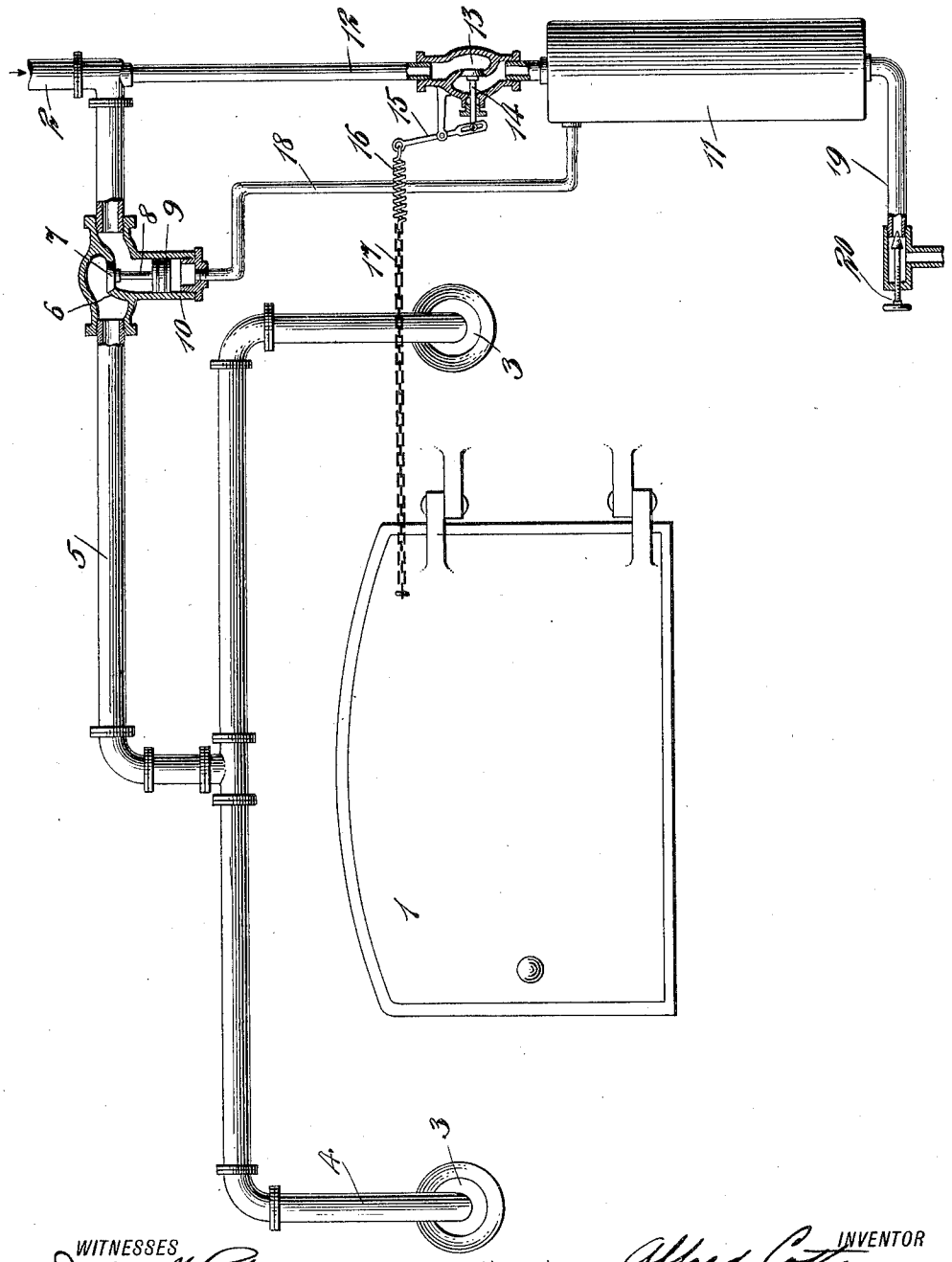
A. COTTON.

AIR REGULATOR FOR STEAM BOILER FURNACES.

APPLICATION FILED JULY 29, 1911.

1,067,319. Patented July 15, 1913.



WITNESSES

Julius A. Katz.

F. R. Miller.

INVENTOR

Alfred Cotton

BY

Davis & Davis

his ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALFRED COTTON, OF NEWARK, NEW JERSEY.

AIR-REGULATOR FOR STEAM-BOILER FURNACES.

1,067,319. Specification of Letters Patent. Patented July 15, 1913.

Application filed July 29, 1911. Serial No. 641,303.

To all whom it may concern:

Be it known that I, ALFRED COTTON, a subject of the King of Great Britain, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Air-Regulators for Steam-Boiler Furnaces, of which the following is a specification.

This invention relates to apparatus for controlling the admission of air to furnaces for burning the gases arising from the primary combustion on the grates. It is adapted for use with all kinds of solid fuel, but more particularly for use with bituminous coal and other smoky fuels to reduce or do away with the emission of smoke.

The object of this invention is to provide an apparatus which will supply a large amount of air over the fire for a predetermined time, said charge arising at the end of a fixed interval. This charge may be governed somewhat by the length of time the fire door is open during the operation of charging the furnace with fuel.

Another object of the invention is to provide an apparatus which will automatically govern the amount of air supplied to the fire box after each charging of fuel, the fireman or stoker being thus relieved of all responsibility as to the amount of air thus supplied.

Other objects and advantages of the invention will appear hereinafter.

The drawing represents a front elevation of a portion of a furnace showing a fire door and my air supplying apparatus connected thereto, the valves of the apparatus being shown in sectional view.

Referring to the various parts by numerals, 1 designates the fire door of a steam boiler furnace; 2 a main steam supply pipe and 3 a pair of steam jet blowers for supplying air over the furnace grates. These blowers are shown as arranged in the boiler front on each side of the fire door, but it will be understood that they may be arranged in the fire door as shown in my Patent No. 899,102, or at any suitable place about the furnace.

To supply steam to the blowers, steam pipes 4 are employed, and these pipes are connected by means of a single pipe 5 to the main steam supply 2. Interposed in the pipe 5 is a pressure-actuated controlling valve 6 which controls the admission of steam to the pipes 4 and the blowers. The controlling valve consists of a valve proper 7 carrying a depending valve stem 8 on the lower end of which is secured a piston 9. This piston reciprocates in a cylinder 10 and the valve is arranged to seat downwardly on the valve seat. The steam is admitted to the upper surface of the piston and the under side of the valve 7. As the area of the piston is considerably greater than the area of the under side of the valve the downward pressure on the piston holds the valve seated.

A controlling reservoir 11 is connected by a pipe 12 with the main steam supply and arranged in said pipe is an admission valve 13. This valve moves inwardly to its seat and the pressure from the steam pipe 12 tends to unseat said valve and force it outwardly. The stem 14 of said valve is connected to the lower end of a lever 15, to the upper end of which is connected a spring 16. The free end of this spring is connected by a chain 17 with the fire door, said chain being of such length that when the fire door is closed the valve 13 will be held to its seat with a fair amount of pressure. It is manifest that when the fire door is opened the pressure of the steam under the valve and tending to unseat it will at once open the valve so that steam may freely pass from the pipe 12 into reservoir 11. To the controlling reservoir 11 is connected a pipe 18, the upper end of which communicates with the lower end of the piston chamber 10 and delivers the steam to said chamber under the piston therein.

Connected to the lower end of the controlling reservoir is an outlet pipe 19 in which is arranged a needle valve 20, said valve governing the speed of exhaust from the controlling reservoir.

The operation of this apparatus may be briefly described as follows: Upon opening the fire door for charging the furnace with fuel, steam will unseat the valve 13 and flow into the controlling reservoir 11. Steam will also rise through pipe 18 into the lower end of the piston chamber, and pressure will accumulate therein until said pressure, combined with the pressure on the under side of the valve 7, will lift said valve from its seat and open communication from the steam supply through the pipe 5 to the pipes 4 leading to the blowers. When the fire door is closed the valve 13 will be seated and the supply of steam to the controlling reservoir

will be cut off. Pressure will be maintained, however, in the lower portion of the piston chamber 10 and the valve 7 will be held open until the pressure in the controlling reservoir, by reason of the exhaust through the needle valve 20 is so reduced that the pressure on the upper side of the piston in the piston chamber will seat said valve. The supply of steam to the blowers will then be cut off and the apparatus will be at rest until the fire door is again opened and the controlling reservoir again charged.

It is to be noted that the reservoir 11 serves merely as a controlling reservoir, the pressure therein controlling the operation of the valve which admits steam directly to the blowers from the steam supply. It is manifest that by properly proportioning the controlling reservoir and the supply of steam thereto, and by properly adjusting the needle valve, the supply of air to the furnace after each charging with fuel may be regulated to the proper interval. The controlling reservoir may be comparatively small as it is not necessary to store therein the steam which is subsequently to be supplied to the jet blowers, as in the apparatus covered by my Patent No. 899,102 dated September 22nd, 1908. It is manifest, therefore, that I have provided a very simple but efficient means for controlling the supply of air over the grates after each charging with fuel. It is also manifest that the apparatus is capable of a very wide range of adjustment.

While I have described the apparatus as being operated by steam pressure, it will, of course, be understood that it may be operated by any fluid under pressure, and I desire it understood that I am not to be limited specifically to the use of the apparatus with steam.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. An air regulator for a furnace comprising a controlling reservoir of fixed capacity, means for supplying steam to said reservoir, means for permitting steam to exhaust therefrom, a pipe leading steam to the furnace fire box, a valve in said pipe means whereby said valve will be normally held seated or closed by the steam pressure in said pipe, means whereby steam under pressure from the controlling reservoir will unseat or open said valve, in combination with a fire door, a valve controlling communication from the steam supply to the controlling reservoir, means operatively connecting the fire door to said valve whereby said valve will be opened when the fire door is opened and will be closed when the fire door is closed.

2. An air regulator for a furnace comprising a controlling reservoir of fixed capacity, means to control the supply of steam to the controlling reservoir, a steam jet blower, a valve controlling the supply of steam to said jet blower, means whereby said valve will be normally held closed by the steam pressure, means operated by pressure from the controlling reservoir to open said valve and permit steam to flow to the jet blower when the pressure in said controlling reservoir is substantially equal to the pressure holding the said valve closed, and means to permit steam to flow from the controlling reservoir, whereby the steam supply to the jet blower will be cut off when the pressure in the controlling reservoir is sufficiently reduced.

3. An air regulator for a furnace comprising a controlling reservoir, means for intermittently supplying steam to the controlling reservoir, a steam jet blower, a valve controlling the supply of steam to said jet blower, means whereby said valve will be normally held closed by the steam pressure, means operated by pressure from the controlling reservoir to open said valve and permit steam to flow to the jet blower when the pressure in said controlling reservoir is substantially equal to the pressure holding the said valve closed, and means to permit steam to flow from the controlling reservoir, whereby the steam supply to the jet blower will be cut off when the pressure in the controlling reservoir is sufficiently reduced.

4. An air regulator for a furnace comprising a controlling reservoir of fixed capacity, a fire door, means operated by the fire door in opening and closing to intermittently supply steam to said reservoir, a steam jet blower, a valve controlling the supply of steam to said jet blower, means whereby said valve will be normally held closed by the steam pressure, said means being also operated by pressure from the controlling reservoir to open said valve and permit steam to flow to the jet blower when the pressure in said reservoir is substantially equal to the pressure holding said valve closed, and means to permit steam to flow from the controlling reservoir, whereby the steam supply to the jet blower will be cut off when the pressure in the controlling reservoir is sufficiently reduced.

5. An air regulator for a furnace comprising a controlling reservoir of fixed capacity, means for supplying steam to said reservoir, means for permitting steam to exhaust therefrom, a pipe leading steam to the furnace fire box, a valve in said pipe adapted to close against the steam pressure therein, a piston connected to said valve and of larger area, said piston being exposed to steam pressure to hold said valve closed, means whereby steam from the controlling reservoir will operate on said valve piston and unseat said valve, a fire door, a valve

controlling communication between the steam supply and the controlling reservoir, and means operatively connecting the fire door to said valve whereby said valve will be opened when the fire door is opened and will be closed when the fire door is closed.

6. An air regulator for a furnace comprising a controlling reservoir, means for supplying steam to said reservoir, a pipe leading steam to the furnace fire box, a valve in said pipe adapted to be moved in one direction by the steam pressure therein, a piston connected to and of larger area than said valve, said piston being exposed to the steam pressure in the pipe to move said valve in one direction, means whereby steam from the controlling reservoir will operate on said piston and move it in the opposite direction, a fire door, a valve controlling the pressure in the reservoir, means operatively connecting the fire door to said valve whereby said valve will be opened when the fire door is opened and will be closed when the fire door is closed.

7. An air regulator for a furnace comprising a controlling reservoir, means for supplying steam to said reservoir, a pipe leading steam to the furnace fire box, a valve in said pipe adapted to be moved in one direction by the steam pressure therein, means connected to said valve and exposed to steam pressure to move said valve in one direction, means whereby steam from the controlling reservoir will operate on said valve moving means to move said valve in the opposite direction, a fire door, a valve controlling the pressure in the reservoir and means operatively connecting the fire door to said valve, whereby said valve will be opened when the fire door is opened and will be closed when the fire door is closed.

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

ALFRED COTTON.

Witnesses:
WM. R. DAVIS,
F. R. MILLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."