

G. J. ALTHAM.
GOVERNOR.

No. 546,872.

Patented Sept. 24, 1895.

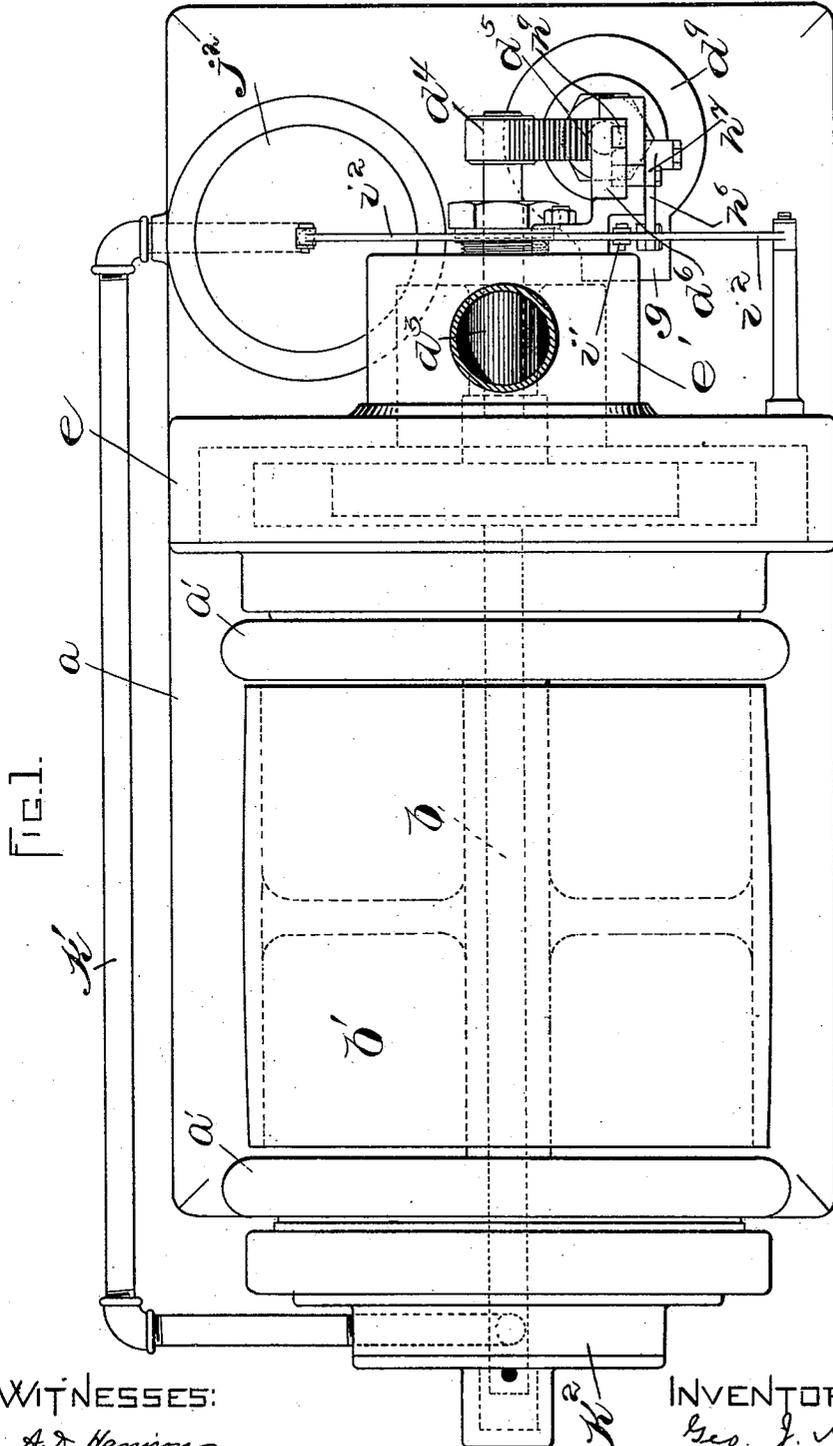


FIG. 1.

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P. Davis.

INVENTOR:

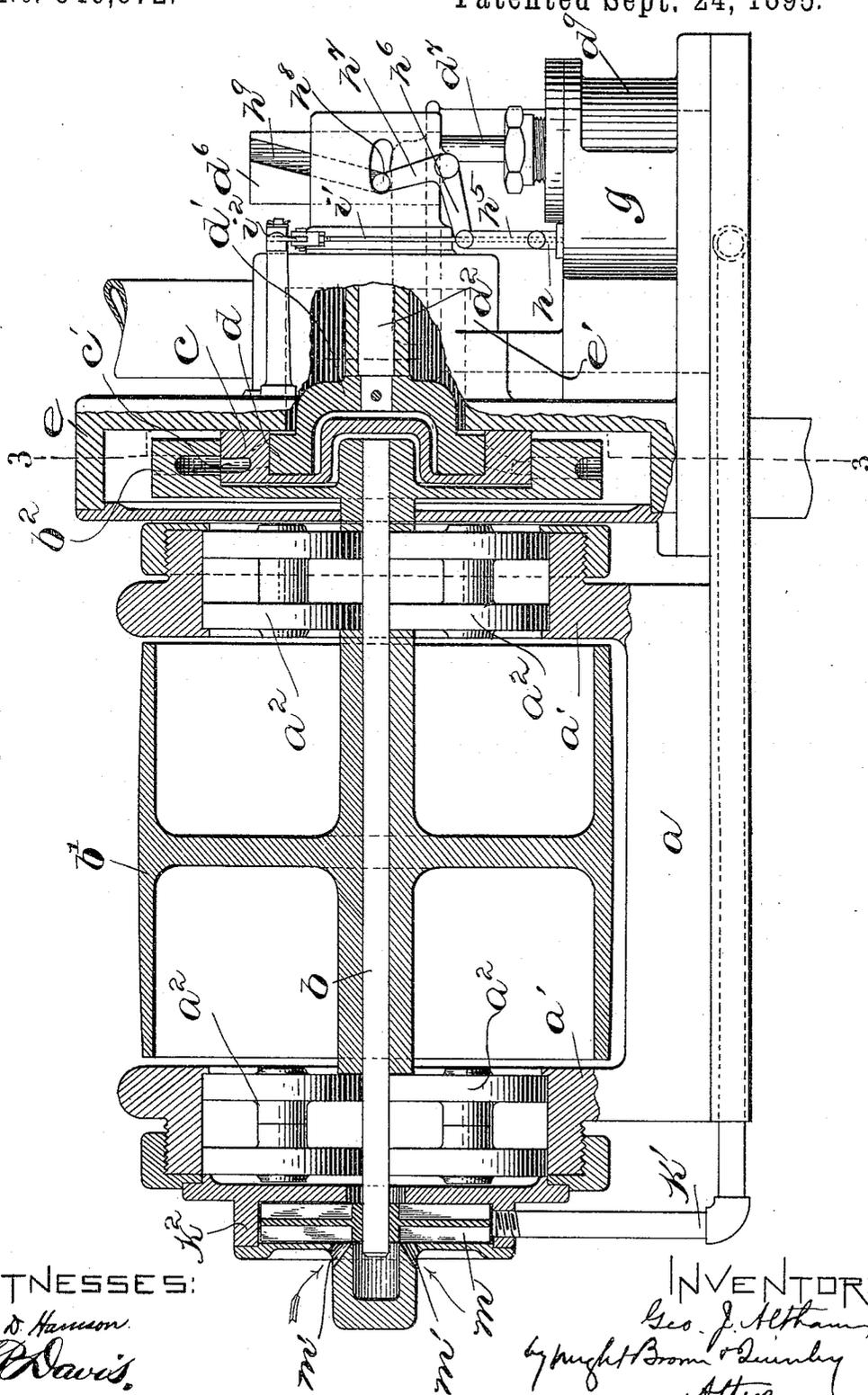
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FIG. 2.



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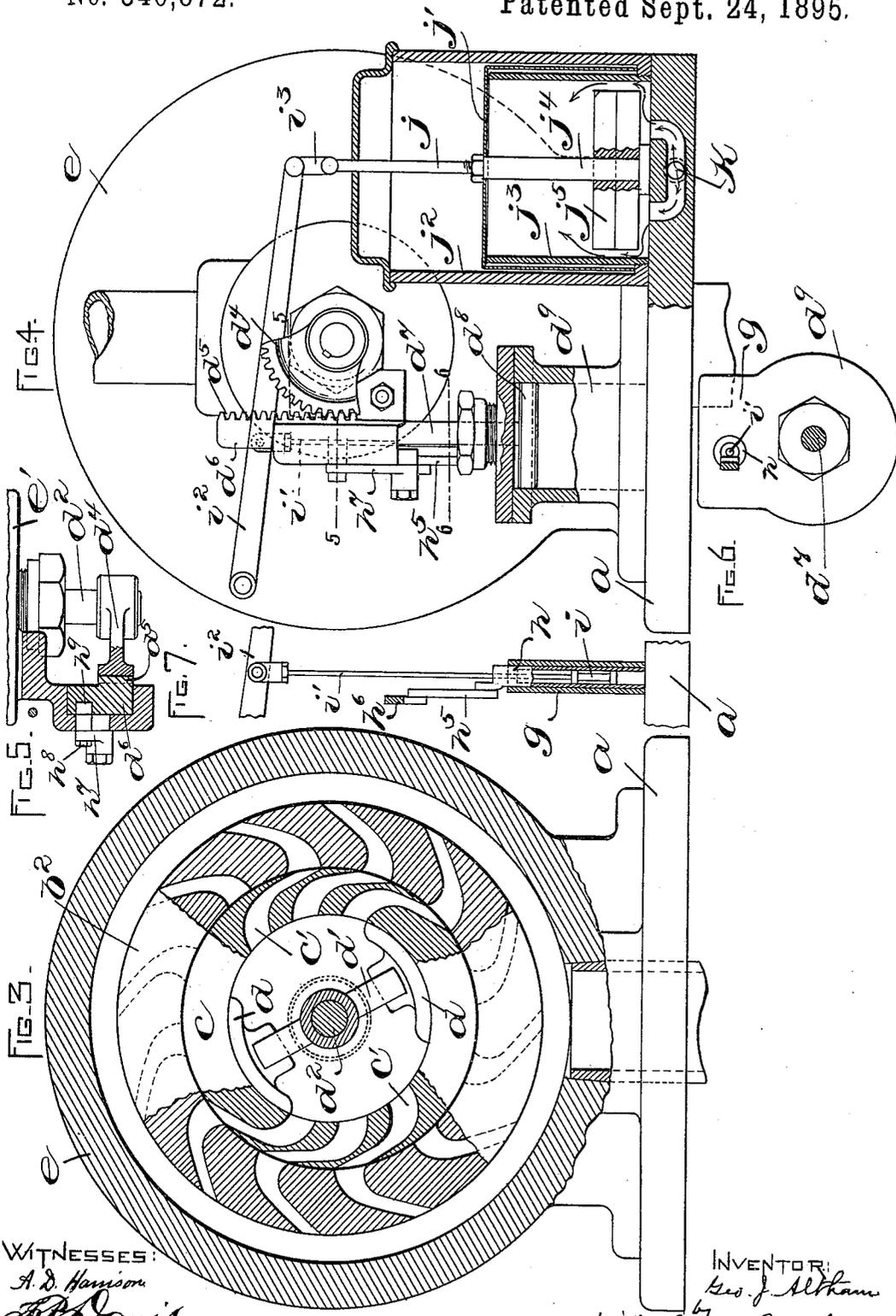
(No Model.)

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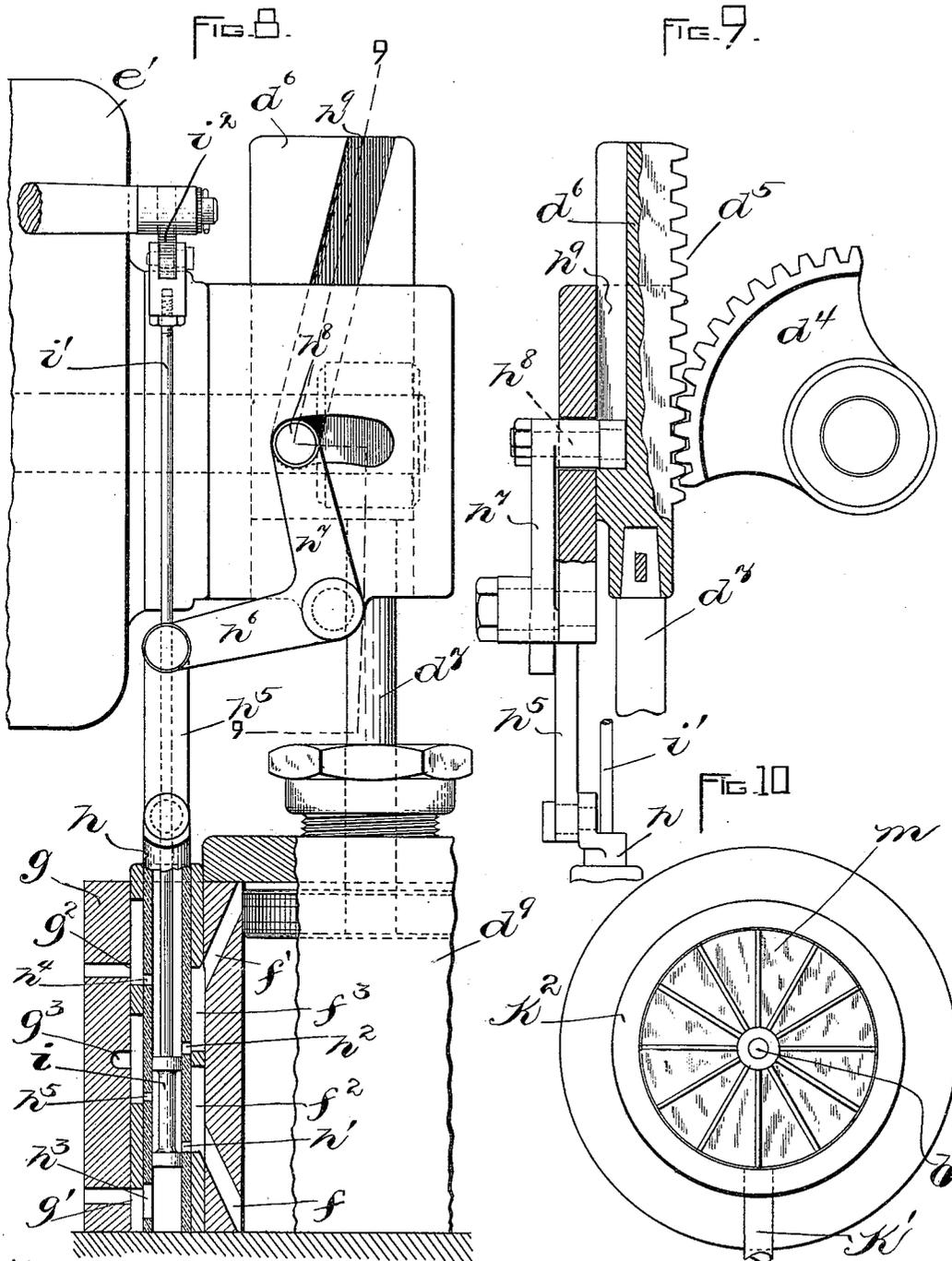
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UNITED STATES PATENT OFFICE.

GEORGE J. ALTHAM, OF SWANSEA, MASSACHUSETTS.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 546,872, dated September 24, 1895.

Application filed December 17, 1894. Serial No. 532,022. (No model.)

To all whom it may concern:

Be it known that I, GEORGE J. ALTHAM, of Swansea, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Governors, of which the following is a specification.

This invention relates to governors for regulating the speed of motors, and particularly that class of motors in which a turbine wheel is driven by fluid which enters a plurality of ports, a valve or valves being arranged to move over said ports, so that any number of them can be opened.

The present invention employs fluid under pressure as a speed-governing agent, and the invention aims to provide a quickly-acting governor, which keeps the motor at a practically uniform speed.

The accompanying drawings illustrate an embodiment of the invention.

Figure 1 shows the motor and governor in top plan. Fig. 2 shows a sectionalized side elevation of the same. Fig. 3 shows a cross-section taken substantially on the line 3 3 of Fig. 2. Fig. 4 shows a sectionalized end elevation. Fig. 5 shows a section on line 5 5 of Fig. 4. Fig. 6 shows a section on line 6 6 of Fig. 4. Fig. 7 shows a sectional detail of certain valve mechanism. Fig. 8 shows a sectionalized side elevation, on an enlarged scale, of parts appearing at the right-hand side of Fig. 2. Fig. 9 shows a section of line 9 9 of Fig. 8. Fig. 10 shows a detail of a certain fan.

The letter *a* designates the supporting-base of the machine, and *a'* standards thereon, formed to contain roller-bearings *a''*, which support a shaft *b*, carrying a pulley *b'*. The shaft *b* is the main shaft of the motor, and on it is affixed a turbine wheel *b''*, which is recessed in one side to receive an annulus *c*, having passages *c'* registering with those in the wheel. The said annulus is fixed, and within it is arranged an oscillatory valve composed of curved feet *d*, conforming to the interior surface of the annulus, and a connecting-yoke *d'*, fastened to a stem *d''*.

The turbine wheel and the annulus are inclosed in a casing *e*, the annulus being fastened to one side of said casing, and a steam-chest *e'* is arranged on one side of said casing and communicates with the space inclosed by

the annulus. The valve-stem *d''* is journaled in a bearing *d'''*, fastened to the steam-chest, and said stem protrudes from the latter and has affixed to it a segment *d''''*. A rack *d'''''* meshes into this segment, said rack being formed on the rear side of a head *d''''''*, which is fastened on the upper end of a rod *d'''''''*, carrying at its lower end a piston *d''''''''* in a cylinder *d'''''''''*, erected on the base *a*. The said cylinder has ports *f* and *f'* at opposite ends, (see Fig. 8,) and these ports register with ports *f''* and *f'''* in a steam-chest *g*, arranged at the side of the cylinder. In the back of the steam-chest there are formed exhaust-ports *g'* and *g''* and a steam-inlet port *g'''*. The chest has a circular bore, which receives a tube *h*, having ports *h'* *h''* *h'''* *h''''* *h''''''* to communicate, respectively, with ports *f''*, *f'''*, *g'*, *g''*, and *g'''*. Said tube constitutes a seat for a piston-valve *i*, of double form, which valve controls inlet of steam to the cylinder. Under the adjustment shown in Fig. 8 it will be seen that the valve closes communication between the steam-supply port *g'''* and the cylinder on the upper side of the piston and opens communication between said port and the cylinder on the lower side of the piston. The ports *f'* *f''* *h''* *h''''* now supply a passage for the exhaust-steam. By an upward movement of the valve the order is reversed.

The tube *h* is movable and connects at its upper end through a link *h''* with one arm *h''''* of a bell-crank lever, which is pivoted to a lug on the steam-chest *e'*, and whose other arm *h''''''* carries a roller-equipped pin *h''''''''*, occupying an oblique slot *h'''''''''*, formed in the front side of the head *d''''''*. Thus when the piston moves the tube *h* is moved for a purpose hereinafter explained.

The piston-valve *i* is on a rod *i'*, which is jointed to a lever *i''*, pivoted at one end to the casing *e* and connected at the other end through a link *i'''* with the stem *j* of an inverted air-receiver *j'*. The latter is of cylindrical form, and its pendent portion occupies an annular liquid-containing space formed between an inclosing casing *j''* and an up-standing shell *j'''* within the same. A rod *j''''* extends downward within the receiver *j'* as a continuation of the stem *j*, and weights *j''''''* are placed on said rod.

A passage-way *k*, bored in the base, commu-

nicates with the space inclosed by the shell j^3 , and a conduit k' extends between said passage-way and a casing k^2 , supported by one of the standards a' . Within said casing there is a fan m , which is affixed to the main shaft b and which draws air through orifices m' in the casing and discharges it into the conduit k' .

The operation is as follows, considering that the passages c' are all open, as shown in Fig. 3: The revolution of the shaft b causes the fan m to drive air into the receiver j' , and when the speed becomes excessive the receiver will be raised, this being governed by the amount of weight carried by said receiver. The elevation of the receiver produces motion in the lever i^2 , which in turn moves the valve i in the tube h , and when the upper piston of said valve crosses the port h^2 steam is admitted through that port to the upper side of the piston d^3 and the latter is depressed, the steam on its under side exhausting through the ports h' , h^3 , and g' . The downward movement of the piston produces motion of the valve-stem d^2 through the rack d^5 and segment d^4 , and the turning of said stem carries the feet d over the passages c' , whereby the inflow of the motive fluid is restricted and the speed of the motor correspondingly decreased. The downward movement of the piston also moves the tubular valve-seat h upward by reason of the coaction of the slot h^9 with the bell-crank lever $h^6 h^7$. Thus, after the valve has shifted, the valve-seat follows it and keeps the ports of the valve-seat in proximity to the valve, so that a very slight movement of the latter at any time will reverse the steam action in the cylinder d^9 .

It will be seen that the invention provides a quickly-acting governor, which will hold the motor at a practically-uniform speed.

What I claim as my invention is as follows:

1. The combination with a fluid motor and its controlling valve, of a governing apparatus comprising a steam cylinder and piston, suitable connections between said piston and the said motor-valve, a valve controlling admission of steam to said cylinder, a movable valve-seat interposed between said steam-valve and the ported side of the cylinder and itself suitably ported, connections between the piston and the valve-seat whereby the latter is moved by the piston, a movable air-receiver suitably jacketed, connections between said receiver and the steam-valve, and air-forcing means driven by the motor and in communication with the air-receiver.

2. The combination with a fluid motor having an oscillatory controlling valve with a segment on its stem, of a governing apparatus comprising a steam cylinder, a piston therein whose rod carries a head with a rack on one side in mesh with the segment on the stem of the oscillatory valve, and with an oblique slot in the other side, a valve controlling inlet of steam to the said cylinder, a movable valve-seat interposed between said valve and the ported side of the cylinder, a lever engaged at one end with the oblique slot in the head of the piston-rod, and connected at the other end with the said movable valve-seat, a movable air-receiver, suitable connections between the same and the steam-valve, and air-forcing means driven by the motor and communicating with the said air-receiver.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 15th day of December, A. D. 1894.

GEORGE J. ALTHAM.

Witnesses:

C. F. BROWN,

A. D. HARRISON.