J. BRESLOVE.

AUTOMATIC STOP GOVERNOR.

APPLICATION FILED JAN. 13, 1906. RENEWED SEPT. 16, 1907.

953,590. Patented Mar. 29, 1910.

3 SHEETS—SHEET 1.

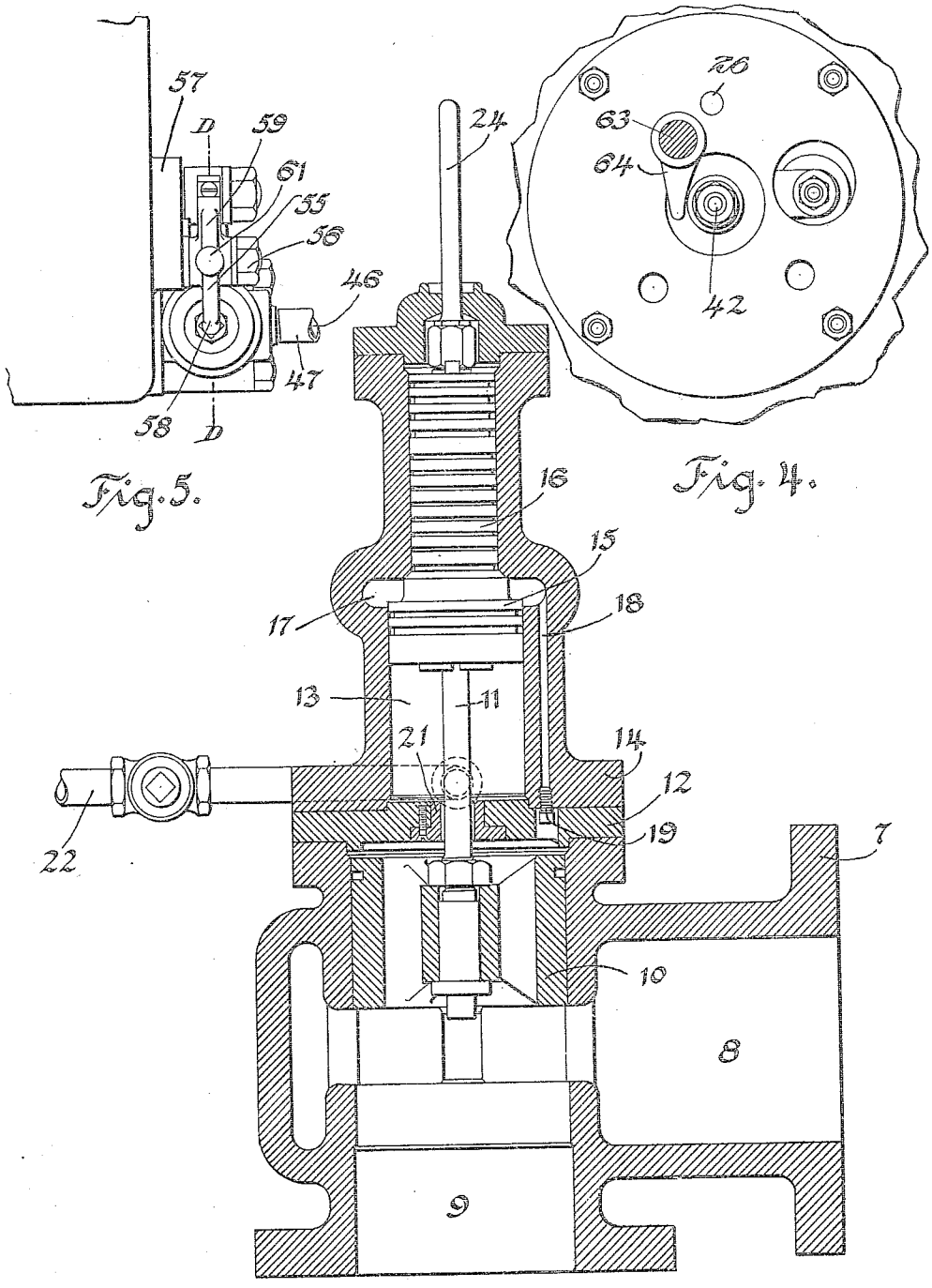

Fig. 1.

Fig. 4.

Fig. 5.

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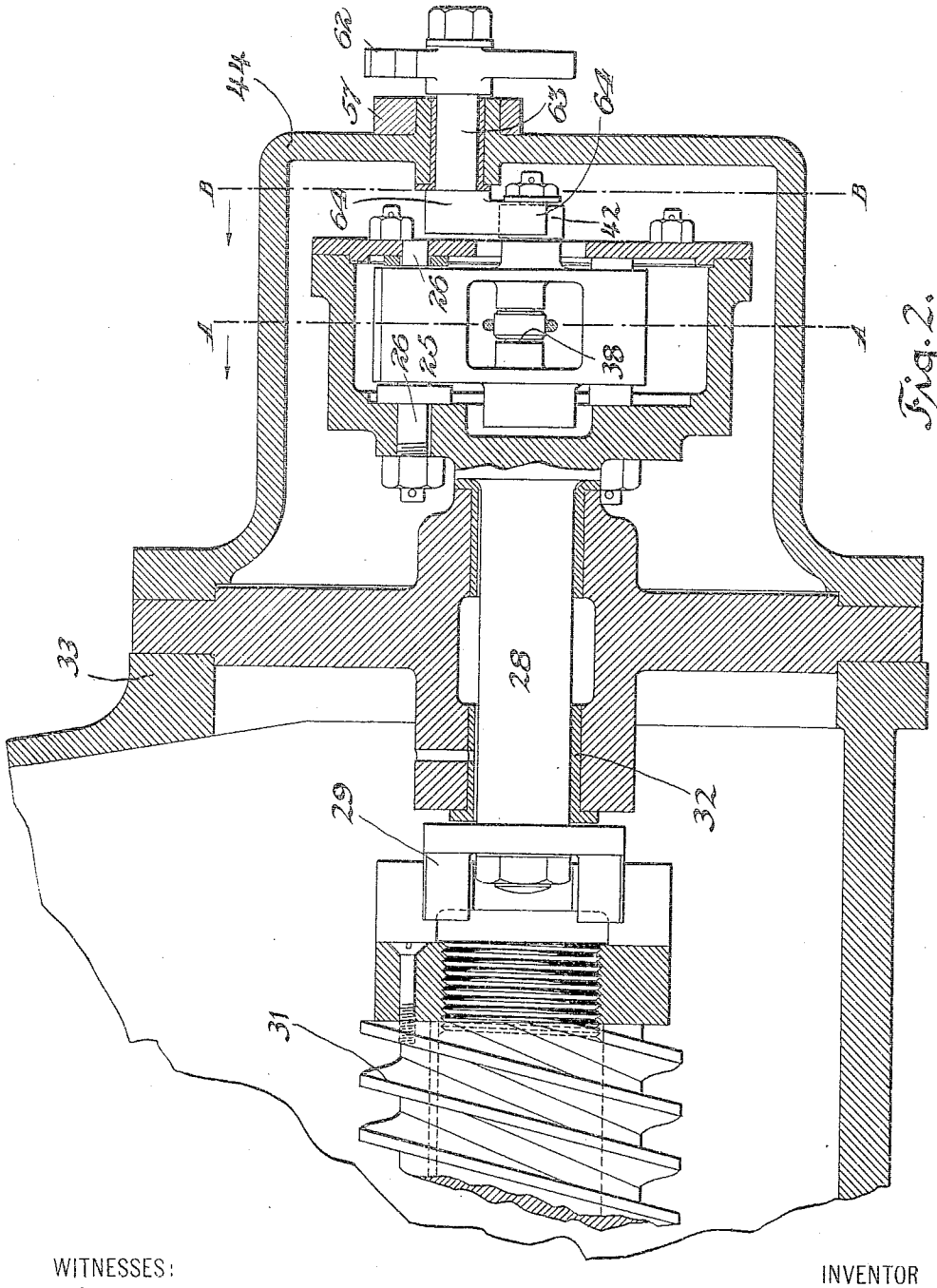

Fig. 2.

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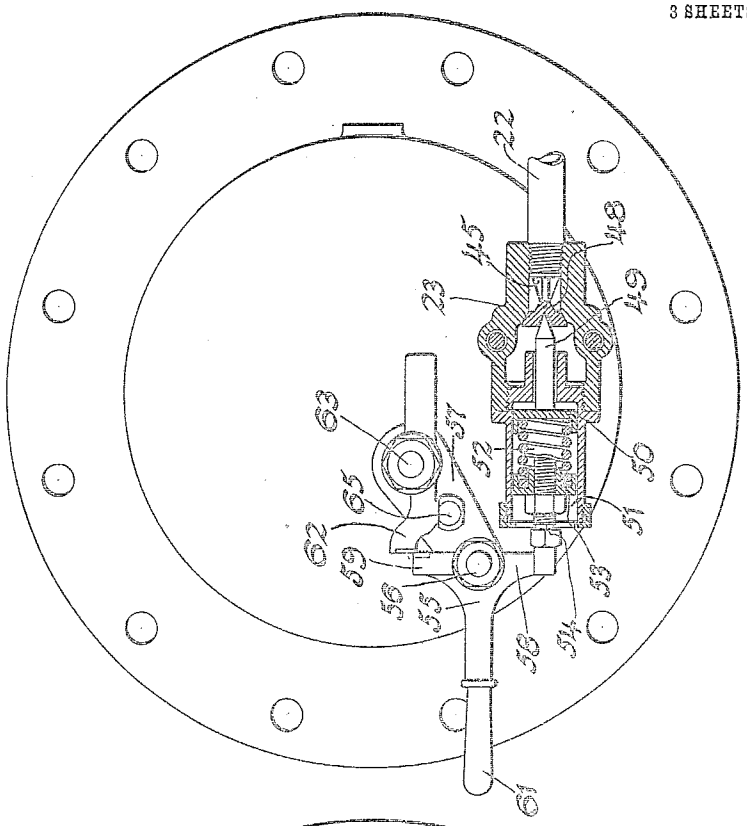

Fig. 6.

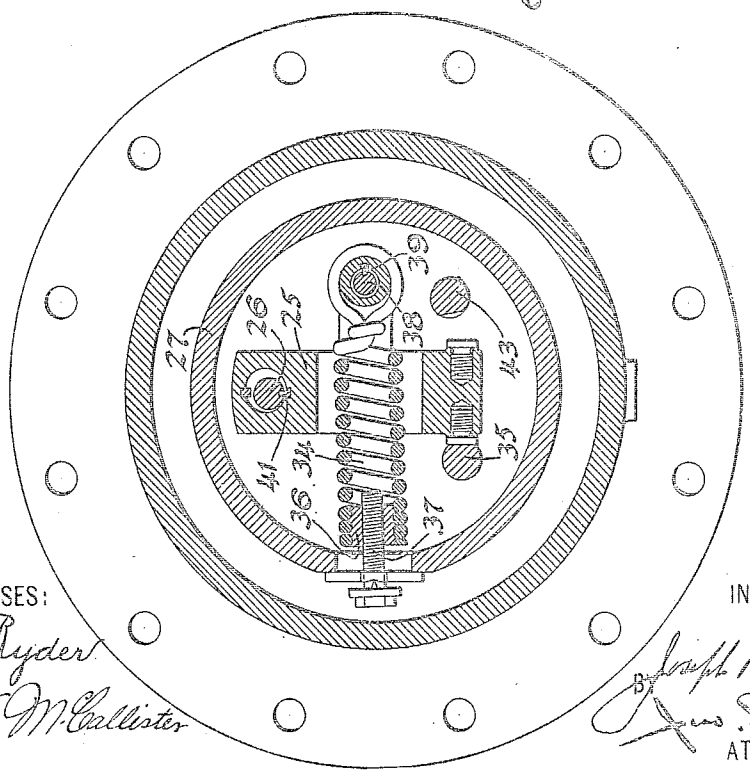

Fig. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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AUTOMATIC STOP-GOVERNOR.

953,590. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed January 13, 1906. Serial No. 295,963. Renewed September 16, 1907. Serial No. 393,115.

To all whom it may concern:

Be it known that I, JOSEPH BRESLOVE, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Automatic Stop-Governors, of which the following is a specification.

This invention relates to governors and more particularly to automatic stop governors.

An object of this invention is the production of comparatively simple and efficient means for automatically cutting off the supply of motive fluid to an engine when the engine exceeds a predetermined speed.

A further object is the production of an automatic stop governor in which means are utilized such that the fluid supply, after being automatically cut off, will remain so until the governor and governor mechanisms are readjusted.

Elastic fluid turbines and all other types of engines are ordinarily provided with speed governors, the functions of which are to automatically proportion the steam supply to the engine in accordance with the load demand. It is also customary to provide auxiliary or automatic stop governors which are effective in shutting off the supply of motive fluid to the engine or turbine when the engine, due to some extraordinary circumstances, exceeds a speed beyond which its operation would prove dangerous. In turbine practice it is necessary, because of the excessive speeds encountered, to provide adequate and effective means for lubricating all the running parts, and it has been an object of my invention to provide an automatic stop governor adapted to run in oil, and one in which the friction between the moving parts is as far as possible eliminated.

These and other objects I attain in a governor embodying the features described in the specification and illustrated in the accompanying drawings, throughout the several views of which similar elements are denoted by like characters.

In the drawings Figure 1 is a sectional elevation of a fluid actuated cut-off valve utilized with this invention. Fig. 2 is a sectional elevation of a governing device controlling the operation of the cut-off valve. Fig. 3 is a section along the line A A of Fig. 2. Fig. 4 is a section along the line B B of Fig. 2. Fig. 5 is an elevation of a detail of this invention. Fig. 6 is a section along the line D D of Fig. 5.

Throughout the further description of this invention it will be described in connection with an elastic fluid turbine without any idea of limiting its application to such engines.

Located conveniently in the motive fluid supply line of a turbine is a valve casing 7, which is provided with a fluid inlet port 8 and an outlet port 9, and within which a piston valve 10, adapted to control the flow of motive fluid through the valve casing, operates. A valve stem 11 is connected to the piston valve 10 and projects through an end wall 12 of the casing 7 into a valve motor cylinder 13, the casing 14 of which is secured to the casing 7. The valve motor cylinder 13 is bored to two diameters and the valve stem 11 carries two pistons, 15 and 16, which are located in the different size bores. Each piston is preferably water grooved to preserve a fluid tight fit within the cylinders and a chamber 17 is located above the piston 15. A by-pass 18 leading from the end wall 12 of the valve casing 7 through the casing 14 connects the chamber 17 with the interior of the valve casing 7 and is provided with a hollow plug 19, adapted to insure the port 18 registering with the port below it when the parts are assembled. A bushing 21 surrounding the stem 11 and located in the end wall 12 of the valve casing 7 is so arranged that motive fluid from the interior of the valve casing 7 is allowed to leak through the bushing into the cylinder 13 and below the piston 15. A pipe 22 entering the cylinder 13 at a point below the piston 15 connects the cylinder with the atmosphere and is provided with an automatically actuated valve 23, the operation of which will hereinafter be described. A rod 24 mounted on the piston 16 extends through an opening in the casing 14 forming a visible indicator of the position of the valve 10.

Assuming that the pipe 22 is closed to the atmosphere and that the interior of the valve casing 7 is subject to fluid pressure; it is

apparent that the pressure accumulated below the piston 15, due to the leakage of fluid through the bushing 21 will hold the valve open against the fluid pressure in the chamber 17, because of the difference of effective areas on the opposite sides of the piston 15. It will be seen, however, that when the pipe 22 is open to the atmosphere and the motive fluid in the cylinder 13, below the piston 15, is exhausted, the piston 15 will be forced down by the fluid pressure in the chamber 17 and the valve 10 will be closed.

The controlling device for operating the valve 10 comprises an inertia weight 25 pivotally mounted on a bolt 26, carried by a rotatable housing 27, which is mounted on a shaft 28 and is driven through a flexible coupling 29 by the turbine shaft 31. The shaft 28 is journaled in a bearing 32, which is formed integrally with the bearing housing 33 of the turbine shaft. The weight 25 is normally held by a helical spring 34 against a stop lug 35, formed integrally with the housing 27. One end of the spring 34 is mounted on a spring block 36, which is provided with a mounting and adjustable bolt 37, adapted to be secured to the housing 27. The other end of the spring is mounted on a support 38 with which the weight 25 is provided, and the arrangement is such that the pull of the spring is transmitted to the weight through a knife-edge 39 with which the mounting portion is provided. The weight is so located that its center of gravity is slightly eccentric to the axis of rotation of the housing and the arrangement is such that the centrifugal force occasioned by the rotation of the housing causes the weight to swing about a knife-edge 41 with which the bolt 26 is provided. The weight is provided with an outwardly extending tripping lug 42, the axis of which, for the normal position of the weight, coincides with the axis of rotation of the housing, but as the weight moves outward, due to the increasing centrifugal force, the lug will revolve about the axis of rotation in circles, which increase in diameter as the speed of the turbine increases, until at some excessive speed it contacts with a stop lug 43 with which the weight housing is provided.

A casing 44 mounted on the bearing housing 33 of the turbine shaft incloses the weight housing 27 and is adapted to be filled with oil or other lubricant, which may be conducted from the bearing housing or through suitable conduits leading from the turbine lubricating system. A valve 23 is mounted on the casing 44 and is provided with a port 45 which communicates with the pipe 22, and an exhaust port 46 which communicates with the atmosphere through a pipe 47. A valve-disk 48 is located within the valve casing and is adapted to close the port 45 to the atmosphere. The valve-disk 48 is provided with a valve stem 49, on which a disk 50 is mounted, which operates in a cylinder 51. A helical spring 52 mounted on the disk 50 is located within the cylinder 51 and is connected to a spring block 53, which is provided with a bolt 54 extending out of the cylinder through a suitable opening.

A lever 55 fulcrumed on a pin 56, which is suitably mounted on a lug 57, is provided with contact arms 58 and 59, and an outwardly extending arm 61. The arm 58 contacts with the bolt 54 and through the spring 52 controls the operation of the valve 23. The arm 59 contacts with, and is held in an operating position by, a finger 62 of an adjusting or locking device 63, which extends through the casing 44 and is suitably journaled on the lug 57.

A releasing pin 64 of the adjusting device 63 is located within the casing 44 and is arranged to contact with the lug 42 of the weight 25 for certain positions of the weight, and finally, for some predetermined and excessive speed of the turbine, the lug 42 is moved to such a position that it contacts with the releasing pin 64 and the finger 62 will release the lever 55.

When the arm 59 of the lever 55 is in operating position, in contact with the finger 62, the arm 58 will contact with the bolt 54 and hold the valve 23 closed against the pressure of the confined fluid in the cylinder 13 and thereby hold the valve 10 open. When the lever 55 is released through the agency of the lug 42 and the adjusting device, the accumulated pressure of the cylinder 13 moves the valve disk 48 to such a position that the pipe 22 is thrown into communication with the exhaust port 46, the valve 10 is then closed by the unbalanced fluid pressure in the chamber 17, and the motive fluid supply to the turbine is cut off.

The pipe 22 and the exhaust port 46 are relatively large in comparison with the leakage opening through the bushing 21, and therefore the flow of motive fluid through the chamber 13 will be unrestricted and the valve 10 will remain closed until the lever 55 and the tripping device 63 are readjusted.

A contact pin 65 is so located on the lug 57 that a delicate adjustment of the tripping and adjusting device is insured and the tension of the spring 52 may be adjusted by the bolt 54 to accord with the pressure in the cylinder 13.

The operation of the weight 25 may be controlled by adjusting the tension of the spring 34 through the bolt 37, and since all the moving parts operate on knife-edge connections variations of the temperature or of the conditions of the lubrication will not

materially affect the operation of the weight and consequently the ultimate speed of the turbine may be gaged with close precision.

The housing 27 is so located and arranged that it will not excessively agitate the oil or other lubricant contained in the casing 44, even while running at a high rate of speed. This characteristic is quite essential as undue heating of the lubricant proves very objectionable. The housing 27 is so arranged that, with the exception of the mounting bolts, no extending and retarding surfaces are presented to the oil in the casing 44 and the tripping lug 42 operates so near the axis of revolution that it does not add appreciable resistance to the rotation of the housing or agitate and heat up the lubricant an objectionable amount. The spring 34 is arranged to hold the weight 25 normally against the lug 35 and the knife-edge 41 and under such conditions the friction of rest will not be appreciably greater than the friction of motion.

It is obvious that many variations and changes in detail and construction of the device would readily suggest themselves to a person skilled in the art and still fall within the limits and scope of this invention.

The invention is not limited therefore to the exact details of construction and arrangement above set forth.

What I claim a new and useful and desire to secure by Letters Patent is:

1. In combination with a cut-off valve, a speed-responsive device, adapted to close said cut-off valve, comprising a rotatable casing, an inertia weight mounted in said casing, a spring resisting the action of said weight and knife-edge connection between said weight and said casing, and said weight and said spring.

2. In combination with a cut-off valve, a speed-responsive device adapted to close said valve, comprising a rotatable casing, an inertia weight mounted in said casing, a spring resisting the operation of said weight and a stationary casing inclosing said speed responsive device.

3. In combination with a cut-off valve, a speed-responsive device adapted to close said valve, comprising a rotatable casing, an inertia weight mounted in said casing, a spring resisting the action of said weight and means for immersing said speed-responsive device in a lubricant bath.

4. In combination with a cut-off valve, a rotatable casing, a speed-responsive device contained within said casing, means dependent on said speed-responsive device for closing said cut-off valve and means for immersing said casing and said speed-responsive device within a lubricant bath.

5. In combination with a cut-off valve, an auxiliary valve adapted to control the operation of said cut-off valve, a speed-responsive device adapted to control said auxiliary valve, comprising a rotatable casing, an inertia weight mounted on a knife-edge provided in said casing, a spring resisting the operation of said weight mounted between said casing and a knife-edge on said weight.

6. In combination with a cut-off valve, an auxiliary valve adapted to control the operation of said cut-off valve, a locking device for said auxiliary valve, comprising a lever adapted to close said valve, a finger adapted to hold said lever in the closing position, a tripping device inclosed within a casing on which said auxiliary valve and said locking device are mounted, a releasing pin within said casing connected with said finger and adapted to be moved by said tripping device to thereby release said lever, open said auxiliary valve and close said cut-off valve.

7. In combination with a cut-off valve, an auxiliary valve adapted to control the operation of said cut-off valve, a locking device for said auxiliary valve, comprising a lever adapted to close said valve, a finger adapted to hold said valve in the closing position, a tripping device comprising a speed-responsive agent inclosed within a casing upon which said auxiliary valve and said locking device are mounted, a releasing pin within said casing and connected with said finger adapted to contact with said tripping device and release said lever, open said valve and thereby close said cut-off valve.

8. In combination with a cut-off valve, an automatically-actuated controlling valve communicating with said cut-off valve, a lever controlling the operation of said controlling valve, a finger contacting with said lever, a tripping device mounted within a rotatable casing comprising a pivotally mounted inertia weight provided with an extending lug adapted to contact with a pin connected with said finger and means for immersing said tripping device in a lubricant bath.

9. In combination with a fluid-actuated cut-off valve, an automatically-actuated controlling valve communicating with said cut-off valve, a lever adapted to close said controlling valve, a finger contacting with and adapted to hold said lever in the closing position, a tripping device, comprising an inertia weight mounted in a rotatable casing and provided with an axially extending contact lug inclosed within a stationary casing exterior to which and on which said controlling valve, said lever and said finger are mounted, a releasing pin within said casing and connected with said finger adapted to be moved by said contact lug and thereby release said lever, open said auxiliary valve

and close said cut-off valve and means for immersing said tripping device in a lubricant bath.

10. In combination with a cut-off valve, a speed responsive device adapted to control the operation of said valve, said speed responsive device comprising a rotatable member and an inertia weight mounted eccentrically on said member and adapted to move across said member under the influence of centrifugal force.

11. In combination with a cut-off valve having an open position and a closed position but no intermediate position, a speed responsive device adapted to control the operation of said valve, comprising a rotatable casing, an inertia weight mounted within said casing and a spring resisting the eccentric motion of said weight, incident to the centrifugal force developed by the rotation of said casing.

12. In combination with a cut-off valve, a speed responsive device adapted to control the operation of said valve, comprising a rotatable casing, an inertia weight mounted within said casing, a spring resisting the action of said weight and means for introducing lubricant into said casing.

13. In combination with a cut-off valve, a rotatable casing, a speed responsive device contained within said casing, means dependent on said device for closing said cut-off valve and means for introducing lubricant into said rotatable casing.

14. In combination with a cut-off valve, an auxiliary valve adapted to control the operation of said cut-off valve, a speed responsive device adapted to control said auxiliary valve, comprising a rotatable casing, an inertia weight mounted within said casing, a lug carried by said weight and adapted to move eccentrically of the axis of rotation of said weight to operate said auxiliary valve.

15. In combination with a cut-off valve, a speed responsive device adapted to control said valve, comprising a rotatable casing, an inertia weight within said casing, a lug carried by said weight and adapted to move eccentrically of the axis of rotation of said weight to close said valve.

16. In combination with a cut-off valve, a controlling valve communicating therewith, a lever controlling the operation of said controlling valve, a finger contacting with said lever, and a tripping device mounted within a rotatable casing and comprising a pivotally mounted inertia weight provided with an extending lug adapted to contact with a pin connected with said finger to open said controlling valve.

17. In combination with a cut-off valve, a controlling valve operating in conjunction therewith, a lever controlling the operation of said controller valve, a finger contacting with said lever, and a tripping device mounted in a rotatable casing and comprising a pivotally mounted inertia weight provided with an extending lug which moves eccentrically of the axis of rotation of said casing to contact with said finger and operate said controlling valve.

18. In combination with a cut-off valve, a speed-responsive device, adapted to close said cut-off valve, comprising a rotatable casing, an inertia weight mounted in said casing and a spring resisting the action of said weight and knife-edge connection between said weight and said casing.

19. In combination with a cut-off valve having an open position and a closed position but no intermediate position, a speed responsive device adapted to control the operation of said valve comprising a rotatable member, a weight pivotally mounted on said member and adapted to move across said member under the influence of centrifugal force and a spring between said member and said weight adapted to resist the motion of said weight.

20. In combination with a cut-off valve, an auxiliary valve adapted to control the operation of the cut-off valve, a speed responsive device adapted to control said auxiliary valve, comprising a rotatable member and an inertia weight mounted on said member, a lug carried by said weight and adapted to move eccentrically of the axis of rotation of said weight to operate said auxiliary valve.

21. In combination with a cut-off valve, a speed responsive device adapted to control said valve comprising a rotatable member, an inertia weight mounted on said member and provided with a lug adapted to move eccentrically of the axis of rotation of said member to close said valve.

In testimony whereof, I have hereunto subscribed my name this 11th day of January, 1906.

JOS. BRESLOVE.

Witnesses:
CHARLES W. McGHEE,
JNO. S. GREEN.