounted one on each pin and embracing the other pin and each having a starting-weight at one side of the suspension-pins, the starting-weight on one disk being arranged opposite to that of the other disk, a spring device arranged diametrically across the governor between said disks and connecting said disks together, means for limiting turning motion of one disk relatively to the other, and an eccentric device attached to the outer side of one of said disks.

15. A speed-governor comprising a rotary carrier, two disks arranged side by side so as to more or less overlap one another and separately pivoted to said carrier at diametrically opposite points thereof so as to be capable of moving apart under the action of centrifugal force, each disk having a diametrically-arranged recess on its inner side, a lateral extension on its inner surface at one side of the center of the carrier and a radial guideway at the opposite side of said center, the extension on one disk entering the guideway in the opposite disk, a spring device located in the passage or tunnel formed by and between the adjacent recessed inner surfaces of the disks and connected to said extensions, and an eccentric device attached to the outer side of one of said disks.

Signed at 77 Cornhill, in the city of London, England, this 28th day of June, 1901.

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