

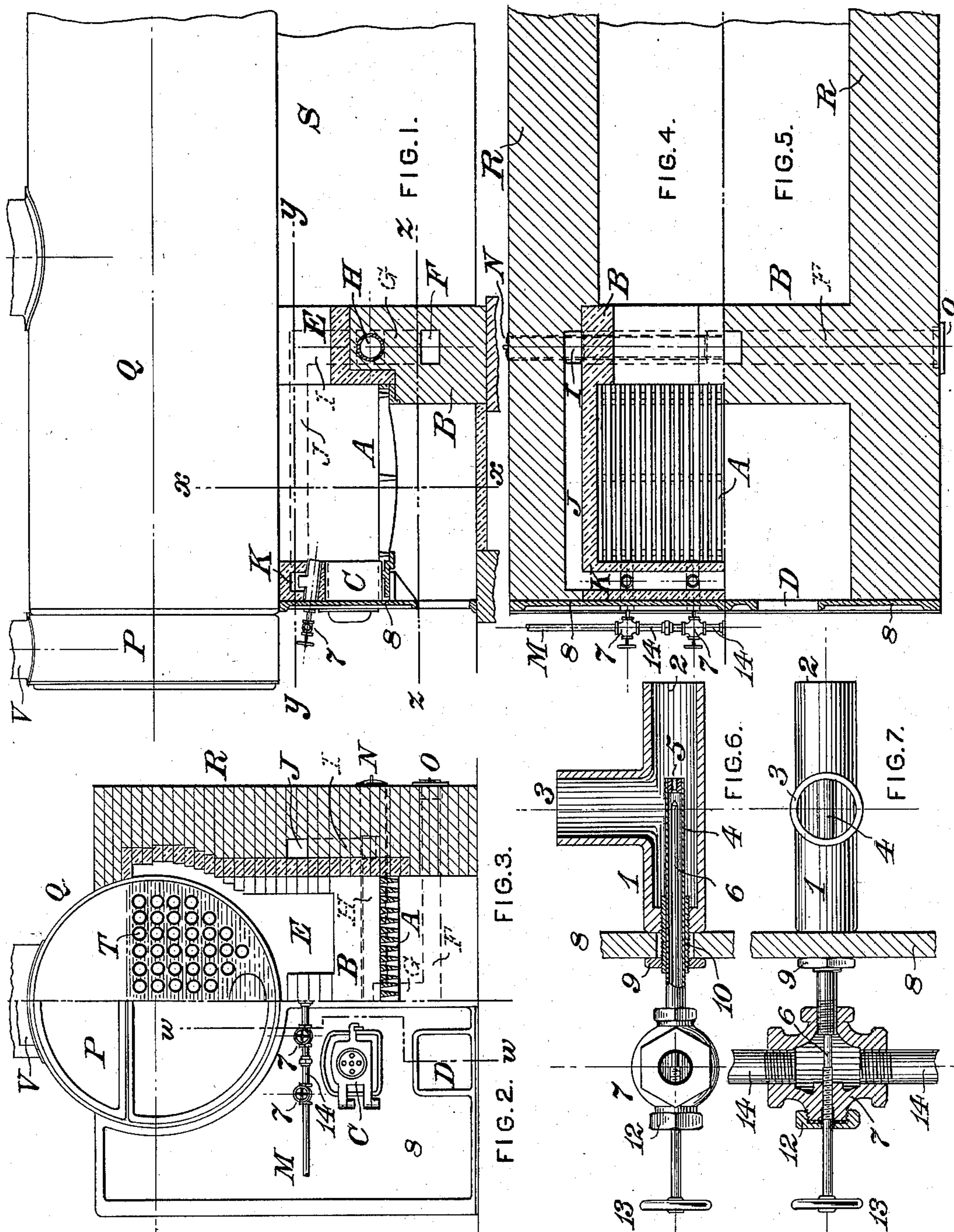
No. 609,225.

Patented Aug. 16, 1898.

C. E. BRINEY.
SMOKE CONSUMING DEVICE.

(Application filed July 3, 1897.)

(No Model.)



WITNESSES:

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SMOKE-CONSUMING DEVICE.

SPECIFICATION forming part of Letters Patent No. 609,225, dated August 16, 1898.

Application filed July 3, 1897. Serial No. 643,479. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BRINEY, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Air-Injectors for Furnaces, of which improvement the following is a specification.

My invention relates to devices for effecting the admission of heated air above the grate-bars of a furnace for the purpose of furnishing an additional supply of oxygen to complete the combustion of any incompletely-burned combustible gases which may arise from the mass of ignited fuel upon the grate-bars.

The object of my invention is to provide a device for mechanically impelling or injecting a controllable supply of air into a furnace which shall be simple and inexpensive in construction, effective in operation, and having its working members so constructed and related as to be protected from the destructive action of the heat of the furnace and capable of convenient and expeditious installation and removal without disturbing the brickwork of the furnace.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal section at the line *ww* of Fig. 2 through a steam-boiler furnace, illustrating an application of my invention thereto; Fig. 2, a view in elevation of one-half of the fire-front thereof; Fig. 3, a transverse section at the line *xx* of Fig. 1; Fig. 4, a half-horizontal section at the line *yy* of Fig. 1; Fig. 5, a similar section at the line *zz* of Fig. 1; Fig. 6, a view, partly in elevation and partly in vertical central section and on an enlarged scale, of an air-injecting device embodying my invention; and Fig. 7, a plan or top view of the same.

My invention is herein exemplified in connection with the furnace of a return tubular steam-boiler Q, which is set between brick side walls R in the ordinary manner. The furnace is closed at its front by a cast-iron fire-front 8, provided with fire-doors C and ash-pit openings D, and extends from the fire-front to a transverse bridge-wall B. The products of combustion from the fuel which is fired upon the grate-bars A pass through

openings E above the bridge-wall into a combustion-chamber S below the boiler, and thence through a back connection (not shown) into the boiler-tubes T, from which they pass into the front connection or uptake P and thence to the exit flue or stack V. The furnace is provided with suitable means for pre-heating the air which is to be supplied above the grate-bars, these not constituting in and of themselves any part of my present invention and being in the instance illustrated a horizontal flue F, passing through the bridge-wall and controlled by end doors or registers O, said flue communicating by a vertical flue G with another flue H, extending through the bridge-wall and having end doors N. The flue H communicates by vertical flues I with horizontal flues J in the side walls R, and these in turn lead into a horizontal flue K, formed in the front wall a short distance above the fire-doors C.

It is obvious that any other suitable and preferred construction of air-heating passages, many of which have long been known in the art—as, for example, flues or passages located in the uptake P or in any other position in which they are subjected to the heat of the gases of combustion—may be equivalently employed in connection with the furnace shown or with any other form of furnace to which my invention may be applied.

In the practice of my invention I provide a device by which air, preferably previously heated by its traverse through a heating flue or flues of the above-specified or any other suitable and preferred description, is supplied to a furnace at any desired point above the grate-bars thereof through the draft or suction induced by a jet of steam or other fluid under pressure. Referring more particularly to Figs. 6 and 7, the preferred form of air-injecting device embodying my invention (any desired number of which devices may be applied to a furnace) is shown as comprising an air receiving and delivery chamber in the form of a T-shaped hollow casting having a cylindrical body 1, a lateral air-inlet passage 3, which communicates in this instance with the air-heating passage K, but which may be connected to any other appropriate avenue of air-supply, and an air outlet or discharge opening 2, leading into the

furnace at one of its ends. The opposite end of the body, which abuts against the fire-front 8, is internally threaded to engage an externally-threaded sleeve or nipple 10, by which the receiving and delivery chamber is connected to the fire-front 8, said sleeve passing freely through the fire-front and being engaged by a nut 9, by which it and the connected air receiving and delivery chamber are firmly secured to the fire-front with the capacity of ready detachment therefrom for removal when required. Fluid under pressure, which is preferably steam from the boiler, is admitted to the air receiving and delivery chamber by a fluid-pressure-supply pipe 4, leading from a point outside the furnace, said pipe fitting removably in the sleeve 10 and terminating, with a discharge-opening 5, formed in a plug at its inner end, adjacent to the bottom of the air-inlet passage 3. The discharge of steam or other fluid under pressure from the opening 5 is regulated and controlled by a supply-valve stem 6, having a valve formed on its inner end, which is adapted to seat on and wholly or partially close the adjacent end of the opening 5. The stem 6 passes through a union or coupling 7, which is connected to the outer end of the supply-pipe 4, a suitable packing-nut 12 being provided to prevent leakage, and carries a hand-wheel 13 on its outer end, by which it is operated. The stem 6 is preferably threaded to engage a nut in the union 7 in the ordinary manner, but may, if desired, be moved directly in and out by hand. Where a plurality of air-injecting devices is employed, as in the instance shown and as is ordinarily the case, steam is supplied to one of the unions 7 by a supply-pipe M, leading from the steam-dome or any other suitable point in the steam-space of the boiler, and to the other unions of the series by pipes 14, by which they are connected one to another.

It will be seen that the velocity and volume of the currents of steam discharged through the openings 5, and consequently the quantity of air injected into the furnace, may be readily and accurately regulated by proper adjustment of the supply-valve stems 6. The volume of air admitted to the furnace may also be controlled by the registers of the air-heating flues or conduits. The air-injecting devices are set at such angle as will insure a thorough mixture of the currents of air and steam with the gaseous products of combustion, and to assist such mixture piers or buttresses of any desired shape may be built up on the bridge-wall B. If desired, the main valve controlling the steam-supply pipe M or the individual supply-valve stems 6 of the air-injecting devices may be connected to an ordinary damper-regulator or to a thermostat for the purpose of making the apparatus as a whole more or less automatic in its action. While my invention is herein shown as applied in a steam-boiler furnace, it is not limited in application to a furnace of such spe-

cific character and is adaptable to use in connection with any furnace having grate-bars with an ash-pit below, a fire-space above, and an exit-opening for the products of combustion.

A special feature of advantage of my improvement is found in the fact that the working parts are effectively protected from the destructive action of the heat of the furnace and may be removed and replaced whenever required without disturbing the brickwork or any other portion of the furnace structure. The valve of the supply-stem 6, being of the "needle" class, can be readily reground when worn, and all the steam connections being outside the furnace they are accessible for renewal or repair whenever desired. The form of the air receiving and delivery chamber is such that it can be readily inserted in and removed from the brickwork of the setting without any material disturbance thereof.

I claim as my invention and desire to secure by Letters Patent—

1. In an air-injector for furnaces, the combination, substantially as set forth, of an air receiving and delivery chamber, having a body, a lateral air-inlet passage adapted to communicate with an air-heating conduit in the wall of a furnace, and an end passage for the discharge of air into a furnace, a threaded sleeve engaging the end of the body opposite the discharge-passage, a nut engaging said sleeve for clamping the same and the connected chamber detachably to a fire-front, a fluid-pressure-supply pipe passing freely through said sleeve and having a discharge-opening within the air receiving and delivery chamber, and an operating-stem passing through the supply-pipe and controlling the discharge-opening thereof.

2. In an air-injector for furnaces, the combination substantially as set forth, of an air receiving and delivery chamber, having a body, a lateral air-inlet passage adapted to communicate with an air-heating conduit in the wall of a furnace and an end passage for the discharge of air into a furnace, means for connecting said chamber detachably to the inside of a furnace-wall, a fluid-pressure-supply pipe extending into and fitting freely in said chamber and having a discharge-opening formed in a plug at its inner end, a union or coupling connected to said pipe, in position to be located exterior to a furnace-wall, an operating-stem passing through the union and fluid-pressure-supply pipe, and removable through the outer ends thereof, said stem being adapted to seat at the inner end of and control the discharge-opening, and a supply-pipe connected to the union.

3. The combination, substantially as set forth, of two or more air receiving and delivery chambers, each having an inlet adapted to communicate with an air-heating passage, means for connecting said chambers detachably to the inside of a furnace-wall, fluid-pressure-supply pipes, each fitting freely in

one of said chambers and having a discharge-opening therein between its heated-air inlet and its delivery passage, unions or couplings, each connected to one of said pipes, in position to be located exterior to a furnace-wall, 5 operating-stems, each passing through one of the unions and controlling the discharge-opening of the supply-pipe connected thereto, said stems being removable through the 10 outer ends of the supply-pipes and unions, pipes connecting the several unions one to another, and a main supply-pipe, connected to one of said unions.

4. In an air-injector for furnaces, a fluid- 15 pressure device adapted to be fitted remov-

ably in an air receiving and delivery chamber, and composed of a supply-pipe having one of its ends closed by a plug in which is formed a discharge-opening, a union detachably connected to the opposite end of said 20 pipe and fitted for connection with a source of fluid-pressure, and an operating-stem passing through said union and having its end adapted to seat in the plug of the supply-pipe and control the discharge-opening thereof, 25 substantially as set forth.

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Witnesses:

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