

O. JUNGREN.
GOVERNING MECHANISM FOR MIXED PRESSURE TURBINES.
APPLICATION FILED SEPT. 5, 1912.

1,060,001.

Patented Apr. 29, 1913.

2 SHEETS-SHEET 1.

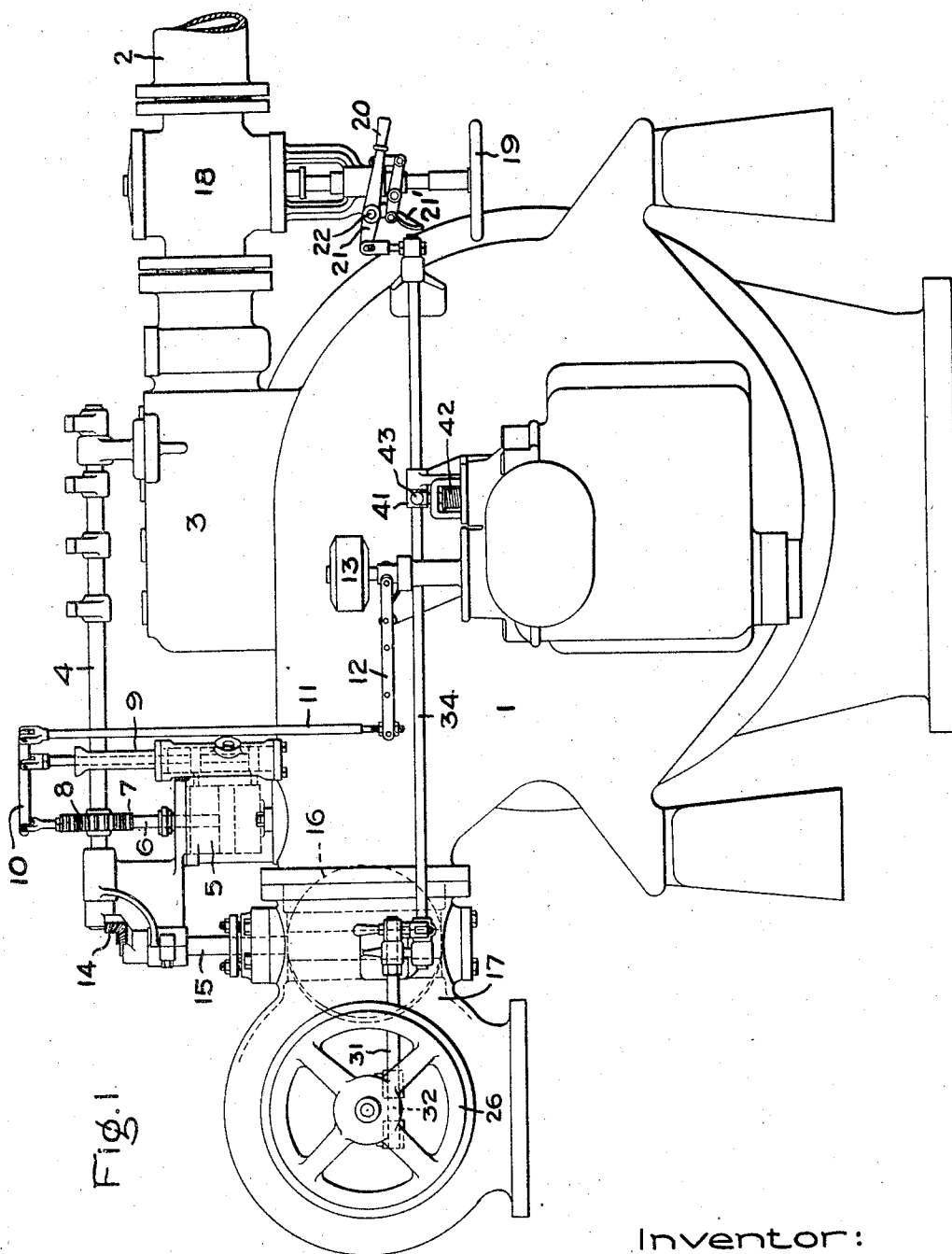


Fig. 1

Witnesses:

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J. Ellis Elm

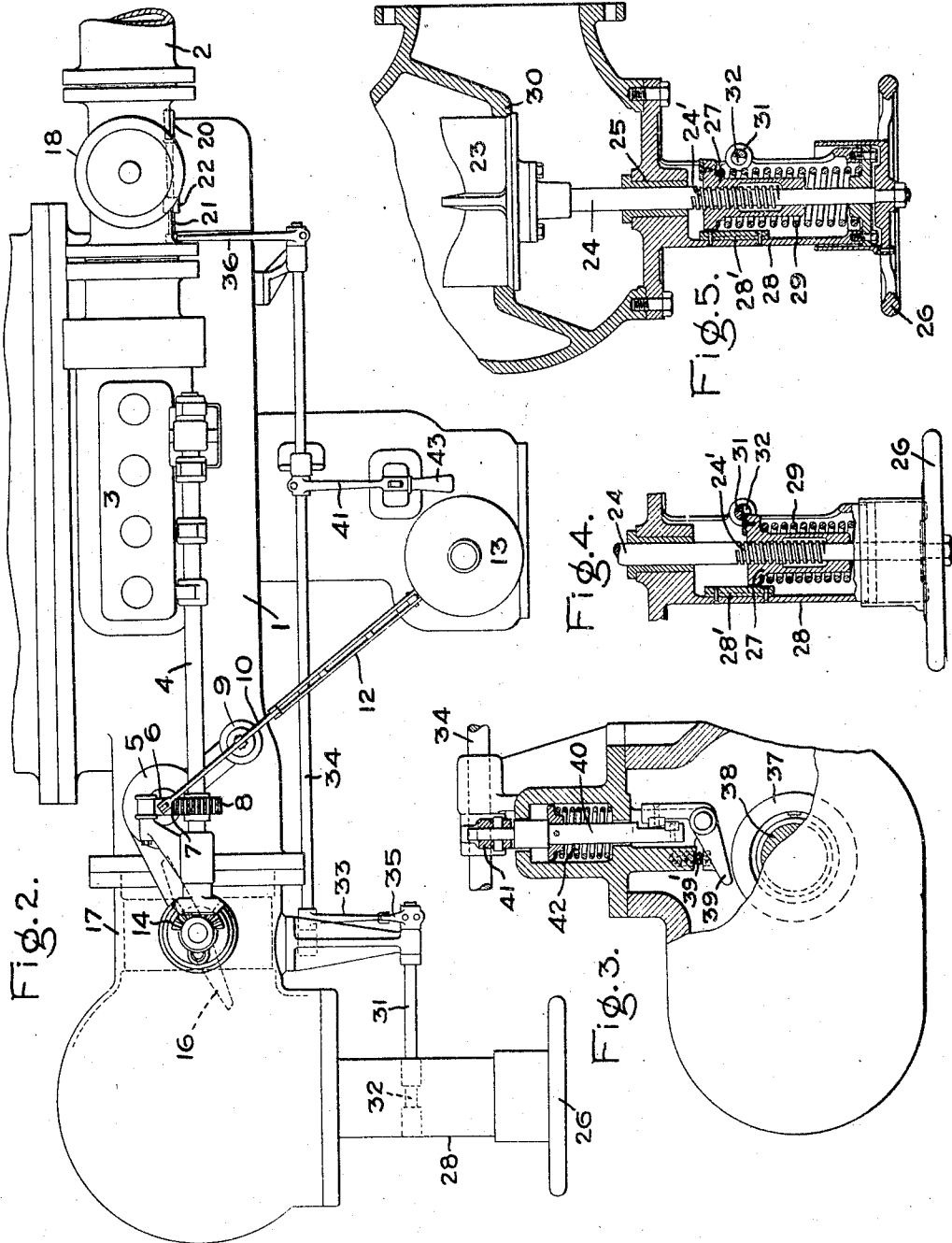
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by *Albert S. Davis*
His Attorney.

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UNITED STATES PATENT OFFICE.

OSCAR JUNGREN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

GOVERNING MECHANISM FOR MIXED-PRESSURE TURBINES.

1,060,001.

Specification of Letters Patent.

Patented Apr. 29, 1913.

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To all whom it may concern:

Be it known that I, OSCAR JUNGREN, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Governing Mechanism for Mixed-Pressure Turbines, of which the following is a specification.

This invention relates to elastic fluid turbines, and especially to those known as mixed pressure turbines, which are driven primarily by low pressure steam exhausting from other high pressure engines or from heating systems or other industrial apparatus, but are also provided with means for supplying high pressure steam to carry the load when the supply of low pressure steam runs short or fails altogether.

The object of the present invention is to provide such a machine with two sets of valves for each character of steam supply, one set controlled by the speed governor; and the other set by the emergency governor. This double control effects good regulation on the one hand, while on the other hand it promptly shuts off both sources of supply in case the turbine attains abnormal speed. In each case, the emergency shut-off valve is so constructed that it serves as a throttle and starting valve.

The accompanying drawings illustrate a horizontal turbine of the Curtis type embodying my invention, Figure 1 being an end elevation, Fig. 2 is a top plan view of the governing mechanism therefor, Fig. 3 is a sectional view of the emergency governor, Fig. 4 is a section of a portion of the starting and shut-off valve for the low pressure steam, in its open position, and Fig. 5 shows the self-closing devices released and the valve closed.

The turbine 1 which I have selected for illustration is of the horizontal type. High pressure steam is supplied through a main 2 to the steam chest 3 in which are the usual nozzle valves actuated by the cam shaft 4. Said shaft is rotated to and fro by a hydraulic motor 5 whose piston rod 6 has a rack 7 meshing with a pinion 8 on said shaft. The pilot valve 9 of said motor is pivotally attached to a floating lever 10 pivoted at one end to the rod 6 and at the other to the link 11 which is attached to the arm 12 of the speed governor 13. The shaft 4 is also

geared by the segment bevel gears 14 to the stem 15 of a butterfly valve 16 in the low pressure steam main 17. The speed governor, through the motor 5, thus regulates the supply of low pressure steam to the turbine, and when that lessens or fails it opens the high pressure valves to admit the high pressure steam to carry the load.

The emergency stop devices comprise in the first place a combined throttle and shut-off valve 18 in the high pressure main 2, preferably the one disclosed in the patent to Weldon, August 31, 1909, No. 932,525. The stem of this valve can be operated by the hand wheel 19 to open and close the main 2, but in whatever position to which it may be adjusted it can be tripped and caused to close instantly by raising the handle 20 on a lever 21 fulcrumed at 22 and carrying the combined detent and cam 21'.

The low pressure main is provided with a combined throttle and shut-off valve 23, adapted to be automatically tripped to close it. The proposed construction is shown in Figs. 4 and 5. The stem 24 is slidable axially in its bearing 25, and can also be rotated by the handwheel 26, to cause a screw-threaded portion 24' of said stem to cooperate with a nut 27 and thereby open and close the valve. The nut is loose in a tubular casing 28 inclosing it, and provided with a spline 28' engaging a groove in said nut, so that said nut is free to move lengthwise in the casing but cannot rotate. A helical spring 29 urges it axially toward the valve seat 30, but the nut is restrained normally by a catch or detent, preferably a rotatable shaft 31 having a cut away portion 32. Said shaft is retained normally in a position to lock the nut, preferably by an arm 33 on a rock shaft 34, which arm engages a lug 35 on the shaft 31. Another arm 36 on the shaft 34 is pivotally connected to the tripping lever 21 of the valve 18 in the high pressure main.

The rock shaft 34 is under the control of an emergency governor, so that when said governor operates, the shaft will trip both of the shut-off valves 18 and 23. The emergency governor I prefer to use is an unbalanced ring 37 on the turbine shaft 38, adapted to actuate a trip catch 39 and release a spring-actuated plunger 40 which is pivoted to a rock arm 41 on the shaft 34. The trip

catch is preferably an elbow lever retained in operative position by a spring 39', but locked out of the way of the ring 37 by the plunger, when the latter rises. The release of said plunger permits its spring 42 to raise it and thereby rock the shaft 34, which trips the self-closing mechanism of the two valves 18 and 23. A handle 43 on the arm 41 enables the attendant to re-set the apparatus when desired.

The supply of steam through each of the mains can be independently controlled by hand by the throttle valves 18 and 23. It will also be automatically regulated by the speed governor 13. It will also be simultaneously cut off by the operation of the emergency governor 37. This arrangement renders the turbine safe and efficient.

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 consider 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 mixed pressure turbine, the combination with high pressure admission valves and a low pressure admission valve, of a speed governor controlling both sets of valves, hand-operated throttle valves in the high pressure and low pressure mains provided with means for closing them automatically, and an emergency governor con-

trolling the self-closing devices of both said throttle valves.

2. In a mixed pressure turbine, the combination with hand-operated throttle valves in the high pressure and low pressure mains, of means for closing said valves automatically, a rock shaft adapted to trip said self-closing means, devices for rocking said shaft, and an emergency governor for tripping said shaft-rocking devices.

3. In a mixed pressure turbine, the combination with hand-operated throttle valves in the high pressure and low pressure mains, of means for closing said valves automatically, a rock shaft adapted to trip said self-closing means, a spring plunger for rocking said shaft, a trip catch for locking said plunger, and an emergency governor for tripping said catch and releasing said plunger.

4. In a mixed pressure turbine, the combination with an emergency governor, of a rock shaft adapted to be actuated by said governor, and a combined throttle and shut-off valve controlled by said shaft, said valve having a sliding and rotatable threaded stem, a sliding nut meshing with the threaded portion of said stem, a spring urging said nut axially, and a cutaway shaft engaging with said nut and restrained from rotation by an arm on said rock shaft.

In witness whereof, I have hereunto set my hand this 4th day of September, 1912.

OSCAR JUNGREN.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.