

No. 684,584.

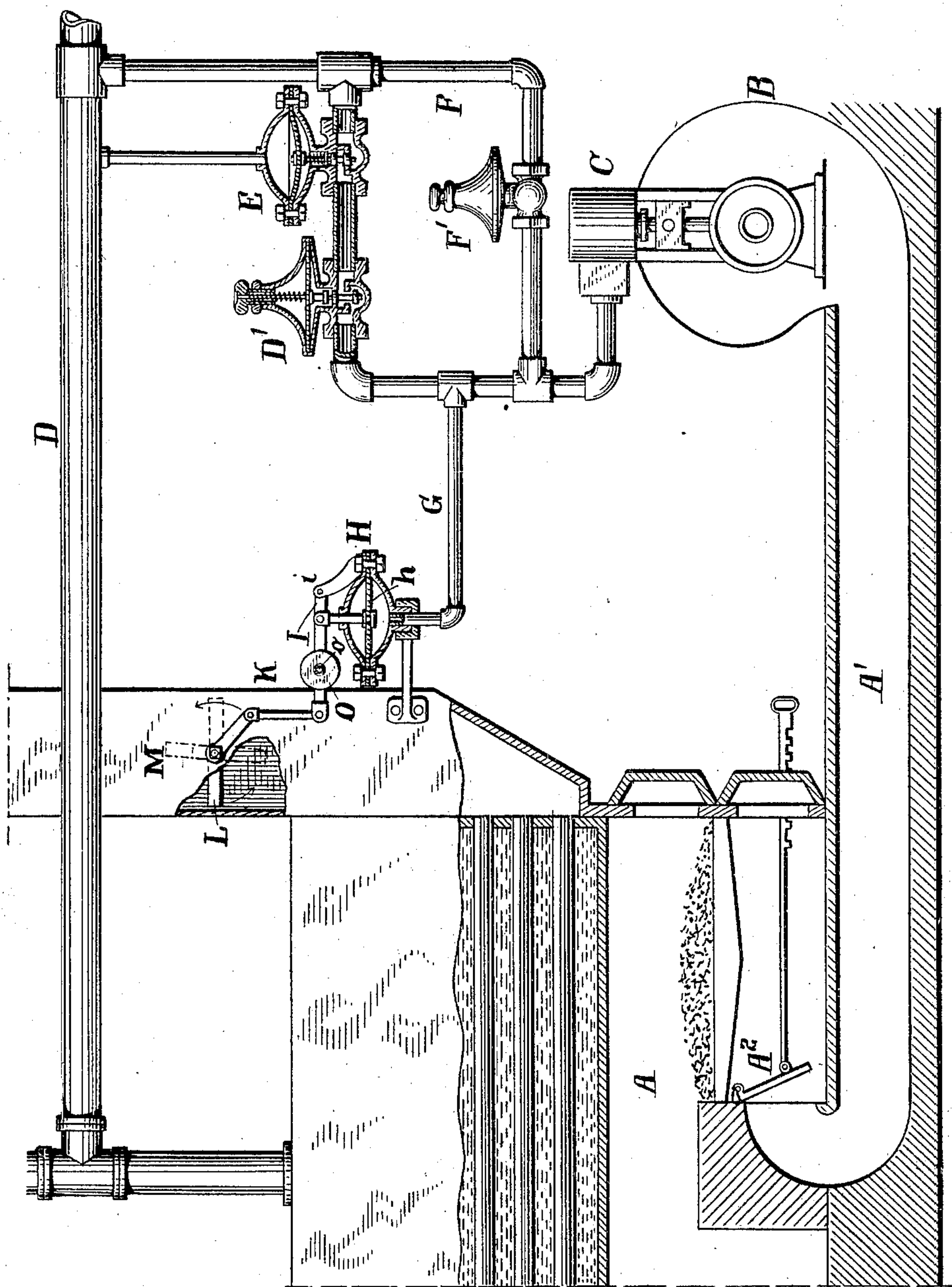
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E. McLEAN.

FORCED DRAFT AND DAMPER REGULATOR FOR STEAM BOILERS.

(Application filed Dec. 31, 1900.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

EMBURY MCLEAN, OF BROOKLYN, NEW YORK.

FORCED-DRAFT AND DAMPER REGULATOR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 684,584, dated October 15, 1901.

Application filed December 31, 1900. Serial No. 41,621. (No model.)

To all whom it may concern:

Be it known that I, EMBURY MCLEAN, a citizen of the United States, residing in the borough of Brooklyn, city of New York, State of New York, have invented certain new and useful Improvements in Forced-Draft and Damper Regulators for Steam-Boilers, of which the following is a specification.

The object of this invention is to control the forced-draft blower and the damper by direct application of the pressure of steam from the boiler and to do this in such a way that the damper may at will, by adjustment of the apparatus, be held closed until the speed of the blower has increased from its minimum speed or condition of substantial inactivity to a predetermined rate of speed, when the damper is then automatically opened.

In carrying out my invention I employ a forced-draft apparatus consisting of a motor and associated blower for delivering a forced draft beneath the grate-bars. Steam from the boiler is conducted to the blower-motor through a pressure-regulator or reducing-valve to control the steam-pressure to drive the motor at the desired maximum speed. In this pipe I also place a cut-off or controller device connected with the steam-space of the boiler and acting to entirely cut off steam from the reducing-valve and blower-engine when the normal working pressure in the boiler is exceeded. In connection with this controller or cut-off and reducing valve I employ also a by-pass pipe, which is provided with a pressure-regulator or reducing-valve, through which a minimum quantity of steam is admitted to the blower-motor to keep it in motion at a minimum speed when the main supply of steam is cut off from it. A by-pass is not essential in the working of such an apparatus, as the blowing-motor may be entirely arrested when the steam is cut off as described; but I prefer to employ it for then maintaining the motor in action at a minimum speed, as it is desirable for well-understood practical reasons. The arrangement I have described is one well known. In connection with such an apparatus it has been proposed to control the damper in the flue or stack, so as to close it when the main steam-supply is cut off from the motor and the blower

is running at minimum speed and open it when steam is restored to the motor and the speed of the blower commences to accelerate. My invention does not therefore contemplate, broadly, such an operation, but consists in the following organization employed in association with the blower organization which has been described.

From the steam-pipe between the reducing-valve and the blower-engine I take a connection for admitting steam to one side of a diaphragm motor or controller, with which is connected a lever or other suitable appliance for actuating the damper, the arrangement of course being such that when the blower-motor is receiving steam freely through its main steam-pipe connection the pressure of steam in the diaphragm-damper controller will be exerted thereupon in such a way as to open the damper. By providing an adjustable weight or weights or other adjustable device or appliance acting to close the damper and to oppose the actuation of the diaphragm-motor to open it I may cause the damper to be opened when the blower has reached a predetermined speed. The advantages of such an arrangement are that the speed of the blower may be increased from its minimum speed up to the desired predetermined point, and the damper being closed the hot gases are held in the furnace until the speed of the blower has reached a point at which it is desirable that the damper should be opened. The arrangement is one which experience has demonstrated to be a most satisfactory and economical one.

The accompanying drawing is a diagrammatic view illustrating the invention.

A represents the fire-box or combustion-chamber of the furnace, and A' a conduit opening at one end into the space beneath the grate-bars, the area of the opening being regulated by an adjustable valve A², as is common. The opposite end of the conduit is connected with a blower, as a common Root blower B, driven by a steam-engine C, connected with the boiler by a pipe D, in which is a reducing-valve D' and a regulator or cut-off valve E, also connected with the steam-space of the boiler. A by-pass or shunt pipe F, containing a pressure-regulating valve F', is connected around the cut-off valve E and

the main reducing-valve D'. When steam in the boiler is below desired pressure, the blower-engine receives steam through the reducing-valve D' and the blower is driven at accelerated speed. When the desired working pressure is exceeded, the cut-off valve E is actuated to arrest the passage of steam through the reducing-valve. At this time the by-pass pipe delivers a minimum quantity of steam to the blower-engine, which is then driven at its minimum speed. As before stated, this is an organization that is common and well understood. From the main steam-pipe, between the reducing-valve D' and the blower-engine, I run a steam-pipe G to the under side of the diaphragm *h* of a diaphragm-motor or controller H, of common construction. The opposite side of the diaphragm is connected with a lever I, pivoted at one end at *i* and at its other end jointed to a rod K, connected with the damper L in the flue or stack M. On the lever I is a sliding weight O, held in any desired position by a set-screw *o*. When the desired working pressure in the boiler is exceeded and the speed of the blower reduced to a minimum, the weight O acts to close the damper L. When the pressure in the boiler falls, the cut-off valve opens and steam through the main supply-pipe again commences to pass to the blower-engine and the speed of the blower is accelerated. The damper need not open at once; but by the proper disposition of the weight O upon the lever I its opening may be delayed until the pressure in the pipe G has risen so as to be sufficient to actuate the diaphragm of the motor H against the resistance of the weight to open the damper, and such pressure would correspond, substantially, with a given speed of rotation of the blower. The moment of opening the damper may therefore be adjusted at will. This mode of operation is due to the fact that with a proper weighting of the lever I the diaphragm *h* will not be actuated by the steam-pressure in the pipe G while the blower-engine is only receiving the minimum quantity of steam and is running at minimum speed. When, however, steam again passes through the valve D', an appreciable interval of time (depending upon the resistance applied to the lever I) will elapse before the pressure in pipe G rises sufficiently to actuate the diaphragm, and during such period the speed of the blower-motor will be accelerated, and the time of opening of the damper will substantially correspond with a given speed of the blower. By suitably regulating the resistance applied to the lever I the time of opening of the damper may within limits be determined.

I prefer to use an adjustable weight instead of an adjustable spring, as I think it is more reliable in action.

I do not limit myself to the specific construction described, as obviously the same results and mode of operation may be accom-

plished by the use of other apparatus performing the same offices or functions as that described.

There are now in the market and well known valves, such as the Foster valve, which combine all the functions of the parts marked D' E F F' in the drawing and which are commonly used in lieu of them--that is to say, a valve which when the desired pressure in the boiler is exceeded permits only a minimum quantity of steam to pass and which also acts as a reducing-valve. I have shown the three valves D' E F' and by-pass F merely as one form of apparatus that I may employ.

I claim as my invention--

1. In a forced-draft and damper regulator apparatus the combination with the boiler and furnace of a blower, its engine, a steam connection from the boiler to the engine, pressure-reducing and cut-off valve mechanism in said steam connection, a damper-motor, a steam connection extending from the damper-motor to the steam connection of the blower-engine and connected therewith between said engine and said valve mechanism, the damper, and an operative connection between the damper and its motor, for the purpose set forth.

2. In a forced-draft and damper regulator apparatus the combination with the boiler and furnace of a blower, its engine, a steam connection from the boiler to the engine, pressure-reducing and cut-off valve mechanism in said steam connection, a damper-motor, a steam connection extending from the damper-motor to the steam connection of the blower-engine and connected therewith between said engine and said valve mechanism, the damper, a lever connection between the damper and the damper-motor and a device applied to said lever acting to oppose the actuation of said motor by the steam-pressure to open the damper, for the purpose set forth.

3. In a forced-draft and damper regulator apparatus the combination with the boiler and furnace of a blower, its engine, a steam connection from the boiler to the engine, pressure-reducing and cut-off valve mechanism in said steam connection, a damper-motor, a steam connection extending from the damper-motor to the steam connection of the blower-engine and connected therewith between said engine and said valve mechanism, a damper, a lever connection between the damper and its motor, and an adjustable device applied to said lever to oppose actuation of the damper-motor by the steam-pressure to open the damper.

4. In a forced-draft and damper regulator apparatus the combination with the boiler and furnace of a blower, its engine, a steam connection from the boiler to the engine, pressure-reducing and cut-off valve mechanism in said steam connection, a damper-motor, a steam connection extending from the damper-motor to the steam connection of the blower-engine and connected therewith between said

engine and said valve mechanism, a damper, a lever connection between the damper and its motor and an adjustable weight applied to said lever to oppose actuation of the damper-motor by the steam-pressure to open the damper.

5 5. In a forced-draft and damper regulator apparatus the combination with the boiler and furnace of a blower, its engine, a steam connection from the boiler to the engine, pressure-reducing and cut-off valve mechanism in said steam connection, a damper-motor, a steam connection extending from the damper-motor to the steam connection of the blower-
10 engine and connected therewith between said engine and said valve mechanism, a damper, a lever connection between the damper and its motor and a sliding weight applied to said

lever to oppose actuation of the damper-motor by the steam-pressure to open the damper. 20

6. In a forced-draft and damper regulator apparatus, the combination with the boiler and furnace of a blower, its engine, means for stopping the effective actuation of the blower when the normal pressure in the boiler is exceeded, means whereby the damper is then closed, and means adjustable at will for opening the damper when the speed of the blower has been accelerated to a predetermined rate.

In testimony whereof I have hereunto subscribed my name. 30

EMBURY MCLEAN.

Witnesses:

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