No. 822,248. PATENTED JUNE 5, 1906.

J. G. CALLAN.

STOP MECHANISM FOR ELASTIC FLUID TURBINES.

APPLICATION FILED NOV. 30, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

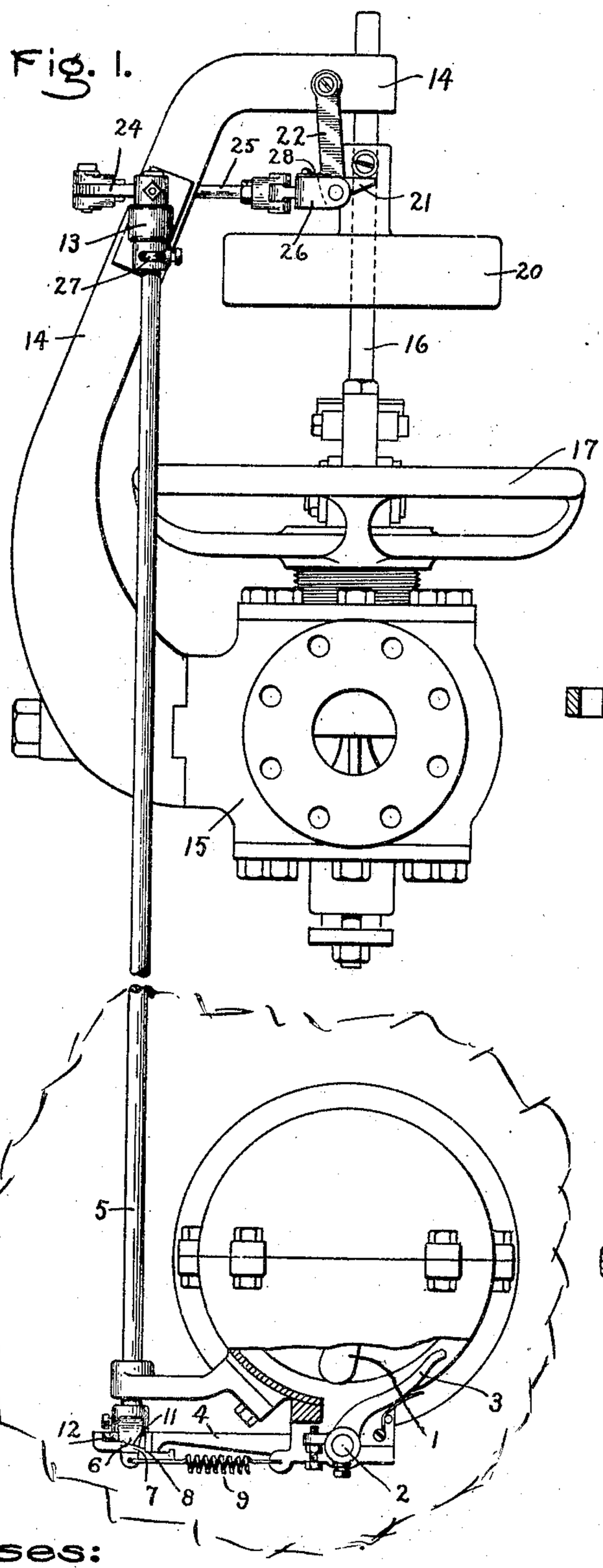


Fig. 4.

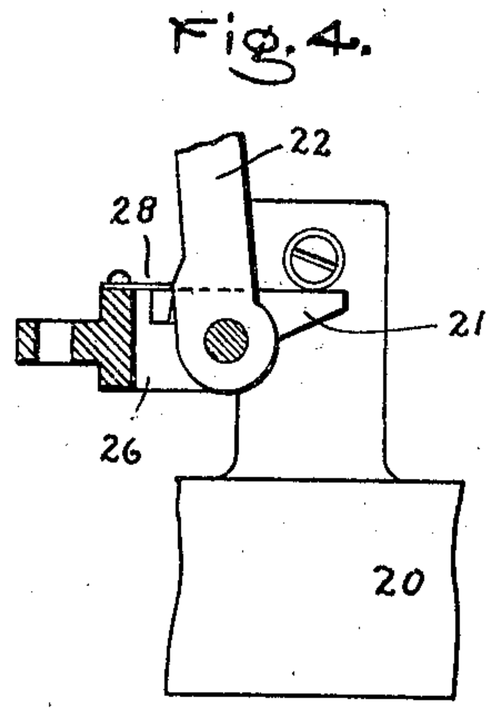


Fig. 5.

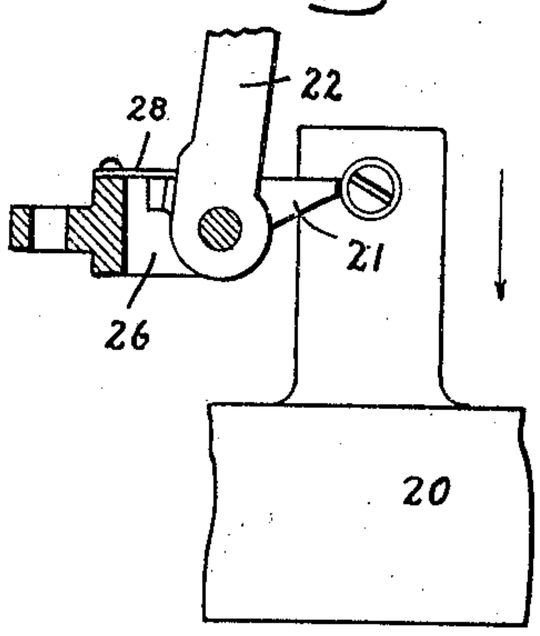
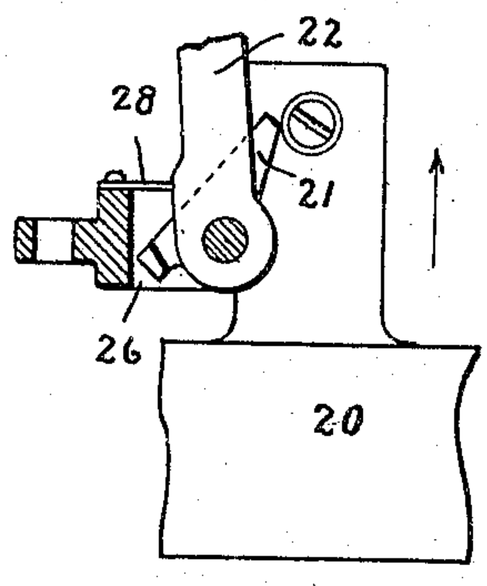


Fig. 6.



Witnesses:
Stella Clifford
Alex. F. Macdonald.

Inventor,
John G. Callan
By Albert G. Davis
Att'y.

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3 SHEETS—SHEET 2.

Fig. 2.

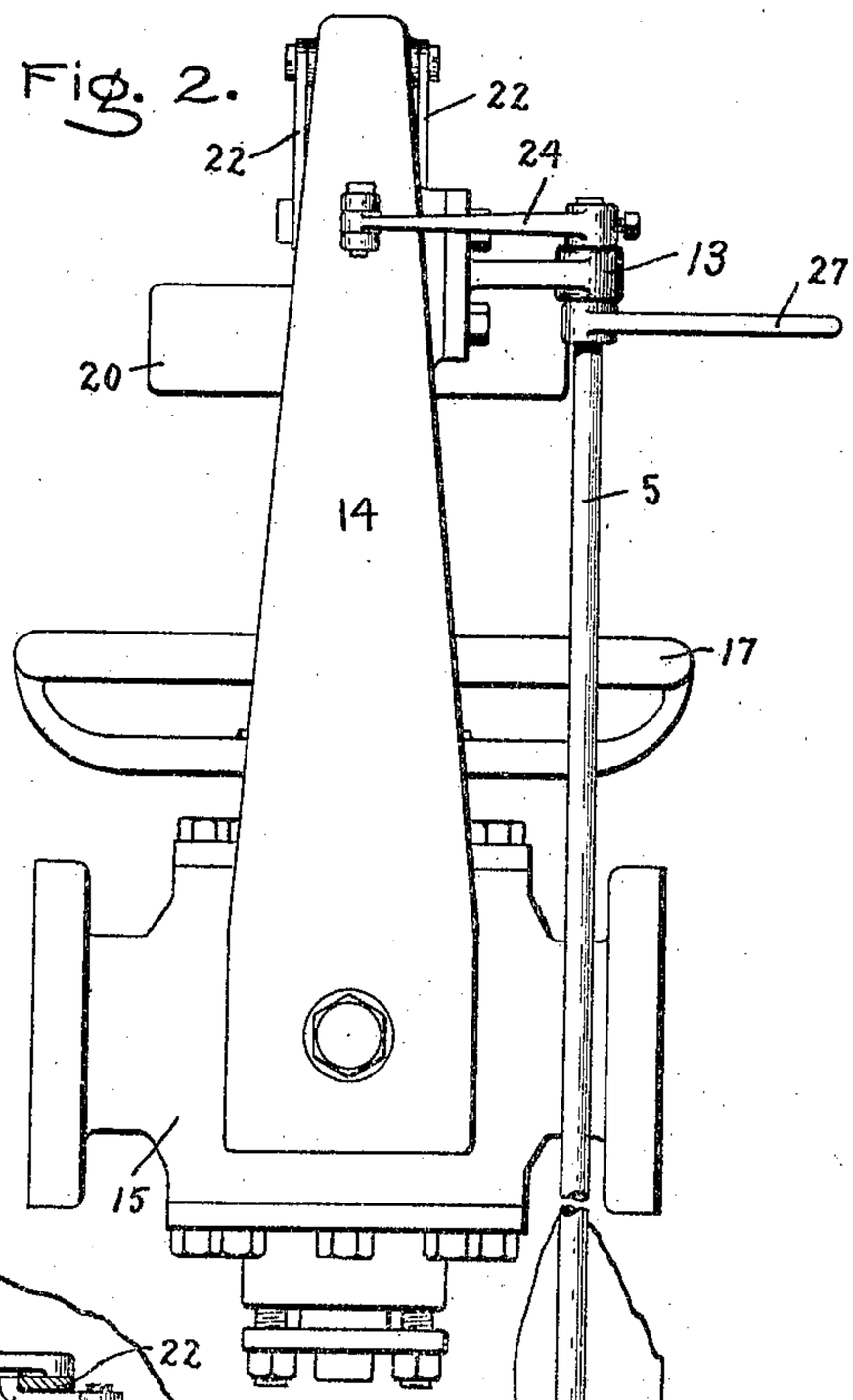
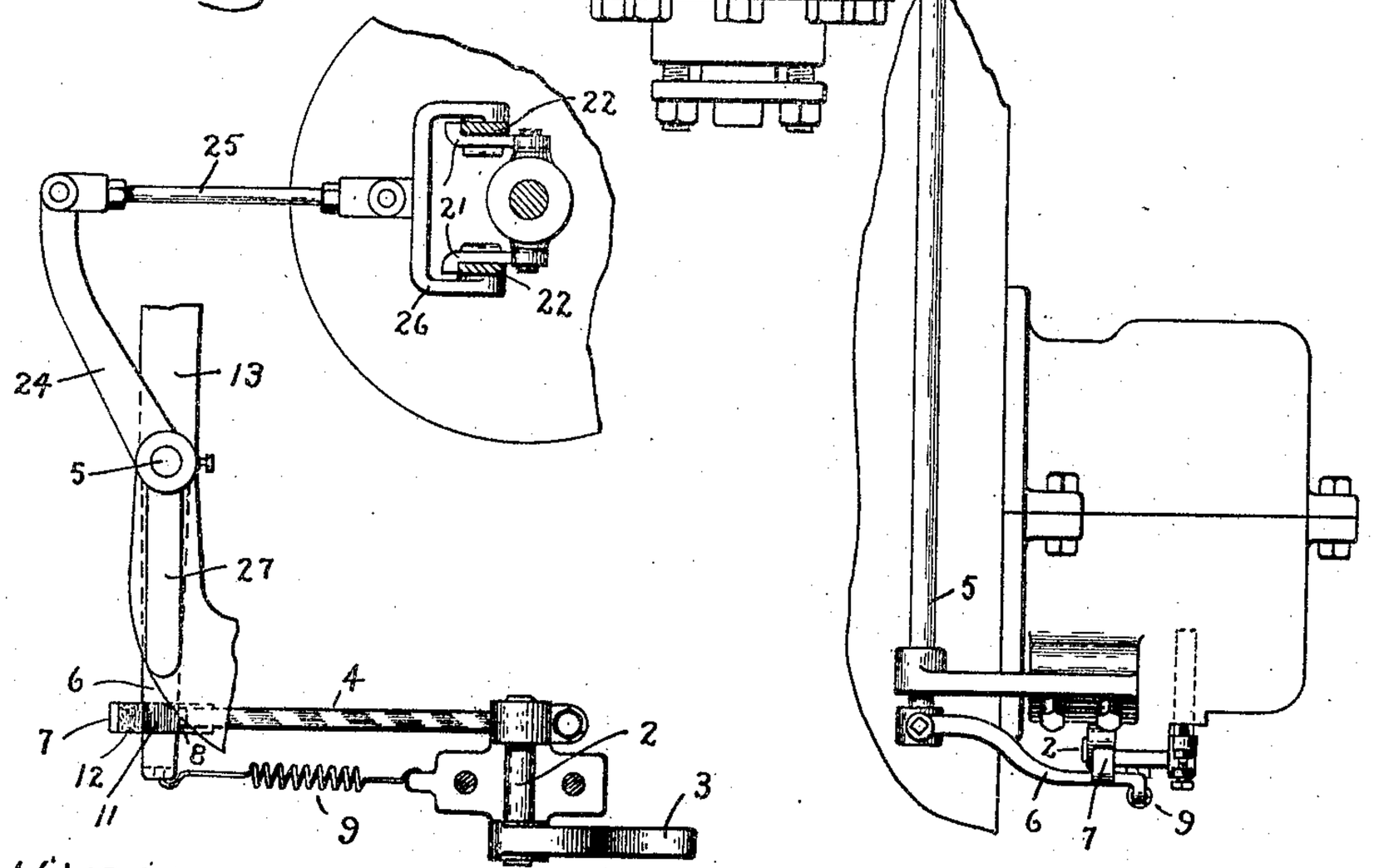


Fig. 3.



Witnesses:
Helen Orford
Alex. F. Macdonald.

Inventor,
John G. Callan,
By Allen Bolton
Att'y.

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3 SHEETS—SHEET 3.

Fig. 7.

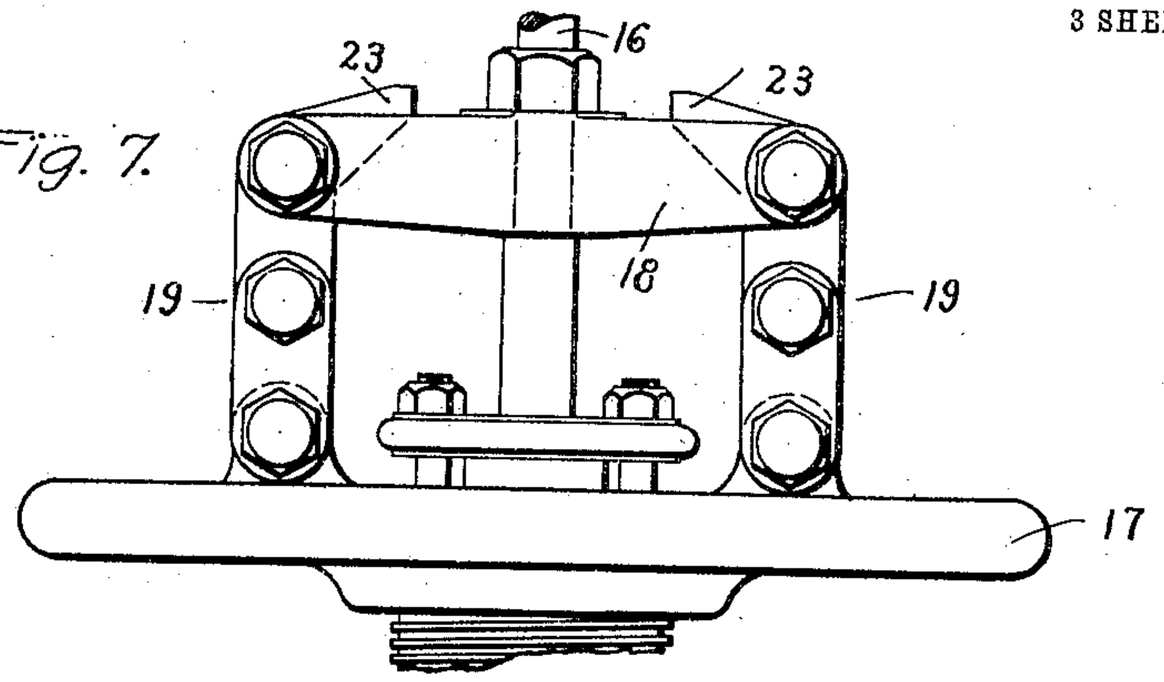


Fig. 8.

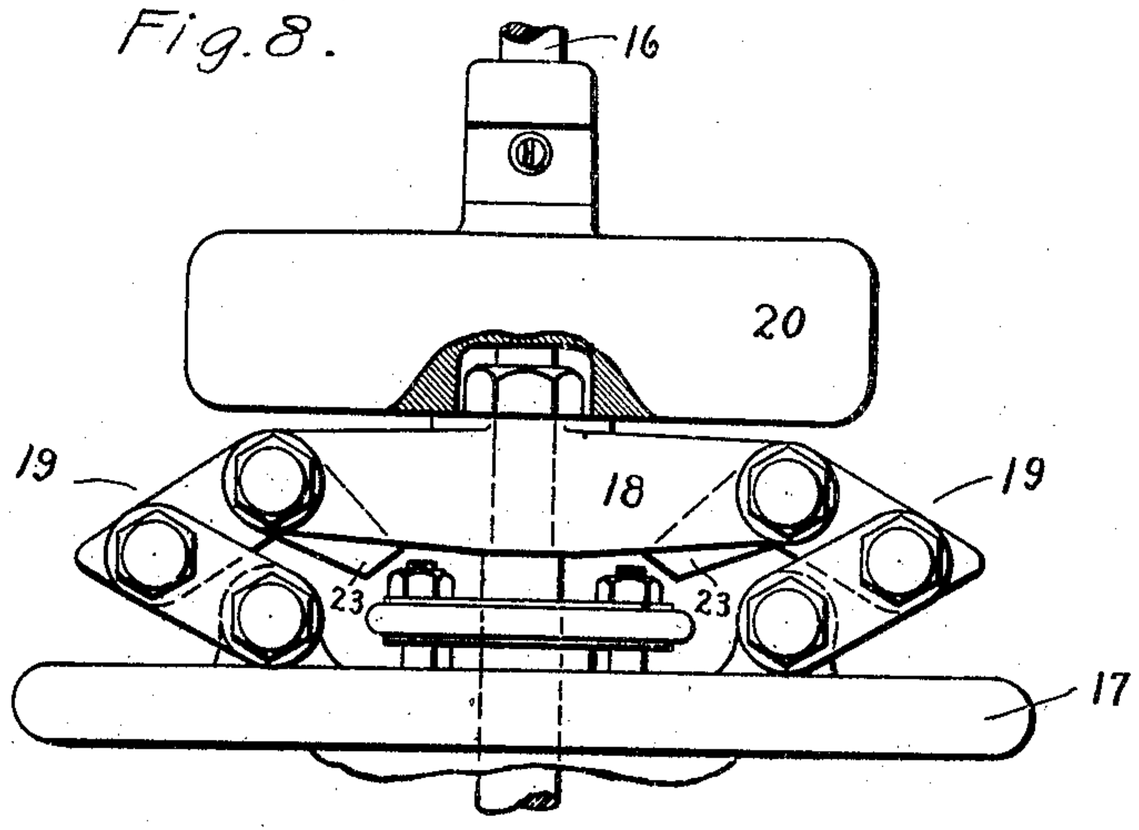
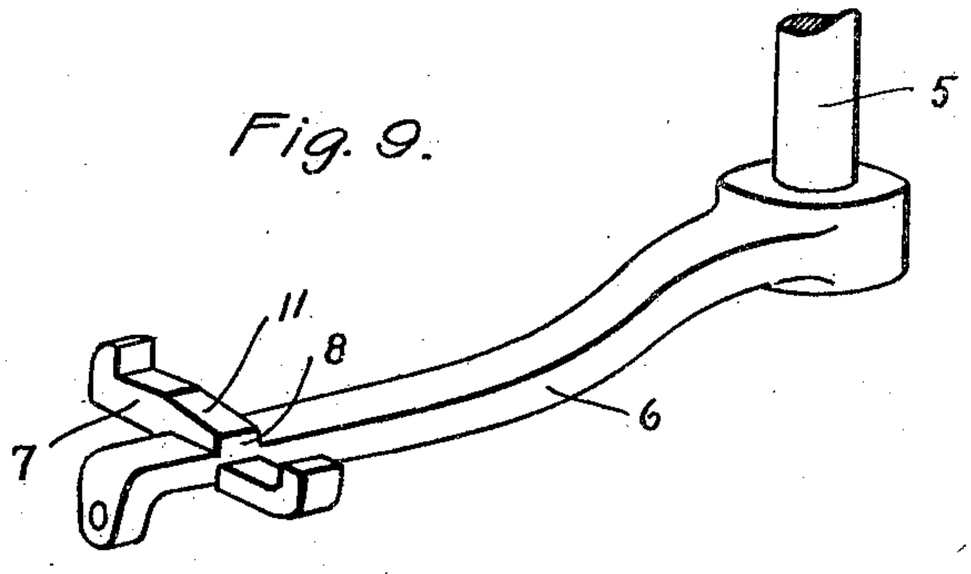


Fig. 9.



Witnesses:
Harold J. Rocke.
Helen Orford

Inventor:
John G. Callan.
by Allen & Davis
Atty.

UNITED STATES PATENT OFFICE.

JOHN G. CALLAN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

STOP MECHANISM FOR ELASTIC-FLUID TURBINES.

No. 822,248. Specification of Letters Patent. Patented June 5, 1906.

Application filed November 30, 1904. Serial No. 234,843.

To all whom it may concern:

Be it known that I, JOHN G. CALLAN, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Stop Mechanisms for Elastic-Fluid Turbines, of which the following is a specification.

My invention relates to stop mechanisms for elastic-fluid turbines, which operate under abnormal or emergency conditions.

The object of my invention is to improve the construction of emergency governing devices or "stop mechanisms," as they are commonly called, whereby their action is rendered more certain and reliable, and this with an apparatus which is of simple construction.

The nature and scope of my invention will be more fully set forth in the specification and appended claims.

In the accompanying drawings, which illustrate one embodiment of my invention, Figure 1 is a partial view, in front elevation, of a turbine and an emergency device for operating the throttle or shut-off valve. Fig. 2 is a side elevation of the same, also showing the cover for the end of the shaft. Fig. 3 is a detail plan view, partly in section, showing the lever and rod for withdrawing the dogs from the suspended weight to permit the latter to close the valve. Fig. 4 is a partial front elevation of the suspended weight and the pivoted dogs which normally hold it in place. Figs. 5 and 6 are similar views showing various positions of the dogs and weight. Fig. 7 is a side elevation of the toggle mechanism for actuating the valve. Fig. 8 is a detail view showing the toggles collapsed, and Fig. 9 is a perspective view of the lever acted upon by the trigger.

The shaft of the turbine is provided with a centrifugally-acting governor-weight 1, which moves outward when the speed of the turbine exceeds a predetermined point. Situated in the path of the weight and mounted on a shaft 2 is a lever 3. The opposite end of the shaft is provided with an arm 4, that normally holds the parts from operating. The lever and arm constitute a trigger for controlling the action of the rock-shaft 5. The arm 3 of the trigger is normally pressed toward the axis of the turbine-shaft by a small flat spring. It is also provided with an adjusting-screw to limit the angular movement of its supporting-shaft. Mounted on the lower end of the vertically-extending rock-shaft is an arm 6, extending toward the observer in Fig. 1. Near the free end of this arm is a cross-piece 7, (see particularly Figs. 3 and 9,) provided with a shoulder 8, which normally engages the end of the trigger. Connected to the free end of the arm 6 and to a fixed support is a motor 9—in this case a spring, which normally tends to rock the shaft 5 from left to right. This tendency is opposed by the trigger. When the weight 1 strikes the trigger a sufficient blow to disengage the opposite end thereof from the shoulder 8 on the cross-piece 7, the spring 9 rocks the shaft 5, and the end of the trigger rides up the incline 11 on the cross-piece until it engages the shoulder 12, also formed on the cross-piece. I may with advantage use a piece of leather, as shown, to prevent injury to the trigger and shoulder. As the end of the trigger rides up the incline it swings the arm 3 out of the path of the weight, so that the latter will not deliver successive blows thereto. It also acts as a stop to limit the angular movement of the rock-shaft.

The upper end of the rock-shaft is provided with a bearing 13, carried by a frame 14 on the valve-casing 15. Located in the casing is a valve of suitable construction designed to cut off the supply of steam or other motive fluid to the turbine. The valve is provided with a stem 16, the upper end of which is guided by the frame 14. The portion of the valve-casing surrounding the valve-stem is screw-threaded to receive the hand-wheel 17, by means of which the valve can be manually operated. Rigidly mounted on the valve-stem is a yoke 18, Fig. 7, and between the ends of the yoke and the hand-wheel are toggles 19, normally standing in a vertical position. Situated above the toggle and surrounding the valve-stem is a weight 20, which is normally held in suspense by dogs or latches 21, located on opposite sides of the stem and carried by links 22. When the latches or supports are withdrawn from the weight, the latter falls and striking the arms or members 23 of the toggle, Fig. 8, causes the same to collapse, at the same time closing the main or shut-off valve. To the upper end of the rock-shaft is attached an arm 24, the latter being connected by a rod 25, which

passes through the frame, with a bridle or U-shaped piece 26. The bridle carries the latches 21 and is itself supported by the links 22, which permit it to have a limited to-and-fro movement.

The action of the mechanism is as follows: Assuming that the speed of the turbine or driven shaft increases above the prescribed limit, the weight 1 will strike the arm 3 a blow and cause it to turn the shaft 2 in its bearing. The arm 4 of the trigger being attached to the shaft will also be moved, disengaging the free end thereof from the shoulder 8, and the spring 9 rocks the shaft 5 from left to right, and in so doing the free end of the trigger is caused to ride up the incline 11 until it engages the leather-covered stop or shoulder 12. This movement of the trigger positively moves the arm 3 out of the way of the centrifugally-acting weight on the shaft. The rocking of the shaft 5, due to the action of the spring, moves the arm 24 to the left, (the arm extending to the rear of the shaft,) which also moves the bridle and dogs to the left, and thus withdraws the support from the weight. The weight in falling causes the members of the toggle to collapse and the valve to close. The blow delivered by the weight overcomes any tendency of the parts to stick.

To set the parts, a handle 27 is mounted on the rock-shaft 5. By rotating the shaft against the spring the cross-piece 7 moves to the left and permits the end of the trigger to drop into its normal position, as shown in Fig. 1.

The weight is reset by hand. The dogs or latches 21 are pivoted, and as the weight is moved upward they move around their pivots, as shown in Fig. 6. As soon as the weight is raised sufficiently to clear the ends thereof they fall back into operative position. In this connection it should be noted that the ends of the dogs adjacent to the weight are heavier than the opposite ends. The short ends of the dogs are limited in their movements by the stops 28, carried by the bridle. By reason of this construction it is possible to first set the trigger, &c., and then the weight, which is much easier than to set both at once.

The next step is to open the valve. This is done by rotating the hand-wheel in a direction to straighten the members of the toggles, and as soon as this is done the hand-wheel is rotated in the opposite direction and the valve is opened through the toggles, yoke, and valve-stem.

When it is desired to close the valve—as, for example, in shutting down the turbine—the handle 27 is moved to the right, Fig. 1, which rocks the shaft 5 and withdraws the latches from the weight and permits the latter to fall. At the same time the trigger must be moved to disengage the shoulder 8.

It will be seen that the emergency-valve and the main throttle-valve are one and the same. This is desirable, since it insures the operation of the emergency mechanism each time the turbine is shut down, thus reducing to a minimum the liability of the mechanism failing to operate automatically when needed.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now believe to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a mechanism of the character described, the combination of a valve, a means for closing the valve, a shaft for controlling the means, a trigger, and a speed-responsive device which controls the shaft through the trigger.

2. In a mechanism of the character described, the combination of a valve, a weight for moving the valve, a rock-shaft which controls the action of the weight, and a speed-responsive device which controls the rock-shaft.

3. In a mechanism of the character described, the combination of a valve, a weight for closing the valve, a dog for sustaining the weight, a rock-shaft for withdrawing the dog and permitting the weight to drop, and a speed-responsive device which controls the action of the rock-shaft.

4. In a mechanism of the character described, the combination of a valve, a means for closing the valve, a shaft controlling the action of said means, a motor normally tending to move the shaft, a means opposing this tendency, and a device responsive to abnormal conditions for withdrawing the second-mentioned means and permitting the motor to operate.

5. In a mechanism of the character described, the combination of a valve, a suspended weight for closing it, a rock-shaft for tripping the weight, a motor normally tending to move the shaft, a weight responsive to speed changes, and a trigger moved by the second-mentioned weight for starting the motor into operation.

6. In a mechanism of the character described, the combination of a valve, a governor responsive to speed changes, means acted upon by the governor and controlling the valve, and a device for preventing the governor from delivering successive blows to said means.

7. In a mechanism of the character described, the combination of a valve, a means for moving the valve, a weight responsive to speed changes, a trigger acted upon by the weight under abnormal conditions to cause

the valve to move, and a means for holding the trigger out of the path of the weight after it has been struck.

8. In a mechanism of the character described, the combination of a weight which is normally suspended, a rock-shaft for withdrawing the suspension, a speed-responsive device, a trigger actuated by said device and normally holding the shaft in a given position, and a spring for rocking the shaft when it is released by the trigger.

9. In a mechanism of the character described, the combination of a valve, a weight for moving it, a speed-responsive device for tripping the weight, a trigger interposed between the weight and device, a spring tending to move the trigger toward said device, and a stop for limiting the movement of the trigger.

10. In a mechanism of the character described, the combination of a valve, a weight loosely mounted on the valve-spindle, a means for suspending the weight, a pivoted dog included in said means, and a speed-responsive device for tripping the weight.

11. In a mechanism of the character described, the combination of a valve, a weight for closing it, a speed-responsive device, a trigger controlling the action of the weight, and means for permitting the weight and trigger to be reset by separate operations.

In witness whereof I have hereunto set my hand this 26th day of November, 1904.

JOHN G. CALLAN.

Witnesses:
JOHN A. McMANUS, Jr.,
DUGALD McK. McKILLOP.