

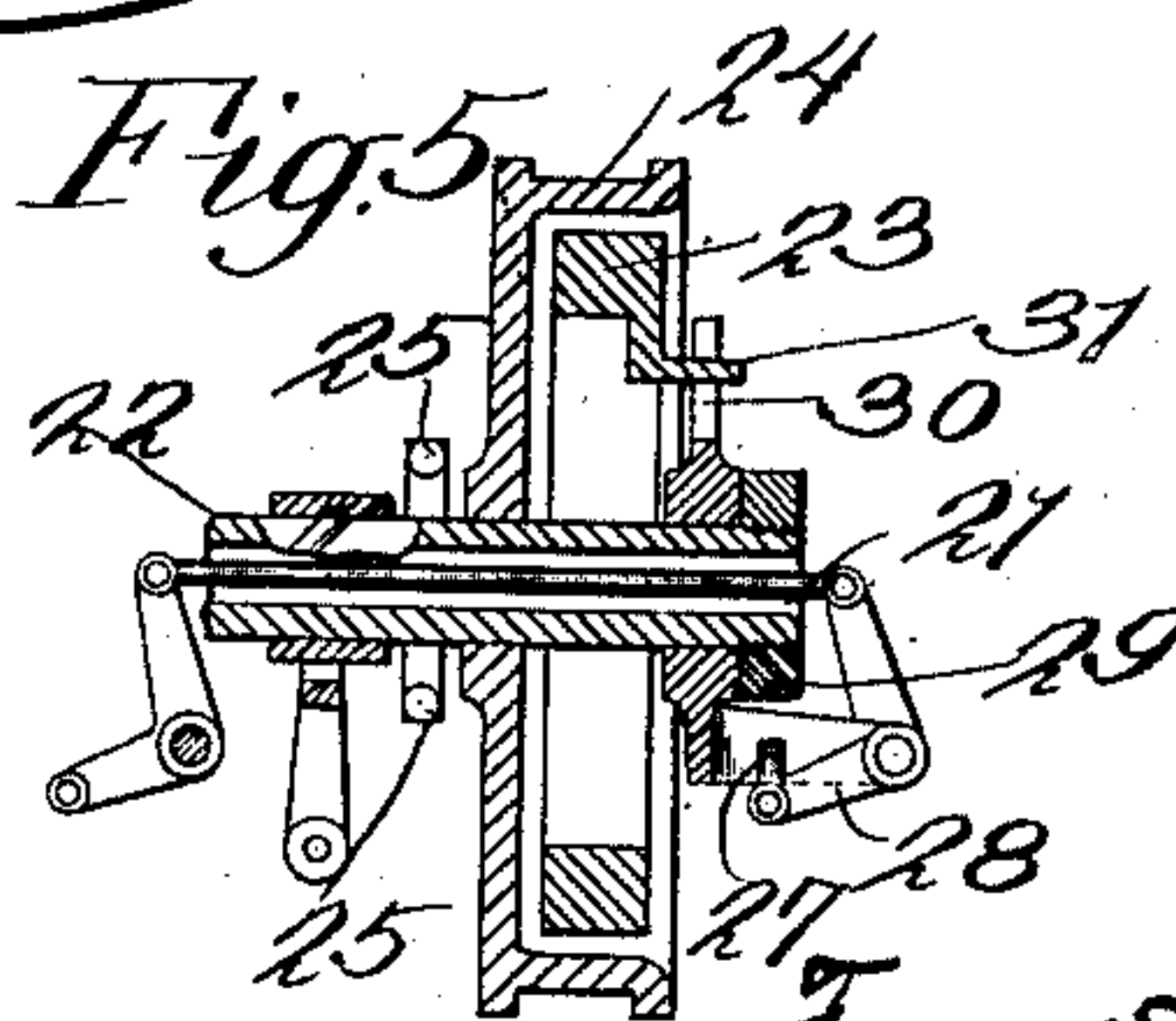
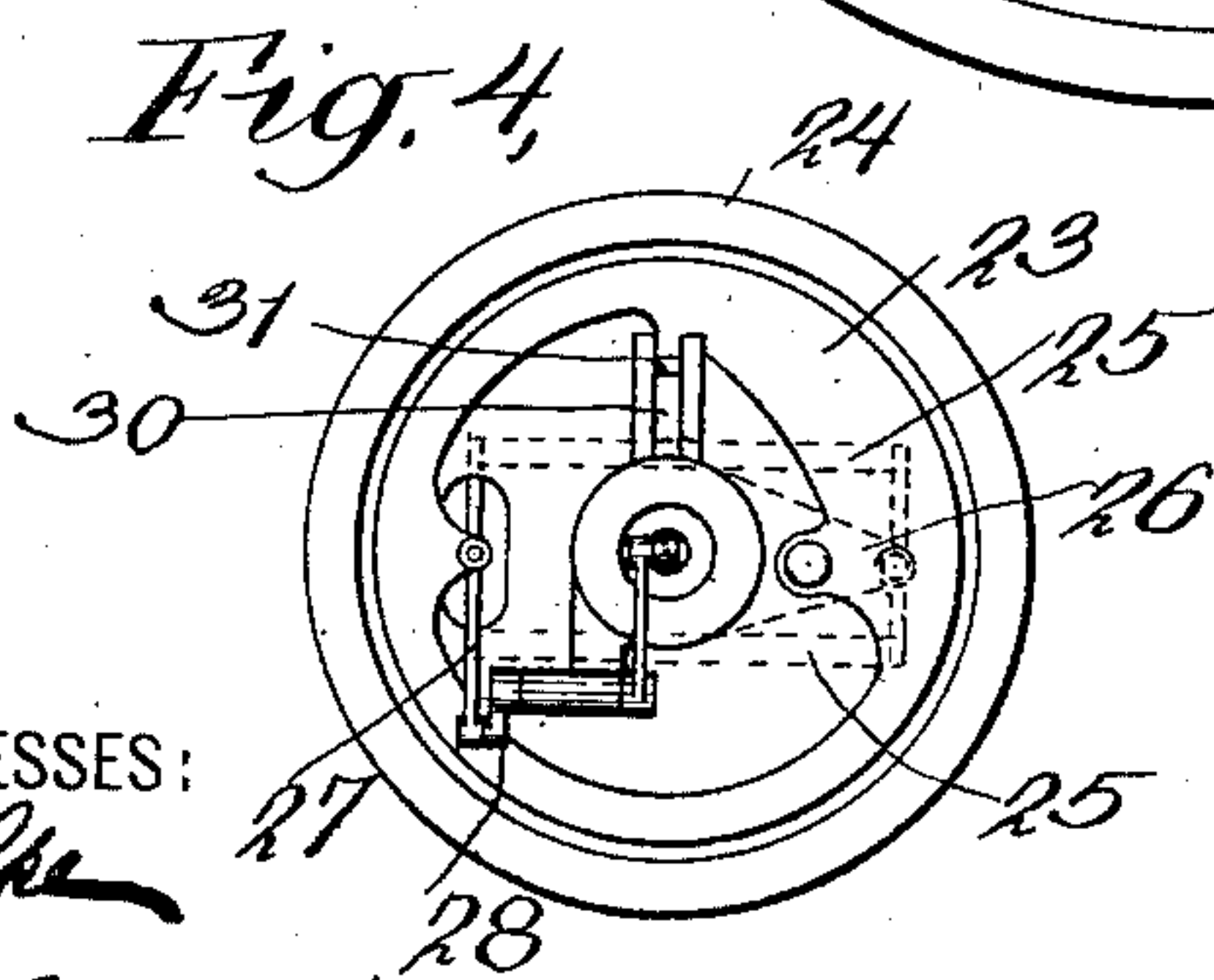
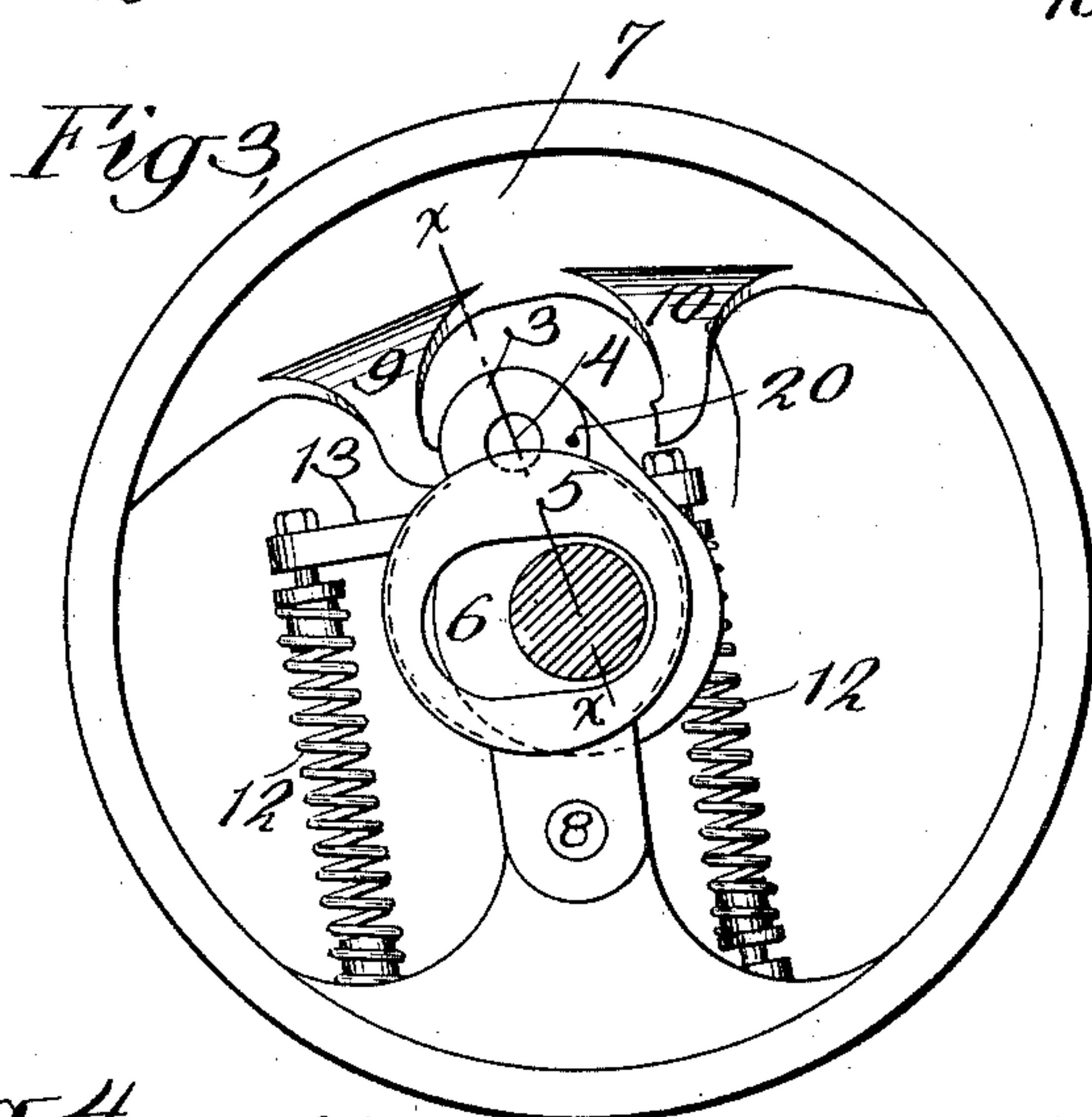
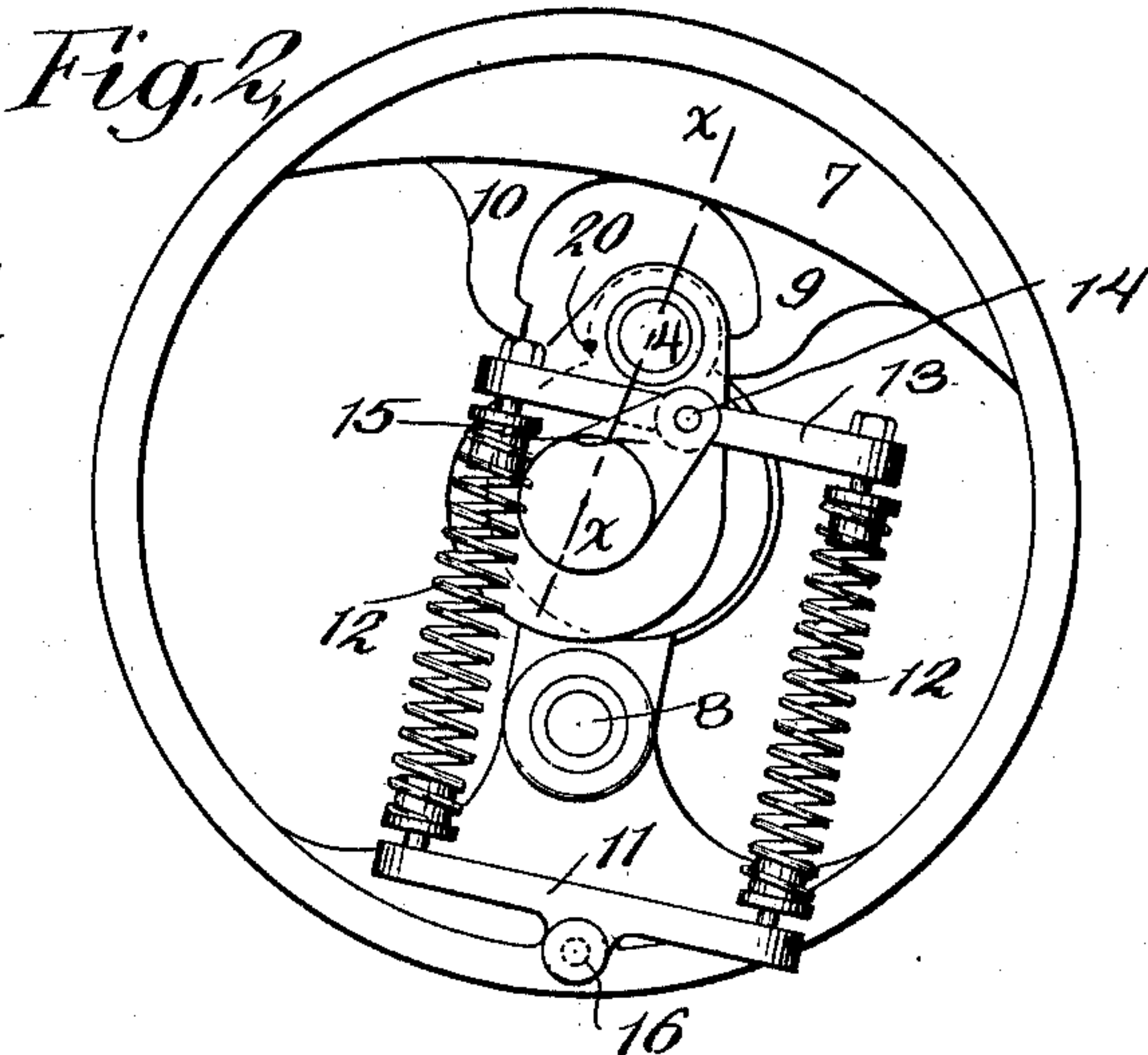
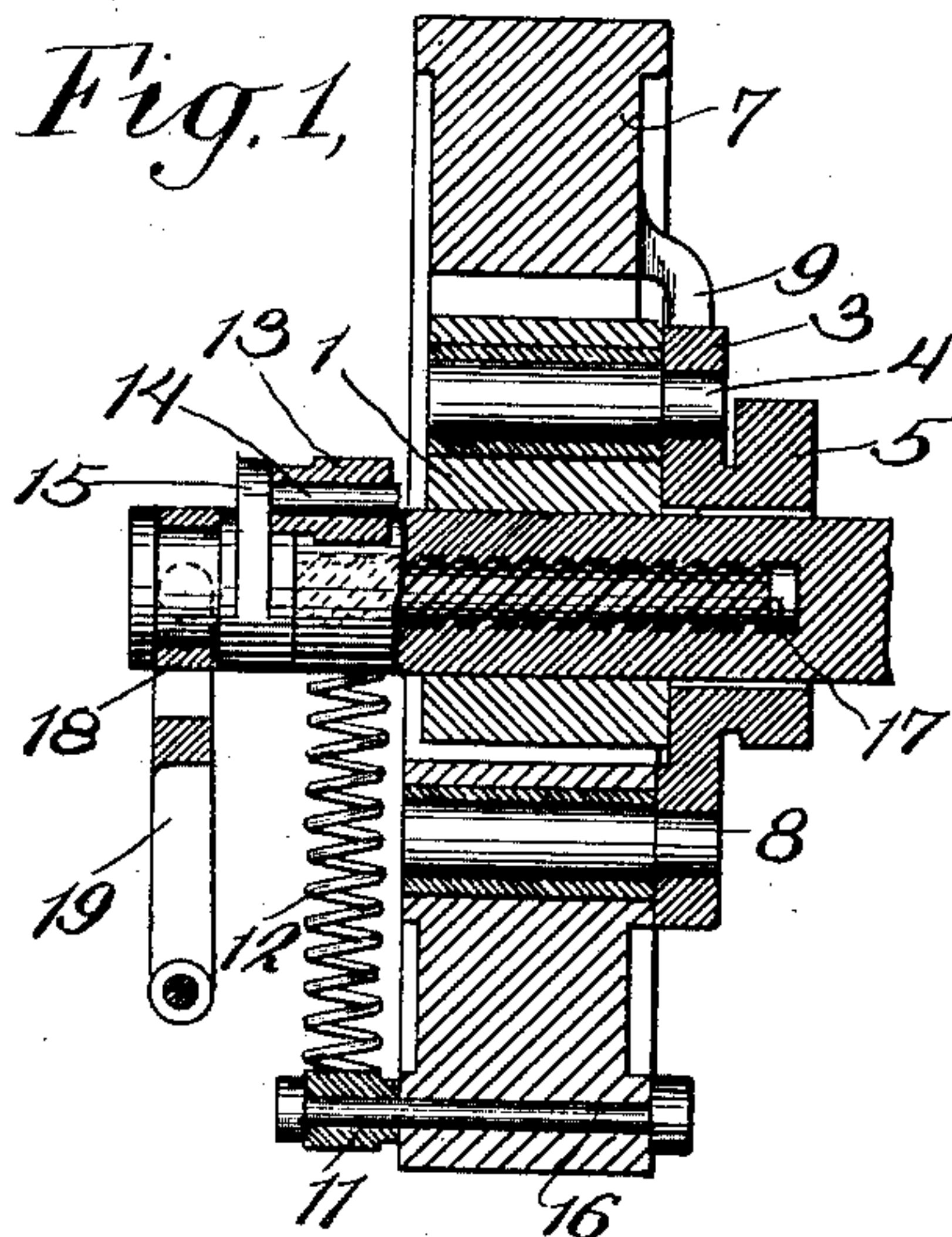
No. 737,486.

PATENTED AUG. 25, 1903.

F. M. RITES.
GOVERNOR.

APPLICATION FILED NOV. 19, 1902.

NO MODEL.



WITNESSES:
Miner Tappan
C. F. Carrington

INVENTOR
Francis M. Rites
BY
Chapin Hayward & Mallet
ATTORNEYS

UNITED STATES PATENT OFFICE.

FRANCIS MARION RITES, OF ITHACA, NEW YORK.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 737,486, dated August 25, 1903.

Original application filed April 8, 1902, Serial No. 101,882. Divided and this application filed November 19, 1902. Serial No. 131,982. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS MARION RITES, a citizen of the United States, residing in Ithaca, in the county of Tompkins and State of New York, have invented certain new and useful Improvements in Governors; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates generally to improvements in automatic speed-governors for steam and other fluid-pressure motors, and particularly to reversible governors by means of which an engine may be reversed and which operate equally to control the speed of the engine in whichever direction the same may be running and to means for varying the normal speed which the governor is adapted to maintain.

My invention consists in novel means for varying the normal speed which the governor is adapted to maintain, in novel means for reversing the governor, and thereby reversing the engine at will, in the novel mounting of the governor-weight, and in various other features, as hereinafter described, and more particularly pointed out in the claims.

The objects of my invention are to improve and simplify the construction of reversing-governors, to utilize in such governors effectively both the centrifugal effort and the inertia action of the governor-weight structure, to improve the means employed for varying the normal speed which the governor is adapted to maintain, and to provide for varying such normal speed while the engine is running, to reduce the number of moving parts and of bearings, and to avoid the necessity of using sliding members which must be shifted by the governor-weight, and to make the governor simple, compact, effective, and automatic in operation.

In its preferred form the governor herein illustrated and described belongs to the type known as "shaft-governors," and is particularly intended to be located on the crank-shaft of an engine and to control the speed of the engine by varying the point of cut-off; but the governor is not necessarily located on the crank-shaft nor is it necessarily employed

to operate variable cut-off-valve gear. It may be mounted in other positions and may be arranged to operate a throttle-valve, for example, or the tripping mechanism of an engine of the Corliss type.

It is frequently desirable to employ a governor so constructed that it may be adjusted as to the speed which it is to maintain while it is in operation. Thus it is desirable that the governors of engines driving alternating-current dynamos connected in multiple shall be adjustable, so that the dynamos may be caused to synchronize perfectly without imposing undue load on any particular dynamo and engine. It is also often desirable to provide automobile and boat engines with governors which may be set to maintain any speed of the automobile or boat which may be desired. This may be accomplished by the governor herein illustrated and described.

In the accompanying drawings I illustrate one form of my governor as adapted for mounting on the crank-shaft of an engine and for controlling the distributing-valve gear of such engine, also another form of my governor adapted for use for controlling a throttle-valve or the tripping-gear of a drop cut-off engine.

In the said drawings, Figure 1 shows a central vertical section of the first-mentioned type of my governor. Fig. 2 is an elevation of one side of the said governor. Fig. 3 is a similar elevation of the opposite side of said governor. Fig. 4 is a side view of the second of the above-mentioned forms of my governor, and Fig. 5 is a central vertical section thereof.

Referring first to Figs. 1 to 3, inclusive, the governor there shown comprises a carrying-ring 1, mounted upon and arranged to revolve with a crank-shaft 2, and an arm 3, pivoted to said carrying-ring 1 by means of a pivot-pin 4, said arm being slotted to permit passage of the crank-shaft and carrying a slotted eccentric 5. The slot 6 of this eccentric is of such length that the eccentric may swing from a position on one side of the center of the crank-shaft to a position on the other side thereof, and thereby reverse the valve driven thereby. To the arm 3 of each governor is pivoted a combined centrifugal and inertia

weight 7 by means of a pivot-pin 8. In the construction shown the weight is substantially circular, having, however, a preponderating mass on the side of the shaft opposite the pivot-pin 8, so that the center of gravity is on that side of said shaft. The shape of this weight, however, is unimportant. The weight is provided with two stops 9 and 10 upon opposite sides of the arm 3. The weight 7 is provided with a yoke 11, to which the ends of two springs 12 are connected. A similar yoke 13 is mounted upon a pin 14, carried by an arm 15, mounted to revolve with the crank-shaft, but to have some motion relative thereto for the purpose of adjusting the governor, as hereinafter described. The effect of the use of the two springs 12 and the yokes 11 and 13 is the same as if a single spring were used, connected to the pin 14 and to the pin 16, by which yoke 11 is connected to weight 7; but inasmuch as such a spring would interfere with the shaft two springs are preferably employed. I do not limit myself to the employment of a plurality of springs, a single spring being a mere mechanical equivalent. In the operation of the governor the weight 7 and its support 3 move as a single rigid piece so long as the direction of rotation remains the same, both swinging about the axis of pivot 4.

In Figs. 2 and 3 20 designates the center of gravity of the weight structure when the parts are in the positions indicated. It will be noted that the springs 12 tend by pulling upon the weight to hold the stop 9 in contact with the carrying-disk. Obviously if the weight be caused to move so as to bring its center of gravity 20 upon the opposite side of the line xx , passing through the center of the shaft 2 and the center of pivot-pin 4, the center of the eccentric will be carried to the opposite side of the shaft and the engine will be reversed. For this purpose and for the purpose of adjusting the governor as to the speed to be maintained mechanism is provided for moving the arm 15 to one side or the other of the line xx at will. This mechanism comprises a screw 17, mounted within a screw-threaded bore in the end of the crank-shaft 2 and provided with a collar 18, connected to a rocker-arm 19, by means of which said screw may be moved longitudinally with respect to the crank-shaft, and thereby caused to rotate with respect to the crank-shaft. This screw carries the arm 15, the pin 14 having a sliding bearing in the yoke 13 of the spring structure. The operation of this governor is as follows: The engine being in motion, as the speed rises the weight 7 and arm 3, acting as a rigid structure, since the stop 9 is in contact with the arm 3, tend to swing about the pivot-pin 4, so as to decrease the eccentricity of the eccentric and produce an earlier cut-off, this tendency being resisted by the governor-springs 12. As in the case of an ordinary shaft-governor, the spring and governor-

weight maintain a balance for any load within the capacity of the engine, the position of the eccentric shifting slightly as the load of the engine varies, so as to maintain constant speed. If any sudden change of speed of the engine takes place, the inertia of the governor-weight, acting in harmony with the increase or decrease of centrifugal effort, hastens the adjustment of the eccentric. By moving the arm 15 toward the medial line xx the leverage of the governor-springs is decreased and the governor will lower the speed of the engine and maintain the speed to which it is adjusted. If this arm be moved past the medial line, the pull of the springs will come upon the opposite side of the crank-shaft, thereby causing the governor-weight to swing relatively to its supporting-arm 3 until its stop 10 is in contact with the boss of the carrying-ring. The governor-weight then influences the eccentric oppositely, moving it to the opposite side of the crank-shaft, and thereby reversing the valve driven by said eccentric. In this new position of the parts the governor acts to maintain the speed to which it has been set just as in the former position. If the speed of the engine rises very greatly above that for which the governor is adjusted—as, for example, if the engine begins to race for any cause—the governor-weight will swing so as to bring the eccentric upon the opposite side of the shaft, thus reversing the valve driven by said eccentric and opposing the positive action of the steam to the motion of the piston, thus effectively checking the speed of the engine. As soon as the engine speed falls to the normal speed for which the governor has been set the governor-weight will swing the eccentric back to the side of the shaft upon which it was before the racing began.

In another application for Letters Patent, filed April 8, 1902, Serial No. 101,882, of which application this present application is a division, I have illustrated and described this governor as applied to a multiple-cylinder multiple-expansion engine of the marine type, the governor being arranged to control the valve-gear of one or more of the cylinders of such engine and to automatically reverse the valve-gear of such cylinders when the engine begins to race, thereby opposing the action of such cylinders to that of the other cylinders of the engine by admitting counter-steam. This, however, is only one use to which my governor is adapted. Any suitable device may be employed for moving the rocker-arm 19 and for holding it stationary in any position to which it may be adjusted.

The improved governor herein described is not limited in its application to use in connection with slide-valves. It may operate a throttle-valve or the releasing mechanism of a drop cut-off valve-gear, such as the ordinary Corliss valve-gear. Such a governor is shown in Figs. 4 and 5. In the form shown in said figures the governor-weight is arranged to

give axial movement to a rod 21, passing through a central bore of the shaft 22, carrying the governor. The governor-weight 23 is in this case pivoted directly to the wheel 24, mounted on said shaft 22, and springs 25 are connected to the said weight and to an arm 26, provided with mechanism like that above described for moving said arm relatively to the shaft, and thereby varying the leverage of the springs and the speed which the governor tends to maintain. The governor-weight 23 does not carry an eccentric, but is connected by a link 27 to a bell-crank 28, connected to the said axial stem 21, said bell-crank being pivoted to a collar 29, itself pivoted on the shaft 22 and provided with a slide 30, in which a pin 31, carried by the governor-weight, works. The purpose of the slide and pin is to move the collar as the governor-weight swings, so that said weight may always pull upon the bell-crank in a straight line. This governor is not a reversing-governor, the uses for which it is employed not requiring that it shall be a reversing-governor.

It will be obvious that my invention is susceptible of many variations and modifications, and I do not limit myself to the particular constructions herein illustrated and described.

What I claim is—

1. In a governor, the combination with a rotary carrier, of a governor-weight mounted thereon and free to move to one side or the other of a line connecting the center of rotation and the point about which said weight swings with reference to the carrier, according to the direction of rotation, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

2. In a governor, the combination with a rotary carrier, of a governor-weight mounted thereon and free to move to one side or the other of the axis of rotation, according to the direction of rotation, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

3. In a governor, the combination with a rotary carrier, of a governor-weight mounted to swing thereon and free to move to one side or the other of a line connecting the center of rotation and the point about which said weight swings with reference to the carrier, according to the direction of rotation, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

4. In a governor, the combination with a rotary carrier, of a governor-weight mounted to swing thereon and free to move to one side or the other of the axis of rotation, according to the direction of rotation, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

5. In a governor, the combination with a rotary carrier, of a governor-weight, a support therefor to which said weight is movably connected and which is movably connected to the carrier, said weight free to move, with respect to said support and to the rotary carrier, to one side or the other of the axis of rotation, according to the direction of rotation, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

6. In a governor, the combination with a rotary carrier, of a governor-weight, a support to which said weight is pivoted, said support likewise pivoted to the carrier, the weight being free to move, about its point of connection to said support, to one side or the other of a line connecting such point of connection and the center of rotation according to the direction of rotation, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

7. In a governor, the combination with a rotary carrier, of a governor-weight, a support therefor to which said weight is movably connected and which is movably connected to the carrier, said weight free to move, with respect to said support and to the rotary carrier, to one side or the other of the axis of rotation, according to the direction of rotation, stops limiting the motion of the weight, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

8. In a governor, the combination with a rotary carrier, of a governor-weight, a support to which said weight is pivoted, said support likewise pivoted to the carrier, the weight being free to move, about its point of connection to said support, to one side or the other of a line connecting such point of connection and the center of rotation according to the direction of rotation, stops limiting the motion of the weight, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

9. In a governor, the combination with a rotary carrier, of a governor-weight mounted thereon and free to move to one side or the other of a line connecting such point of connection and the center of rotation according to the direction of rotation, means for so shifting said weight at will, a valve-actuating device adjusted by the movement of the weight, and means for opposing centrifugal action of said weight.

10. In a governor, the combination with a rotary carrier, of a governor-weight mounted thereon and free to move to one side or the other of the axis of rotation, according to the direction of rotation, means for so shifting said weight at will, a valve-actuating device adjusted by the movement of said weight, and means for opposing centrifugal action of said weight.

11. In a governor, the combination with a rotary carrier, of a governor-weight, a support to which said weight is movably connected, said support likewise movably connected to the carrier, the weight being free to move about its point of connection to said support, to one side or the other of a line connecting such point of connection and the center of rotation, stops for said weight, springs normally holding the weight to one side or the other and resisting centrifugal action thereof, means for shifting the direction of effort of the springs, and a valve-actuating device adjusted by said weight.

12. In a governor, the combination with a rotary carrier, of a governor-weight, a support to which said weight is movably connected, said support likewise movably connected to the carrier, the weight being free to move about its point of connection to said support, to one side or the other of a line connecting such point of connection and the center of rotation, stops for said weight, springs connected at one end to said weight, a movable adjusting-arm to which the other ends

of said springs are connected, and means for moving said arm.

13. In a governor, the combination with a rotary carrier, of a governor-weight thereon, springs resisting centrifugal effort of said weight, means adjustable during the operation of the governor, for varying the leverage of said springs, and a valve-actuating device adjusted by said weight.

14. In a governor, the combination with a rotary carrier, of a governor-weight thereon, springs connected at one end to said weight and resisting centrifugal effort thereof, an adjusting-arm to which the other ends of the springs are connected, means for adjusting said arm during the operation of the governor, and a valve-actuating device adjusted by said weight.

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

FRANCIS MARION RITES.

Witnesses:

C. F. CARRINGTON,
MINERVA PAPE.