J. P. NIKONOW.

GOVERNOR.

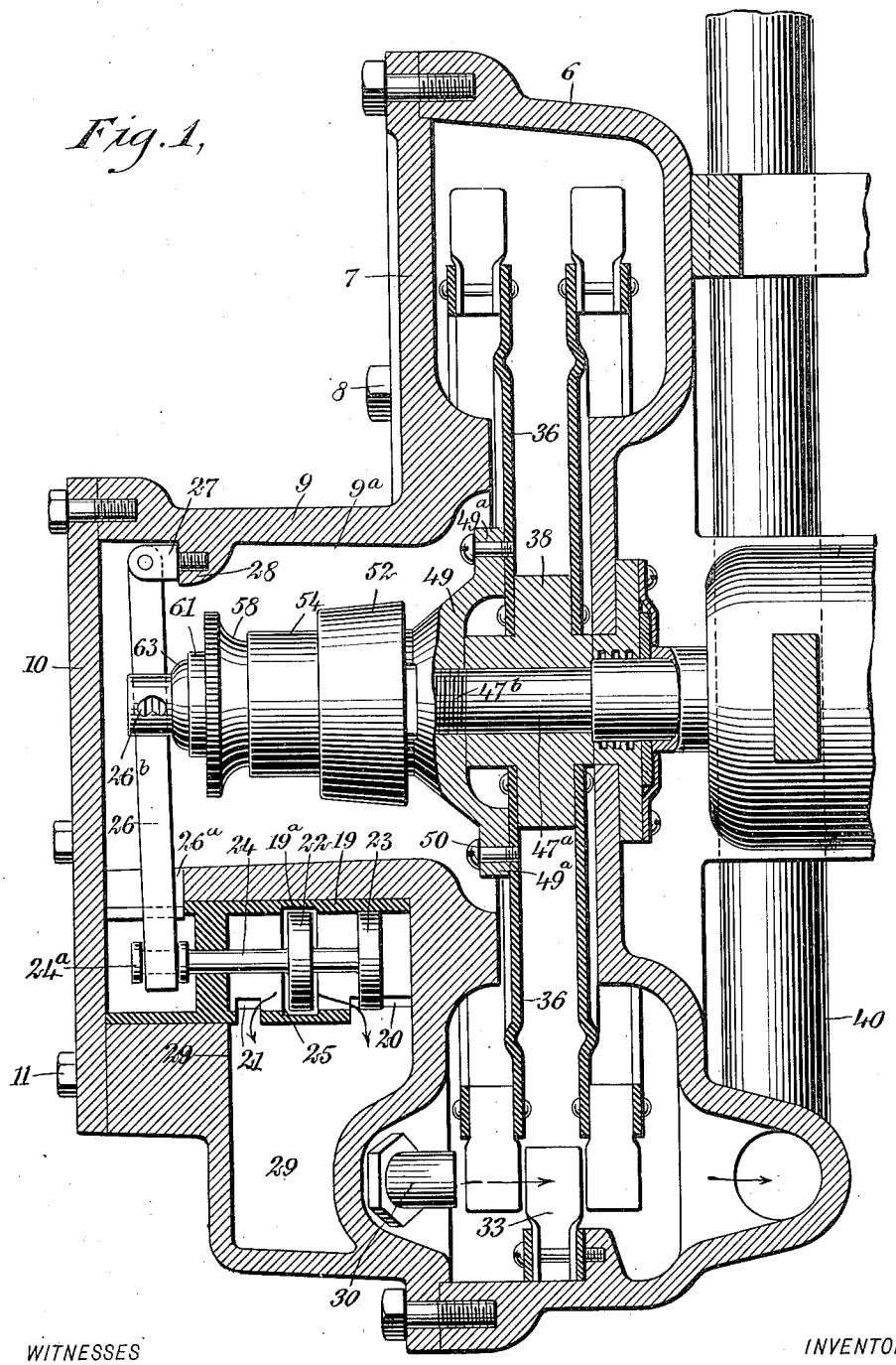
APPLICATION FILED DEC. 29, 1908.

948,791

Patented Feb. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.




WITNESSES

Edward Thorpe.

W. Harrison

INVENTOR

John P. Nikonow

BY Munn & Co.

ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 3.

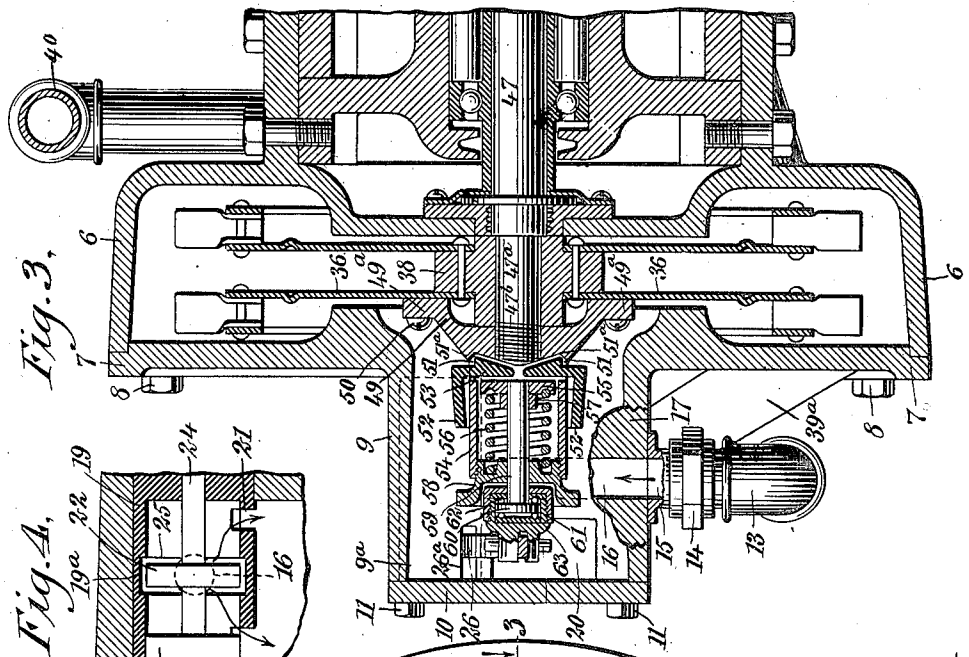
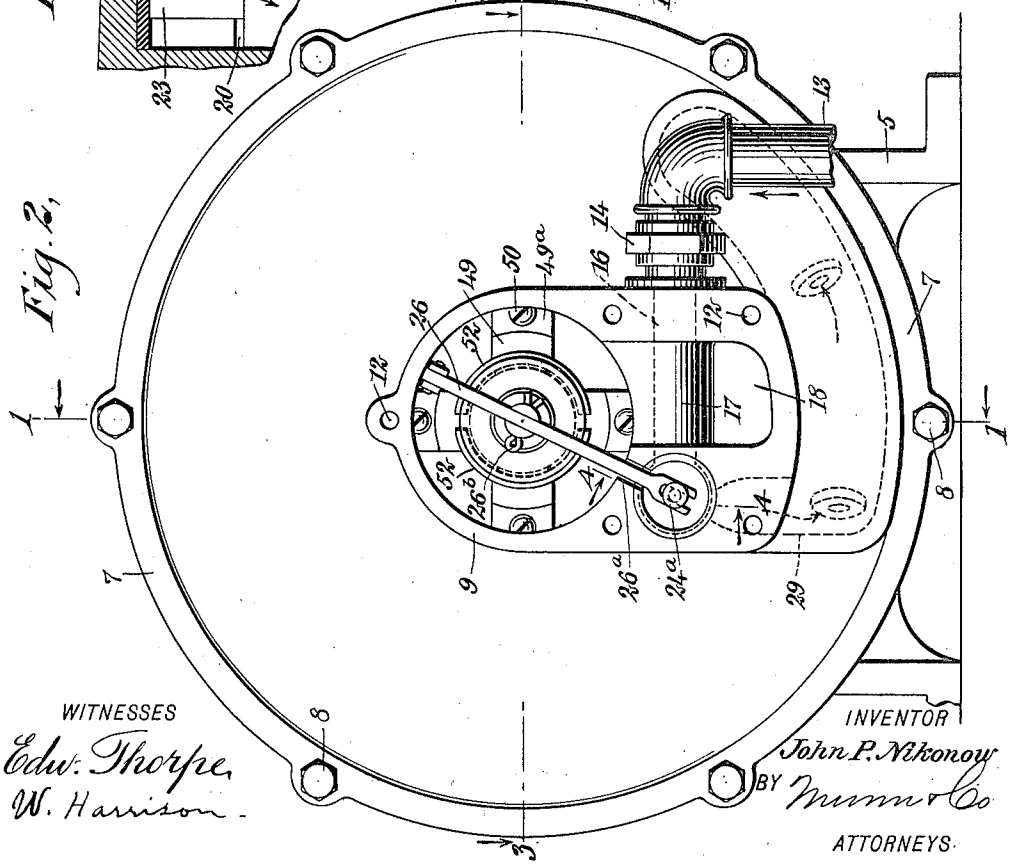


Fig. 4.



Fig. 2.



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# UNITED STATES PATENT OFFICE.

JOHN P. NIKONOW, OF EVANSVILLE, INDIANA, ASSIGNOR TO SCHROEDER HEADLIGHT COMPANY, OF EVANSVILLE, INDIANA, A CORPORATION.

## GOVERNOR.

948,791. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed December 29, 1908. Serial No. 469,867.

*To all whom it may concern:*

Be it known that I, JOHN P. NIKONOW, a subject of the Czar of Russia, and a resident of Evansville, in the county of Vanderburg and State of Indiana, have invented a new and Improved Governor, of which the following is a full, clear, and exact description.

My invention relates to governors, my more particular purpose being to provide an improved type of governor suitable for use upon turbines, acting by internal combustion or employing steam, air or vapor for their propulsion.

More particularly stated, my invention relates to improving the valve mechanism forming a part of the turbine and also improving the form of the weights operated by centrifugal force, and also improving the form of parts associated with these weights and with the valve controllable by the governor.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical cross section upon the line 1—1 of Fig. 2, looking in the direction of the arrows and showing the turbine as arranged for operating an electric generator, this view further showing the governor connected with the turbine and with valves for controlling the flow of the elastic fluid used for driving the turbine; Fig. 2 is a reduced end elevation showing the turbine and its associated parts viewed as from a point at the left of Fig. 1, the head of the casing containing the governor, being removed; Fig. 3 is a horizontal section upon the line 3—3 of Fig. 2, looking in the direction of the arrows and showing more particularly the details of the governor; and Fig. 4 is a fragmentary section on the line 4—4 of Fig. 2, looking in the direction of the arrows, through the valve which is controlled by the centrifugal action of the governor.

Mounted upon feet 5 is a casing 6 closed by a head 7, held thereupon by aid of bolts 8. Integral with the head 7 and extending laterally therefrom is a portion 9, containing a substantially cylindrical compartment $9^a$, closed by a head 10. This head has generally the form of a plate and is held upon the portion 9 by aid of bolts 11 which extend into holes 12 as will be understood from Figs. 2 and 3.

The inlet pipe for the elastic fluid is shown at 13 and is provided with a coupling 14. The passage in the pipe 13 may be seen at 15 and registers with a bore or passage 16, extending through a web 17, the latter having some semblance to a cylindrical form, as will be understood from Fig. 2, being located within an opening 18 formed for the sake of lightness. The passage 16 communicates with a valve cylinder 19 which is provided with an enlarged portion $19^a$, and is further provided with ports 20, 21. Two pistons 22, 23 are mounted rigidly upon a piston rod 24 and spaced apart, as indicated in Fig. 4. Adjacent to the piston 22 the enlarged portion $19^a$ is provided with a wall 25 so that when the piston 22 occupies a central position relatively to the enlarged portion $19^a$ the elastic fluid can readily find its way from the passage 16 through the ports 20, 21, as indicated in Figs. 1 and 4, and yet when the piston 22 is moved into contact with the wall 25 so as to fit neatly within the cylinder 19, the flow of the elastic medium is affected accordingly.

The piston rod 24 is provided with a head $24^a$ which is engaged by the lower end of a lever 26. This lever is journaled upon a bearing bracket 27, the latter being secured upon a lug 28 supported by the framework. The lever 26 extends through a slot $26^a$ and is adapted to work therein. Below the cylinder 19 is a compartment 29 for receiving the elastic fluid as the latter passes through the ports 20, 21. A nozzle 30 is screwed directly into the frame and communicates with the compartment 29.

A hub 38 supports a disk 36 and extends through this disk, as indicated in Fig. 1. The revoluble shaft 47, carrying the hub 38, is provided with a reduced portion $47^a$, the latter having a thread $47^b$. A spider 49 is provided with feet $49^a$ which are secured to the disk 36 by aid of screws 50. The spider 49 engages the hub 38 directly. This spider is provided with slots 51 so shaped as to form notches $51^a$. The spider 49 is screwed upon the threaded end $47^b$ and is thus held in position, partly by its connection with the reduced portion $47^a$, partly by the screws 50, and partly by its direct engage-

ment with the hub. The centrifugal weights are shown at 52 and have each a general semicylindrical form. Each weight is provided with a shouldered supporting arm 53, there being two of these arms, one for each weight, and they extend into the slots 51. The shouldered arms 53 extend into the notches 51[a] and are thus secured in position while having a certain freedom of movement due to centrifugal force.

Extending from the base 49 and integral therewith is a cylinder 54, which is partially encircled by the semicylindrical weights. As the slots 51 are located at the dividing line between the spider 49 and the cylinder 54, the slots may be considered as in the cylinder 54 as well as in the spider. A head 55 having substantially the form of a disk is mounted loosely within the cylinder 54 and in close proximity to the shouldered arms 53. A coiled spring 56 engages the head 55 and also engages a cap 58. Extending through this cap and journaled therein is a revoluble stub shaft 59. Mounted upon this stub shaft is a nut 57 which engages the head 55. The stub shaft 59 terminates in a disk 60 which is disposed within a cup 61 containing a ball bearing 62, the latter having two sets of balls, mounted one set upon each side of the disk 60.

A cover 63 is provided for the cup 61 containing the ball bearing. The cover 63 is pivotally connected to the lever 26 by aid of a cotter pin 26[b]. As the stub shaft 59 rotates, carrying with it the disk 60, this disk turns within the cup 61, presenting comparatively little friction, owing to the action of the ball bearing contained within the cup.

The operation of my device is as follows: An elastic fluid, such as steam, being admitted into the pipe 13, travels through the passage 16 into the cylinder 19 and then, under ordinary conditions, passes downwardly through both ports 20, 21, as indicated in Fig. 4. The spiral spring 56 being kept always partially under tension by the head 55, is not free to yield except when an opposing pressure, greater than its own, is applied to the head 55 in a direction opposite to that in which the spring 56 is pressing. As the centrifugal weights 52 fly outwardly, the arms 53 engage the head 55, and when the speed of rotation exceeds a predetermined limit, the pressure of the arms 53 against the head 55 becomes sufficient to move this head slightly to the left according to Fig. 3. This actuates the lever 26 and thereby shifts the position of the piston rod 24, causing the pistons 22, 23 to control the flow of the elastic fluid downwardly through the ports 20, 21. The pressure upon the piston 23 is nearly balanced but is slightly unbalanced because of the difference in area of the two faces of this piston, owing to the fact that the piston rod itself has some little area in cross section. The action of the centrifugal weights is sufficient to control the position of the stub shaft 59 independently of the slight want of balance of the piston 23. If, however, the lever 26 should break or become disconnected, there is no danger of the turbine running away, for the reason that the unbalanced pressure upon the piston 23 drives the latter to the right, according to Fig. 4 (that is, to the left according to Fig. 1) so as to stop the flow of the elastic medium through both ports 20, 21 and thus bring the machine to a standstill.

The double race ball bearing employed in connection with the disk 60 is of great advantage, in that it enables the speed of the turbine to be increased to a high rate without in any way adversely affecting the action of the governor.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a governor, the combination of a shaft, a hub mounted thereupon, a disk secured to said hub and revoluble therewith, a spider engaging said hub and provided with feet secured to said disk, said spider engaging said hub directly and being provided with a cylindrical portion, centrifugally operated mechanism connected with said cylindrical portion, a lever engaging said centrifugally operated mechanism and actuated thereby, and a valve connected with said lever and controllable by motions of the same.

2. The combination of a disk, a hub provided with a portion extending through said disk, a spider engaging said portion of said hub and provided with feet engaging said disk, fastening members for securing said feet rigidly upon said disk, and governor mechanism connected with said spider and actuated by movements thereof.

3. In a governor, the combination of a hub provided with a reduced portion, a disk through which said reduced portion extends, a spider engaging said reduced portion directly, said spider being provided with portions secured upon said disk, a revoluble shaft engaging said hub and also engaging said spider, and governor mechanism mounted upon said spider and controllable by movements thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN P. NIKONOW.

Witnesses:
LAURA M. GABERT,
DANIEL M. FAIRCHILD.