

A. G. KRIEG.  
SMOKE CONSUMER.

APPLICATION FILED JAN. 17, 1908.

982,970.

Patented Jan. 31, 1911.

2 SHEETS-SHEET 1.

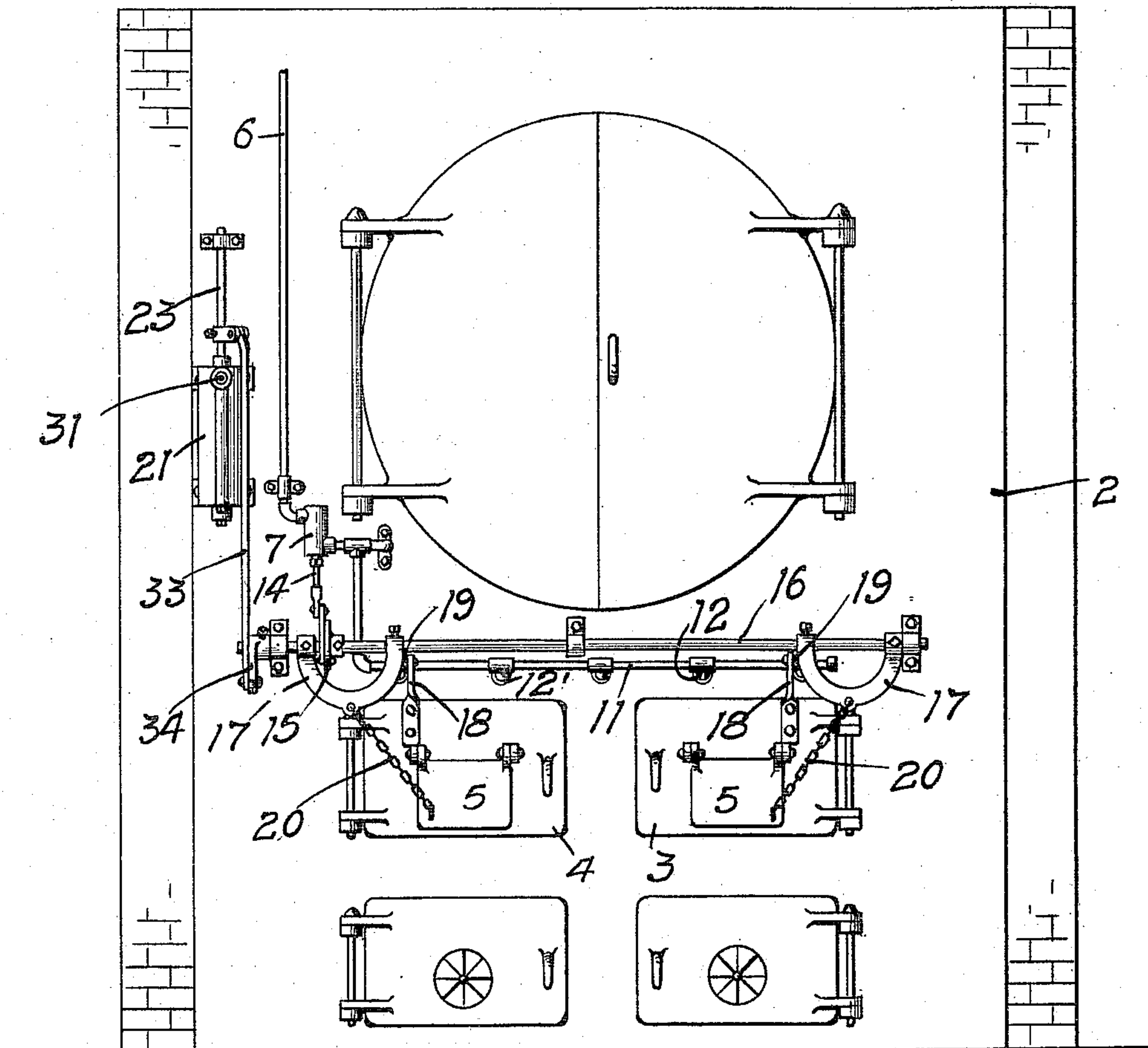


Fig. 1.

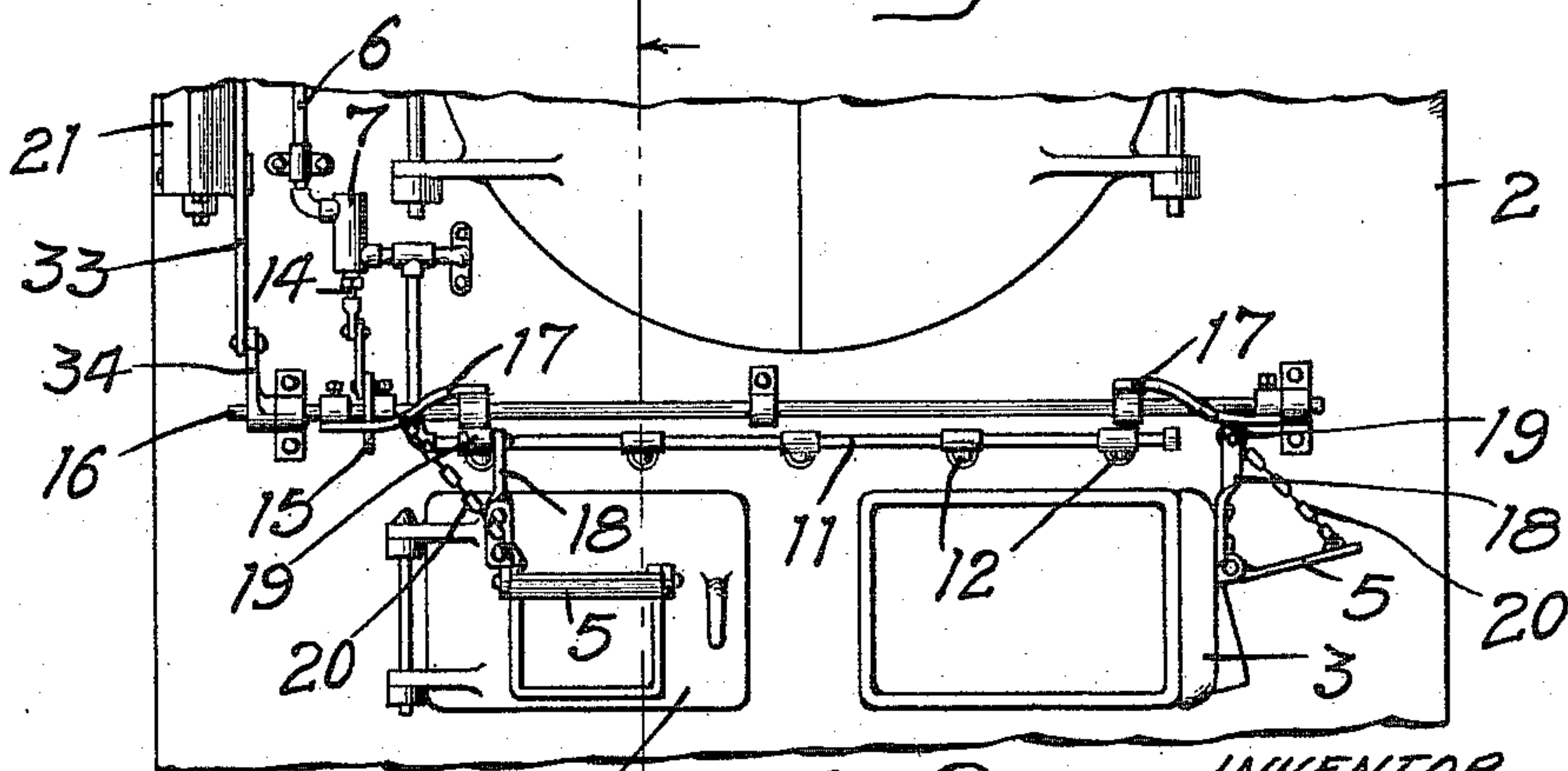


Fig. 2.

WITNESSES  
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INVENTOR  
AUGUST G. KRIEG

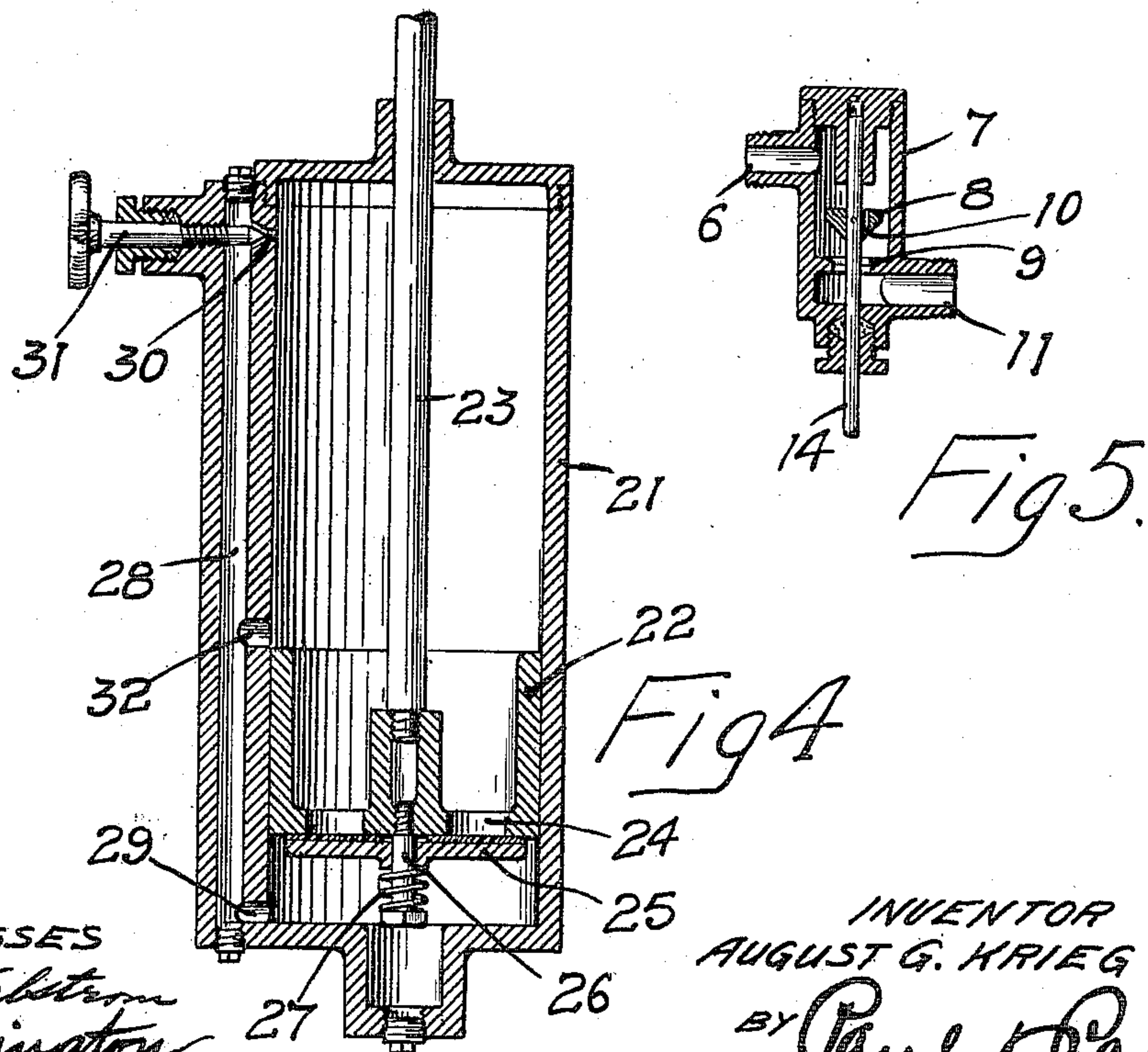
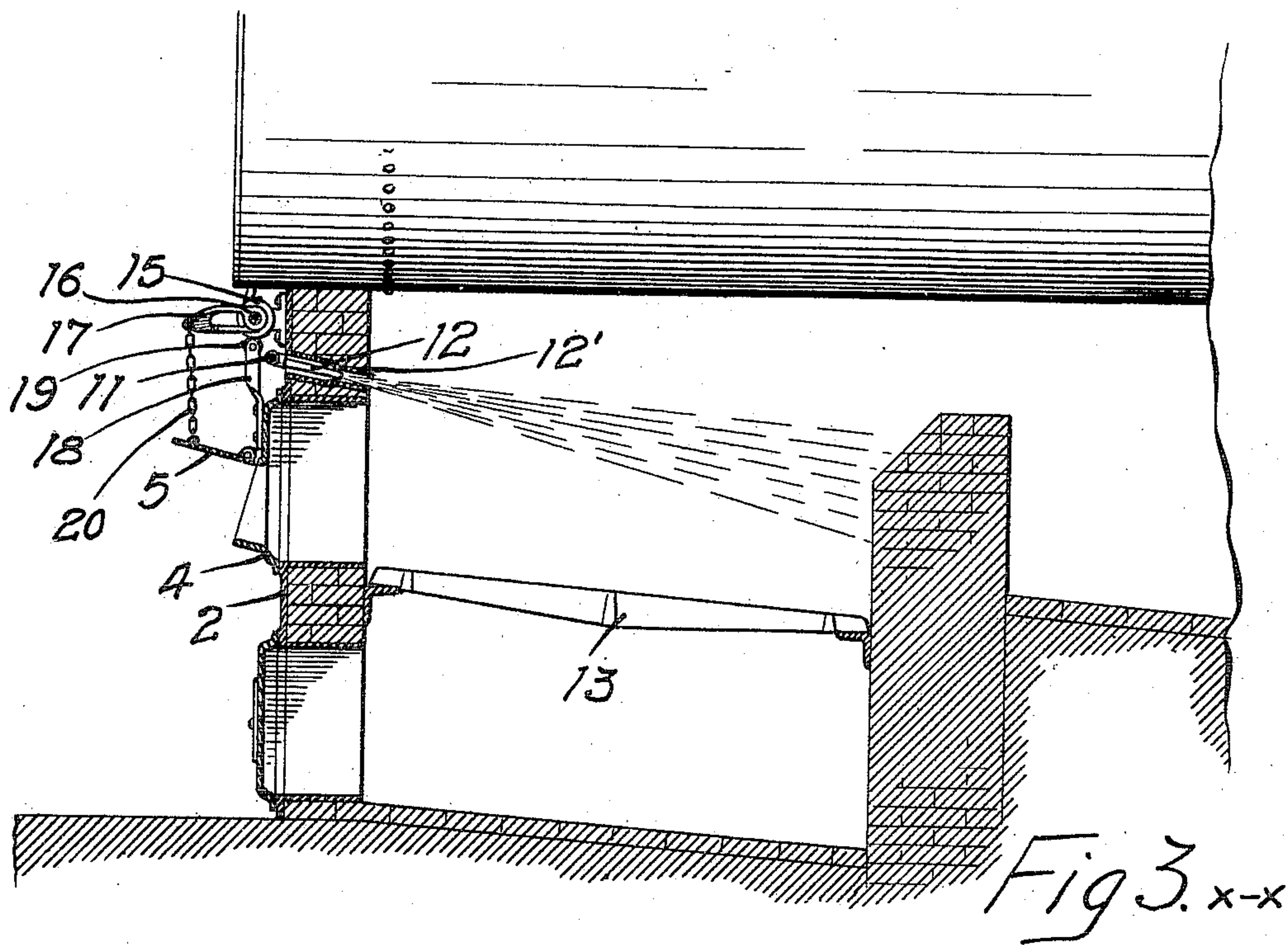
BY *Paul Paul*  
HIS ATTORNEYS

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2 SHEETS—SHEET 2.



WITNESSES  
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INVENTOR  
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# UNITED STATES PATENT OFFICE.

AUGUST G. KRIEG, OF MINNEAPOLIS, MINNESOTA.

SMOKE-CONSUMER.

982,970.

Specification of Letters Patent.

Patented Jan. 31, 1911.

Application filed January 17, 1908. Serial No. 411,236.

*To all whom it may concern:*

Be it known that I, AUGUST G. KRIEG, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Smoke-Consumers, of which the following is a specification.

The object of my invention is to provide an apparatus for attachment to the front of a boiler for the purpose of improving the combustion of the fuel and preventing the discharge of volumes of black smoke from the stack.

A further object is to provide means whereby the gases will be prevented from coming in contact with the lower portion of the boiler and being cooled thereby when the fuel doors are opened.

A further object is to provide an apparatus capable of application to any type of boiler and one which is very simple in construction, easily operated and not likely to get out of order.

My invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming part of this specification, Figure 1 is a front elevation of a stationary boiler with my invention applied thereto showing the normal position of the parts. Fig. 2 is a detail view illustrating the position of the parts when the fuel doors or one of them are open. Fig. 3 is a vertical sectional view on the line  $x-x$  of Fig. 1. Fig. 4 is a vertical sectional view of the dash pot device by means of which the closing of the draft doors is regulated. Fig. 5 is a sectional view of the valve by means of which the delivery of steam to the jets in front of the fire is regulated.

In the drawing, 2 represents a boiler front having fuel doors 3 and 4 provided with the usual doors 5.

6 is a live steam pipe connected to a valve 7 having a disk 8 normally held on a seat 9 by the pressure of the steam and having a by-pass port 10 through which a small amount of steam is admitted to a horizontal pipe 11 on the front of the boiler, and a series of nozzles 12 connected thereto. The nozzles 12 extend into pipes 12' that are mounted in the wall of the boiler and have inner ends of less diameter than their outer ends. When steam is admitted to the nozzles the suction will cause an envelop of cold air to be formed around the nozzles and

inclosing the steam jets as they enter the fire box will prevent the jets from spreading vertically in the box and will cause them to be projected over the fire and against the bridge wall. The nozzles extending only part way through the inclosing pipes 12' will be protected thereby against the heat of the fire box. There may be any number of these nozzles according to the size of the boiler and the amount of steam it is desired to project into the fire box. The effect of delivering a volume of steam over the fire and mingling it with the gases and with the oxygen of the air entering through the open doors 5 is to produce almost perfect combustion of the gases and prevent the discharge of black smoke from the boiler stack.

The stem 14 of the valve 8 is pivotally connected to a crank 15 on a rock shaft 16 having bearings on the front of the boiler. Yokes 17 are secured to said rock shaft and straps 18 mounted on the fuel doors 3 and 4 have anti-friction rollers 19 which bear on the yokes 17 and cause them to swing upwardly and rock the shaft 16 when either one of the fuel doors is opened. The yokes 17 have flexible connections 20 with the draft doors 5 so that when the fuel doors are closed after a fresh supply of fuel has been put on the fire the act of closing these doors will raise the draft doors 5 and allow a sufficient volume of air to pass into the fire-box to produce combustion of the gases.

The immediate closing of the draft doors 5 when the fuel doors are closed is prevented by means of a dash pot device which I have illustrated in detail in Fig. 4. As here shown 21 represents a cylinder and 22 a piston therein having a rod 23. The piston 22 has ports 24 in its lower wall normally closed by a valve 25 that is slidable on a stud 26 and held in a raised position on said stud by a spring 27. A passage 28 is provided in the wall of the cylinder having a port 29 at its lower end communicating with the space beneath the piston, and a port 30 at its upper end adapted to be closed by a valve 31 and an intermediate port 32. This piston is supplied with a quantity of inelastic fluid such as oil, and when the piston is raised to the top of the cylinder the oil will displace the valve 25 and flow through the ports 24 into the space beneath the piston. When the piston descends the oil will flow up through the passage 28 and past the valve 31 into the space above the piston, the



time of such passage being regulated by the adjustment of the valve 31. As soon as the piston has descended below the port 32 a greater volume of oil may flow into the chamber above it and the speed of descent of the piston will be materially increased. The port 32 allowing the flow of a considerable portion of the inelastic fluid into the cylinder insures the closing of the doors 5 and the return of the mechanism to its normal position. Generally in devices of this kind a sticking occurs when the dash pot plunger draws near the end of its stroke and is often necessary for the fireman to return the dash pot plunger and the draft doors to their normal position by hand.

The piston rod 23 is connected by a rod 33 with a crank 34 on the shaft 16. The rocking of this shaft by the opening of the fuel doors will raise the rod 23 and with it the piston to the top of the cylinder. When the fuel doors are closed the piston will descend slowly as described, the shaft will be slowly returned to its normal position and the draft doors 5 will close gradually.

This apparatus is extremely simple and durable in its construction. Its application to the doors of the boiler is direct and the crank connection between the steam valve and the rock shaft is simple and positive in action. There are no parts to get out of order and none of the mechanism is in the way of the convenient opening and closing of the fuel doors.

In the operation of the apparatus steam will be admitted to the nozzles when the fuel doors are open and a blanket of steam will be directed in the fire box over the fire, preventing the gases from rising and contacting with the under side of the boiler and becoming cooled by such contact. When the fuel is fed to the fire the gases generated will mingle with the steam jets and with the air drawn in over the fire through the openings in the fuel doors. This will produce a mixture of oxygen and steam with the gases which, upon ignition will effect a very complete combustion of the gases.

I claim as my invention:—

1. In a device of the class described, a cylinder having a passage in its wall extending from end to end thereof and ports near the ends of the cylinder communicating with said passage, a needle valve arranged to close one of said ports, said cylinder having a third port near its middle portion leading to said passage, a piston within said cylinder having comparatively large ports on each side of its rod, a stud carried by said piston concentric substantially with the piston rod, a valve disk slidably mounted on said stud and adapted to close the ports through said piston, a spring mounted on said stud and normally holding said valve in its closed position, but permitting said

valve to open when said piston is raised, the head of said cylinder having a recess therein to receive said stud and allow said piston to travel from end to end of said cylinder, said cylinder being adapted to contain a supply of inelastic fluid, and the movement of said piston downward closing its valve and forcing the inelastic fluid through said passage into the space above said piston, and the intermediate port leading to said passage being exposed when said piston has descended to a predetermined point, whereby the discharge of inelastic fluid from said passage into the space above said piston will be accelerated, for the purpose specified.

2. The combination, with a boiler front having a fuel opening and a door therefor and a draft door in said fuel door, of steam nozzles projecting through said front, a steam supply pipe connected with said nozzles, a valve provided in said pipe and normally closed, a rock shaft mounted on said boiler front above and near said fuel door, a crank secured on said rock shaft and pivotally connected with said valve, a yoke secured on said rock shaft, a strap mounted on said fuel door and having a bearing on said yoke, whereby, when the door is opened, said yoke and shaft will be rocked and said valve opened, flexible means connecting said yoke with said draft door, and means connected with said shaft for slowly rocking it and returning said yoke and draft door to their normal position after the fuel door is closed.

3. The combination, with a boiler front having fuel openings and doors therefor, and draft doors in each fuel door, of steam nozzles projecting through said front, a steam supply pipe connected with said nozzles, a valve provided in said pipe and normally closing the same against the passage of steam to said nozzles, a rock shaft mounted on said boiler front above said fuel doors and near the same and operatively connected with said valve, yokes secured to each end of said rock shaft, flexible means connecting said yokes with said draft doors, straps secured to said fuel doors and having bearings on said yokes, whereby, when said fuel doors are opened, said shaft and said yokes will be rocked and said valve will be opened to admit steam to said nozzles, a crank secured to said rock shaft and means including an inelastic fluid controlled mechanism connected with said crank for returning said yokes and draft doors to their normal position when said fuel doors are closed.

In witness whereof, I have hereunto set my hand this 10th day of January, 1908.

AUGUST G. KRIEG.

Witnesses:

J. A. BYINGTON,  
C. G. HANSON.