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REGULATOR FOR STEAM ACCUMULATORS
APPLICATION FILED JAN. 6, 1912.

1,066,411.

Patented July 1, 1913.

Fig. 1.

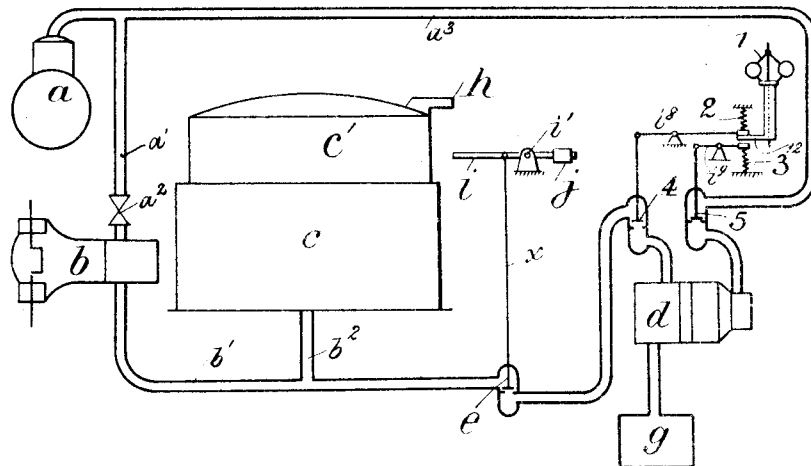
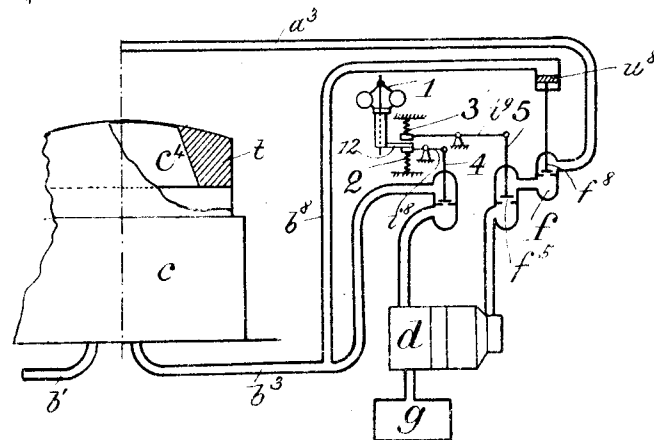


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

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REGULATOR FOR STEAM-ACCUMULATORS.

1,066,411.

Specification of Letters Patent.

Patented July 1, 1913.

Original application filed September 30, 1910, Serial No. 584,739. Divided and this application filed January 6, 1912. Serial No. 669,856.

To all whom it may concern:

Be it known that I, EMILE HARLÉ, citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Regulators for Steam-Accumulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it

appertains to make and use the same.

This invention relates to improvements in regulators for steam accumulators.

It has been proposed heretofore to provide a steam plant comprising a source of steam, a primary engine taking live steam from said source, a secondary engine arranged to take either live steam from said source or exhaust steam from the primary engine, according to whether the primary engine is idle or operating, in combination with a steam accumulator interposed between the exhaust of the primary engine and the exhaust steam inlet of the secondary engine, said accumulator serving to store any surplus exhaust steam from the primary engine and in turn supply it to the secondary engine, thus allowing the latter to receive a fairly constant supply of exhaust steam notwithstanding the intermittent discharge of exhaust steam from the said primary engine.

In my application No. 584,739, filed in the United States Patent Office Sept. 30, 1910, is described a plant of the kind above mentioned, in which the accumulator has a capacity of variable volume, in combination with regulating means controlled by this accumulator for supplying live steam to the secondary engine when the exhaust steam fails, and in the specific embodiment claimed in said application a governor is arranged to control the steam supply to the secondary engine, whether live or exhaust steam be used, the governor being thrown into action with one or the other source of the steam to the secondary engine by the movement of the accumulator.

The present application is a division of my aforesaid application, and relates to a specific embodiment of the invention in which the governor controls separate governor valves for the live steam and exhaust steam supply, respectively, while the accumulator controls one separate valve in one

only of the sources of steam supply. In this modification, the accumulator either cuts off the exhaust steam supply, which causes the secondary engine to slow down and the governor to open the live steam supply, or the accumulator, upon receiving a sufficient exhaust steam supply shuts off the live steam supply, whereupon the governor acts wholly on the exhaust steam supply.

My invention will be more specifically described in connection with the accompanying drawings and then will be particularly pointed out in the claims.

In the drawings, Figure 1 is a diagrammatic view of one form of the invention in which the source of exhaust steam is controlled by a valve under the influence of the accumulator; Fig. 2 is a similar view of a modification in which the source of live steam is controlled by a valve under the influence of the accumulator.

Referring to the drawings, and particularly to Fig. 1, *a* is a source of steam, for example, a boiler; *b* is a primary steam engine, and *c* a steam accumulator of variable volume and constant pressure, this accumulator comprising a tank in which is mounted a rising and falling bell *c'*. At *d* is indicated a secondary steam engine connected to a condenser *g*. The primary engine *b* takes live steam from the boiler *a* through a suitable conduit *a'* controlled by a valve as indicated at *a''* and said engine discharges exhaust steam through an exhaust pipe *b'* to the exhaust steam inlet of the secondary engine *d*, said exhaust pipe *b'* having a branch *b''* extending into the accumulator *c* in a well known manner. The secondary engine *d* may be operated by live steam taken direct from the boiler *a* by a live steam pipe *a''*. In the example shown in Fig. 1, the exhaust pipe *b'* is provided with a valve *e* arranged to be controlled by the movement of the accumulator bell *c'*. In the example shown the bell *c'* is provided with an arm *h*, and a lever, *i*, is arranged with one end in the path of the arm *h*, this lever being fulcrumed at *j*, and connected to the valve *e* by suitable means, as for example, a rod *x*, whereby as the lever *i* is moved it will move the rod and valve. The lever *i* is provided with a suitable counterbalancing device, as for example, a weight, *j*, which tends to move the valve rod

x in such a direction as to open the valve e . At 1 is indicated a governor of the usual flying ball type, said governor having an arm arranged to play between the ends of two levers i^s and i^p fulcrumed as shown in the drawing and connected to valves 4 and 5 respectively, the former being located in the exhaust steam supply and the latter in the live steam supply to the secondary engine. The ends of the levers i^s and i^p are pressed toward each other and toward the arm of the governor spindle by means of springs 2 and 3 respectively.

The operation of this embodiment of the invention is as follows: When the primary engine is operating, the bell is raised and the lever i opens the valve e , thus maintaining a supply of exhaust steam under uniform pressure to the secondary engine d . The governor spindle rises and lifts the end of the lever i^s according to the speed of the engine, thereby tending to throttle the exhaust steam supply at the valve 4 as may be required. If the engine slows down the spring 2 moves the lever i^s to open the valve 4. If the source of exhaust steam fails owing to the stopping of the engine b the bell falls and closes the valve e while the valve 4 is opened by the falling of the governor and the action of the spring 2. The continued movement of the governor spindle downward compresses the spring 3, moving the lever i^p to open the valve 5 and thereby supply live steam to the secondary engine. Variations in the speed of the engine will cause movements of the governor spindle and its attached arm thus moving the lever i^p to adjust the valve 5 as may be required to control the speed of the said secondary engine. It will be noted that if at any time while the secondary engine is running with the live steam supply the primary engine is started, the arm h of the bell will free the lever i and allow the counterweight j to open the valve e . Since the valve 4 is standing open, the exhaust steam may pass to the secondary engine and speed up the same whereby the governor spindle will lift and cooperate with the lever i^s to control the valve 4 for the exhaust steam inlet, while the spring 3 will be free to move the lever i^p so as to close the valve 5 and shut off the live steam from the said secondary engine.

In Fig. 2 the arrangement of the governor and the valves 4 and 5 with their springs is similar to the construction shown in Fig. 1, but in this case the valve e for the exhaust steam pipe is omitted and the accumulator is used to influence a control valve f^s located in the live steam pipe leading to the secondary engine. In this arrangement, the accumulator and exhaust steam pipe connections are modified as follows: The exhaust pipe b' from the primary engine does not extend directly to the sec-

ondary engine but terminates in the accumulator. A second pipe b^s leads from the accumulator to said secondary engine. The bell c^s of the accumulator is provided with a float t whereby as the bell descends and the float t enters the liquid at the bottom of the accumulator, a part of the weight of the bell is taken off the steam, whereby a variation of pressure on the exhaust steam results. To the stem of the valve f^s is connected a piston u^s movable in a cylinder as shown, one end of the said cylinder being in constant communication with the exhaust steam pipe b^s , through the pipe b^s . In this arrangement when the bell c^s is down the exhaust steam coming into the accumulator initially raises the said bell at a low pressure but as the bell is lifted and the float t emerges from the water of condensation in the bottom of the accumulator a relatively larger proportion of the weight of the bell must be overcome by the steam so that the pressure of the steam in the accumulator gradually increases. When the steam pressure has reached the proper point the piston u^s is pushed downward, thereby closing the valve f^s . Thereafter the secondary engine is actuated by exhaust steam, the supply of this steam to the said engine being controlled by the governor through the valve 4. When the supply of exhaust steam fails the piston u^s is moved upward by any suitable means, as for example a spring, and the valve f^s is opened to allow live steam to supply the secondary engine. This live steam supply is controlled by the governor through the valve 5. At this time the valve 4 is closed by the spring 2. It will be noted from the drawing that the spindle 12 of the governor 1 has a certain play between the ends of the valve levers i^s and i^p for the purpose of not completely cutting off the supply of steam through one valve after the spindle has left the lever of the other valve and thereby cut off the steam through said valve.

Having thus fully described my invention, what I claim is:—

1. The combination, with a primary engine, a secondary engine, and a boiler, of connections between said boiler and the primary engine whereby live steam may be supplied to the latter, connections between the boiler and the secondary engine for supplying live steam to the said secondary engine, means for supplying exhaust steam from the primary engine to the secondary engine, a steam accumulator comprising a bell arranged to be acted upon by said exhaust steam, and means influenced by the said bell for shutting off one of the sources of steam supply to the secondary engine.

2. The combination, with a primary engine, a secondary engine, and a boiler, of

connections for supplying steam from the boiler to said primary engine, connections for supplying steam from the boiler to the secondary engine, means for supplying exhaust steam from the primary engine to the secondary engine, a steam accumulator having a bell arranged to be acted upon by said exhaust steam, a valve for controlling one source only of the steam supply to the secondary engine, means influenced by the accumulator for operating said controlling valve, a governor actuated by the secondary engine, and governor valves controlled by said governor and arranged to control both sources of steam supply to the secondary engine.

3. The combination, with a primary engine, a secondary engine, and a boiler, of connections for supplying steam from the boiler to said primary engine, connections for supplying steam from the boiler to the secondary engine, means for supplying exhaust steam from the primary engine to the secondary engine, a steam accumulator having a bell arranged to be acted upon by said exhaust steam, a valve for controlling one source only of the steam supply to the secondary engine, means influenced by the accumulator for operating said controlling valve, a governor actuated by the secondary engine, and governor valves independent of the accumulator-influenced means and con-

trolled by said governor and arranged to control both sources of steam supply to the secondary engine.

4. The combination, with a primary engine, a secondary engine, and a boiler, of connections for supplying steam from the boiler to said primary engine, connections for supplying steam from the boiler to the secondary engine, means for supplying exhaust steam from the primary engine to the secondary engine, a steam accumulator having a bell arranged to be acted upon by said exhaust steam, a valve for controlling one source only of the steam supply to the secondary engine, means influenced by the accumulator for operating said controlling valve, a governor actuated by the secondary engine, and governor valves controlled by said governor and arranged to control both sources of steam supply to the secondary engine, spring impelled valve levers for actuating said governor-valves and a spindle from the governor extending between said levers, a play being provided between said spindle and the valve levers.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

EMILE HARLÉ.

Witnesses:

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