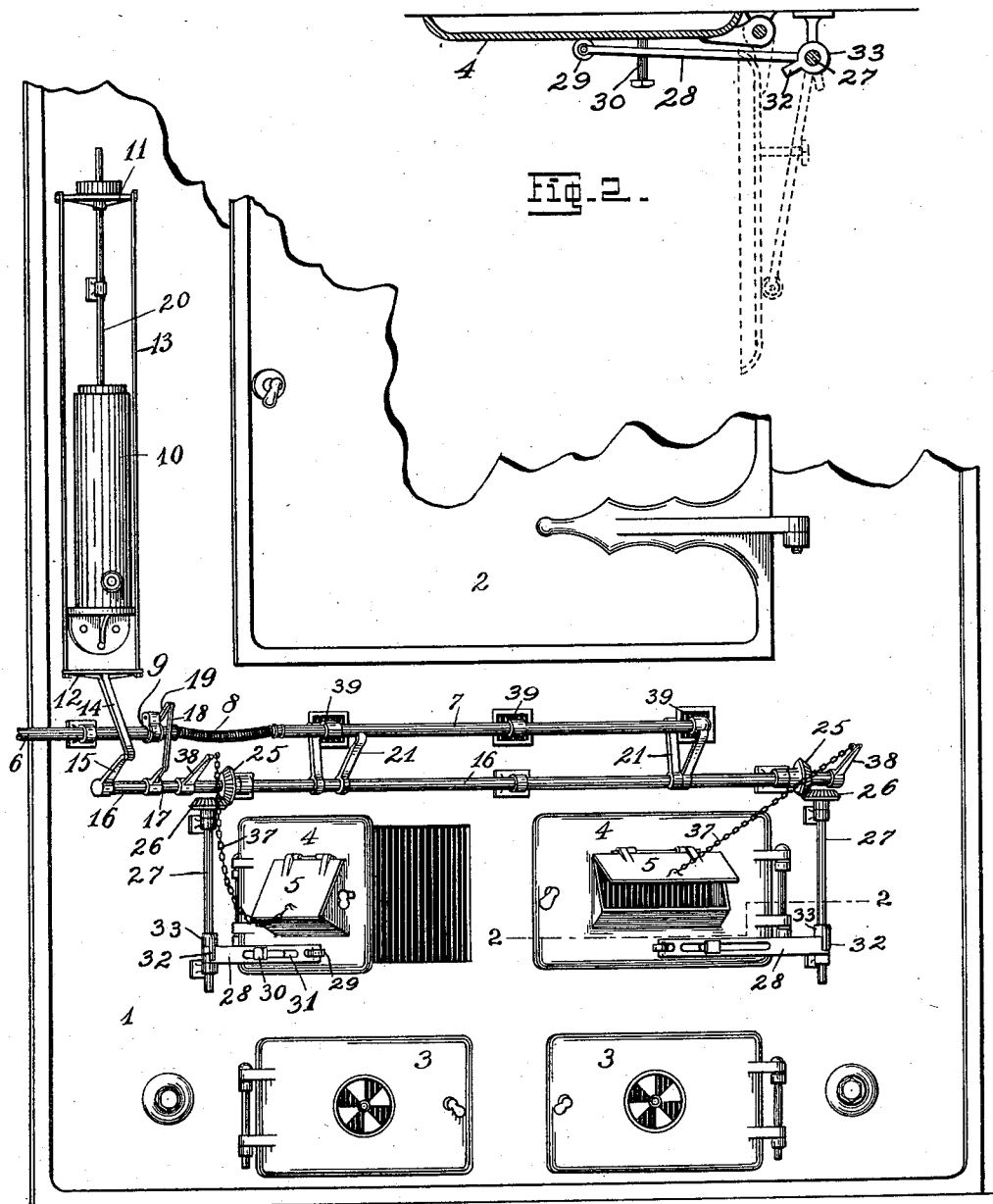


E. HONESS.
 DEVICE FOR PROMOTING COMBUSTION IN FURNACES.
 APPLICATION FILED MAY 9, 1906.

1,028,879.

Patented June 11, 1912.

2 SHEETS—SHEET 1.



WITNESSES: Fig. 1.

Brennan West.

Cassie M. O'boy.

Edwin Honess, INVENTOR

BY
 Bates, Foster & Hull,
 ATTORNEYS.

1,028,879.

2 SHEETS—SHEET 2.

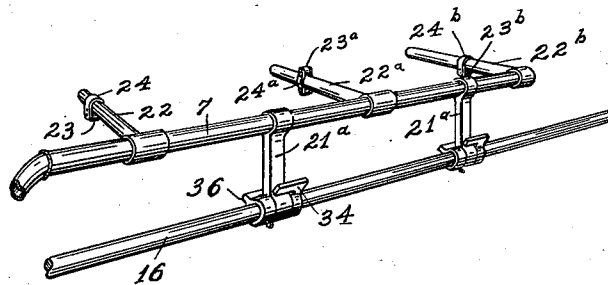


Fig. 3

Fig. 4

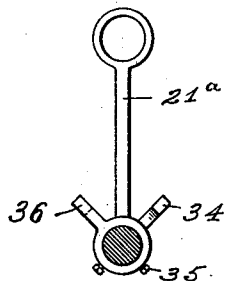
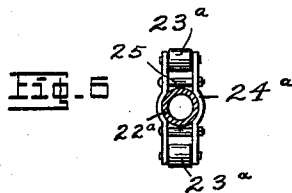
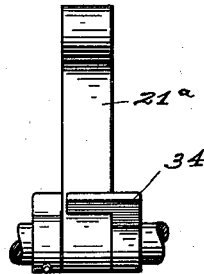


Fig-5



WITNESSES:

Brennan Bld est.
Ludo H. Keller.

INVENTOR,

INVENTOR,
Edwin Housse,
BY
Bates, Founts & Hull
ATTYS.

UNITED STATES PATENT OFFICE.

EDWIN HONESS, OF CLEVELAND, OHIO.

DEVICE FOR PROMOTING COMBUSTION IN FURNACES.

1,028,879.

Specification of Letters Patent.

Patented June 11, 1912.

Application filed May 9, 1906. Serial No. 315,918.

To all whom it may concern:

Be it known that I, EDWIN HONESS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Devices for Promoting Combustion in Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to apparatus for obtaining practically perfect combustion in furnaces and more especially to an apparatus of the general character shown in my application for patent filed May 24, 1904, Serial Number 209,589. In furnaces having attached thereto smoke-consuming devices of the character disclosed in such application, the operator sometimes, either purposely or otherwise, neglects to set the air-supplying apparatus into operation, with the result that clouds of smoke escape from the furnace.

The object of the invention is to render the operation of the air-supplying apparatus automatic, making it dependent upon some operation which must be performed in the course of stoking, as the operation of opening the furnace doors.

A further object of the invention is to prevent the deterioration of the nozzles which inject air into the furnace by automatically withdrawing them from the zone of intense heat after their office of so injecting air has been completed.

Generally speaking, the invention may be defined as consisting of the combinations of elements, for the purposes above specified, embodied in the claims hereto annexed.

In the drawings; Figure 1 represents a front elevation of a furnace having my invention applied thereto, certain parts being shown in perspective; Fig. 2 represents an enlarged sectional view on the line 2—2 of Fig. 1; Fig. 3 represents a perspective view of the steam-supplying pipe and nozzles, showing the manner in which said pipe and nozzles are operated to insert the nozzles into and withdraw them from the zone of intense heat in the furnace, said figure showing a modification of the form of connections between the pipe and shaft illustrated in Fig. 1. Figs. 4 and 5 represent details of the device for operating the steam supply pipe; and Fig. 6 represents a sectional detail of one of the nozzles.

Describing the parts by reference characters 1 represents the front of the furnace and boiler; 2 represents the door for the front of the boiler; 3, the ash-pit doors; 4 the fuel doors, each having an air door 5; 6, the steam pipe for supplying steam to the air injecting nozzles, said pipe being connected to the nozzle pipe 7 by means of a suitable length of flexible pipe 8; 9 the valve by which steam is supplied from the pipe 6 to the pipe 7; and to the regulator 10 for determining the length of time that the air injecting apparatus shall operate. The valve 9 is a quick opening and quick closing valve of any preferred type, such, for instance, as referred to in my application No. 209,589. The furnace front, doors, and regulator are substantially the same in construction as shown in my application above referred to. The regulator, however, is provided with an upper cross-head 11 and a lower cross head 12 connected by rods 13. Projecting from the lower cross head is an arm 14, the lower end of which is pivotally connected to an arm 15 rigid with the shaft 16.

The shaft 16 is part of the train of mechanism for automatically setting in operation the air injecting apparatus and for automatically withdrawing the nozzles from the zone of intense heat after the action of the said air injecting apparatus has ceased. It is connected with the valve 9 by means of an arm or lever 17, link 18 and lever 19. It will be apparent that, by the rotation of this shaft in one direction, the plunger rod 20 of the regulator will be elevated and the valve 9 will be operated in the desired direction (in this instance to open the same). The shaft 16 is also provided with two or more pairs of arms 21, said arms being rigid with said shaft. The upper ends of said arms are curved and spaced apart and are for the purpose of inserting the nozzles into the furnace preliminarily to their action as injectors and of withdrawing said nozzles a sufficient distance to prevent injury by heat at the close of such operation. The manner in which this is accomplished will be described hereinafter.

The pipe 7 is provided with a suitable number of nozzles, three such nozzles, 22, 22^a, 22^b being shown in the drawing. Each of these nozzles projects into an air opening or port 39, extending through the front wall of the furnace into the fire box thereof in about the position shown for the nozzles

in my application No. 209,589. To prevent binding of the nozzles against the walls of the ports and to facilitate their movement within said ports, each nozzle is provided with one or more rollers. As will appear more particularly from Fig. 3, the nozzle 22, is provided with a roller 23 carried below and near the discharge or inner end thereof, said roller being supported by a strap 24. The nozzle 22^a is provided with a roller above and below the same, as shown at 23^a, these rollers being carried between straps 24^a secured to the nozzle in any convenient manner, as by bolts 25 extending through said straps above and below the nozzle. These rollers are carried near the middle of the nozzle. The nozzle 22^b is provided with a roller 23^b carried beneath the same by a strap 24^b in the same manner as the roller 23 is carried by the nozzle 22, with the exception that the roller 23^b is near the outer end of the nozzle, being so located that it will not be entirely withdrawn from its port when the pipe 7 is moved away from the furnace wall to the end of its stroke.

To operate the shaft 16 automatically, and with it the regulator, valve 9, and pipe 7, I connect said shaft operatively to the fuel doors 4. As will appear more particularly from Figs. 1 and 2, the shaft 16 is provided with a suitable number of bevel gears 25, there being one such gear for each fuel door. These gears mesh with similar gears 26 carried by vertical shafts 27, each shaft being journaled adjacent the hinges of each door 4.

28 designates an arm which is sleeved onto the shaft 27, said arm having at the free end thereof a roller 29 adapted to engage the door 4. A bolt 30 extending through a slot 31 in the arm 28 holds said arm in operative relation to the door 4. 32 designates a dog which is rigidly secured to the shaft 27, as by means of a sleeve 33, said dog extending downwardly into the path of movement of the arm 28, sufficient lost motion being provided between said arm and dog to prevent undue rotation of shaft 16 by the opening of a door 4.

It will be apparent from the foregoing description that, when a door is opened a sufficient distance to provide for stoking, the shaft 27 will be rotated and this motion will be transmitted to the shaft 16. The rotation of the shaft 16 lifts the plunger rod 20 and also opens the valve 9, with the result that steam is supplied to the nozzles 22, 22^a and 22^b; supplying air to the furnace through the ports 39 in the manner described in my application hereinbefore referred to and in my Patent No. 720,695 granted February 17, 1903. As the plunger rod 20 descends, the shaft is rotated in the reverse direction and the furnace door will

be closed thereby in the event that the operator does not close the same by hand. Owing to the arrangement of the arm 28 and dog 32, it will be apparent that the door may be closed after the stoking operation without interfering with the operation of the injecting apparatus, which will continue to operate as long as the valve 9 is opened, that is, until the plunger 20 reaches the end of its down stroke.

By means of the arms 21 the rotation of the shaft 16 automatically inserts the nozzles their full length into the ports 23, before the plunger rod 20 begins to descend and also withdraws such nozzles a sufficient distance when the rod 20 has about completed its down stroke. This is accomplished by providing a proper space between the upper ends of the arms 21.

In Fig. 3, I have shown a modification of the arrangement whereby the rotation of the shaft 16 withdraws the nozzles from the ports and reinserts them into the same. In this case, I employ two or more arms 21^a sleeved onto the shaft 16 and the pipe 7. To operate these arms at the proper times and thereby move the pipe 7 toward and from the furnace wall, I provide a dog 34 which may be secured to the shaft as by the set screw 35 and a dog 36 on the opposite side of the arm 21^a secured in like manner to the shaft 16. By means of these dogs, the arm 21^a is rotated by the shaft 16 when the plunger rod 20 has nearly reached the end of its descent, and said arm and pipe 7 are moved in a direction to withdraw the tips of the nozzles from the interior of the fire box. It is not necessary to withdraw the nozzles entirely from the ports, as a movement of about 2 inches will be sufficient, with nozzles of the length which I employ, to remove the ends thereof a sufficient distance from the interior of the fire box to prevent their injury by the intense heat within the same. By means of the adjustable dogs 34 and 36, the rotation imparted to the shaft 16 by opening a fuel door and the reverse rotation imparted to the same by the descent of the rod 20 may be caused to impart the desired movement to the nozzles to insert them at the beginning of the operation of the air-injecting apparatus and to withdraw them at the close of such operation.

As will appear from Fig. 1, the opening of either of the doors will automatically set the regulator in operation, and the smoke-consuming appliance will operate whether one or both doors are open.

Each of the air doors 5 is connected by a chain 37 with an arm 38 rigid with the shaft 16. The length of this chain is sufficient to enable a door 4 to close, when the injecting apparatus is not in operation, without lifting the door 5. When, however, the shaft

16 has been rotated by opening one of the doors 4, the air door 5 of the other fuel door will be opened by the rotation of the arm 38, gradually closing as the shaft 16 is rotated in the reverse direction by the plunger rod 20 and entirely closing at or about the end of the return movement of said shaft 16.

From the construction herein described, it will be apparent that the operation of the air-injecting device is entirely automatic, such apparatus being put in operation by the act of opening any or all of the fuel doors for the purpose of stoking. It will be also apparent that, by opening any or all of the fuel doors 4, the pipe 7 may be moved toward the furnace wall, the flexible connection 8 permitting such movement, and that when the blast is at an end, the said pipe will be moved away from the wall, withdrawing the nozzles from the injurious effects of the heat within the furnace. The automatic accomplishing of these results has proven of great utility in the practical operation of smoke-consuming devices, particularly where an operator is not disposed to give such apparatus fair treatment.

While I have necessarily described in detail the embodiment of my invention herein set forth, it will be obvious that such details may be departed from or varied more or less without avoiding the spirit of my invention, and I do not propose to be limited to such specific details except as they may appear in the claims hereto annexed or may be rendered necessary by the prior state of the art.

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

1. The combination, with a furnace wall having ports therein, of a fluid supply pipe extending along said wall, nozzles on said pipe projecting into said ports, a shaft adjacent said pipe, said shaft having one or more arms engaging said pipe, a fuel door, and means operated by the opening of said door for rotating said shaft in a direction to move the pipe toward the furnace wall, substantially as specified.

2. The combination, with a furnace wall having ports therein, of a fluid supply pipe extending along said wall, nozzles on said pipe projecting into said ports, a shaft adjacent said pipe, said shaft having one or more arms engaging said pipe, a fuel door, and connections between said door and shaft whereby the opening of said door will rotate said shaft in a direction to move the pipe toward the furnace walls while permitting the closing of the door without operating said shaft, substantially as specified.

3. The combination, with the front furnace wall having ports therein, of a fluid supply pipe extending along said front wall and having nozzles projecting into said

ports, a shaft, a valve in said pipe connected with said shaft, a time regulating device operating said shaft in one direction, a pair of fuel doors, means operated by the opening of either of said doors for rotating said shaft in the opposite direction, and means carried by said shaft adapted to engage said supply pipe to move the same toward and from the furnace wall, substantially as specified.

4. The combination, with a furnace wall having ports therein, of a fuel supply pipe having nozzles projecting into said ports, a shaft adjacent said pipe, positive connections between said shaft and said pipe whereby the rotation of said shaft may move the pipe toward and from the furnace wall, time regulating means for rotating said shaft in one direction, a fuel door, and means operated by the movement of said door for rotating said shaft in the opposite direction, substantially as specified.

5. The combination, with a furnace wall having ports therein, of a fluid supply pipe having nozzles projecting into said ports, a shaft adjacent said pipe, a lost motion connection between said shaft and pipe whereby the rotation of the shaft may move said pipe toward and from the furnace wall, a fuel door, means operated by said door for rotating said shaft in one direction, and means for automatically rotating said shaft in the opposite direction, substantially as specified.

6. The combination, with a furnace, of a supply pipe having nozzles projecting into the furnace wall, and adapted to supply fluid to the furnace to promote combustion therein, a valve in said pipe, a rock-shaft extending substantially parallel with said pipe, fuel doors, connections between each of said doors and said rock-shaft whereby the opening of each door will rock said shaft, a connection between said shaft and said valve whereby the rotation imparted to the shaft by the opening of a door will open said valve, a device for regulating the time for which said valve shall be open and adapted to rock the shaft in the opposite direction, and a lost-motion connection between said rock-shaft and said pipe whereby the supply pipe is moved toward the furnace wall by the rotation of the shaft to open the valve and is moved away from said wall at approximately the end of its rotation in the opposite direction, substantially as specified.

7. The combination, with a furnace wall having a port therein, an injecting nozzle in said port, means for moving said nozzle longitudinally of said port, and rollers applied to said nozzle above and below the same, substantially as specified.

8. The combination, with a furnace wall having ports therein, of a pipe extending

along said wall and having a nozzle projecting into each port, rollers on the middle nozzle, applied to the top and bottom thereof, a roller applied to the under side
 5 of each of the other nozzles, and means for moving said pipe toward and from the furnace wall, substantially as specified.

9. The combination, with a furnace, of a supply pipe having nozzles projecting into
 10 the furnace wall and adapted to supply fluid to the furnace to promote combustion therein, a valve in said pipe, a rock-shaft
 extending substantially parallel with said pipe, fuel doors, a shaft adjacent to each
 15 of said fuel doors and each having a gear thereon meshing with a corresponding gear on the rock shaft, an arm carried by each of
 said latter shafts and sleeved thereon, a dog rigid with each of said latter shafts and
 20 projecting into the path of movement of the arm thereon, a valve in the supply pipe, a connection between said valve and
 said rock shaft, a time-regulating device, and a connection between said device and
 25 said rock shaft.

10. The combination, with a furnace having a wall provided with ports, of a supply pipe extending along said wall and having
 nozzles projecting into such ports, a valve in said pipe, a rock-shaft arranged substan- 30
 tially parallel with said pipe, a plurality of fuel doors, a shaft for each of said doors, each having a gear meshing with a corresponding gear on the rock shaft, an arm
 35 sleeved on each of the shafts which are adjacent to the doors, each of said arms having a roller adapted to engage a door and having a pin-and-slot connection with said door, a dog carried by each of the shafts
 adjacent the fuel doors and extending into 40
 the path of movement of the arm connected thereto, and connections between the rock shaft and the valve in the supply pipe.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses. 45

EDWIN HONESS.

Witnesses:

W. L. MCGARRELL,
 J. B. HULL.

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