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Patented Apr. 30, 1901.

O. J. COUGHLIN.

AUTOMATIC WATER FEED APPARATUS FOR STEAM BOILERS.

(No Model.)

(Application filed Mar. 2, 1900.)

2 Sheets—Sheet 1

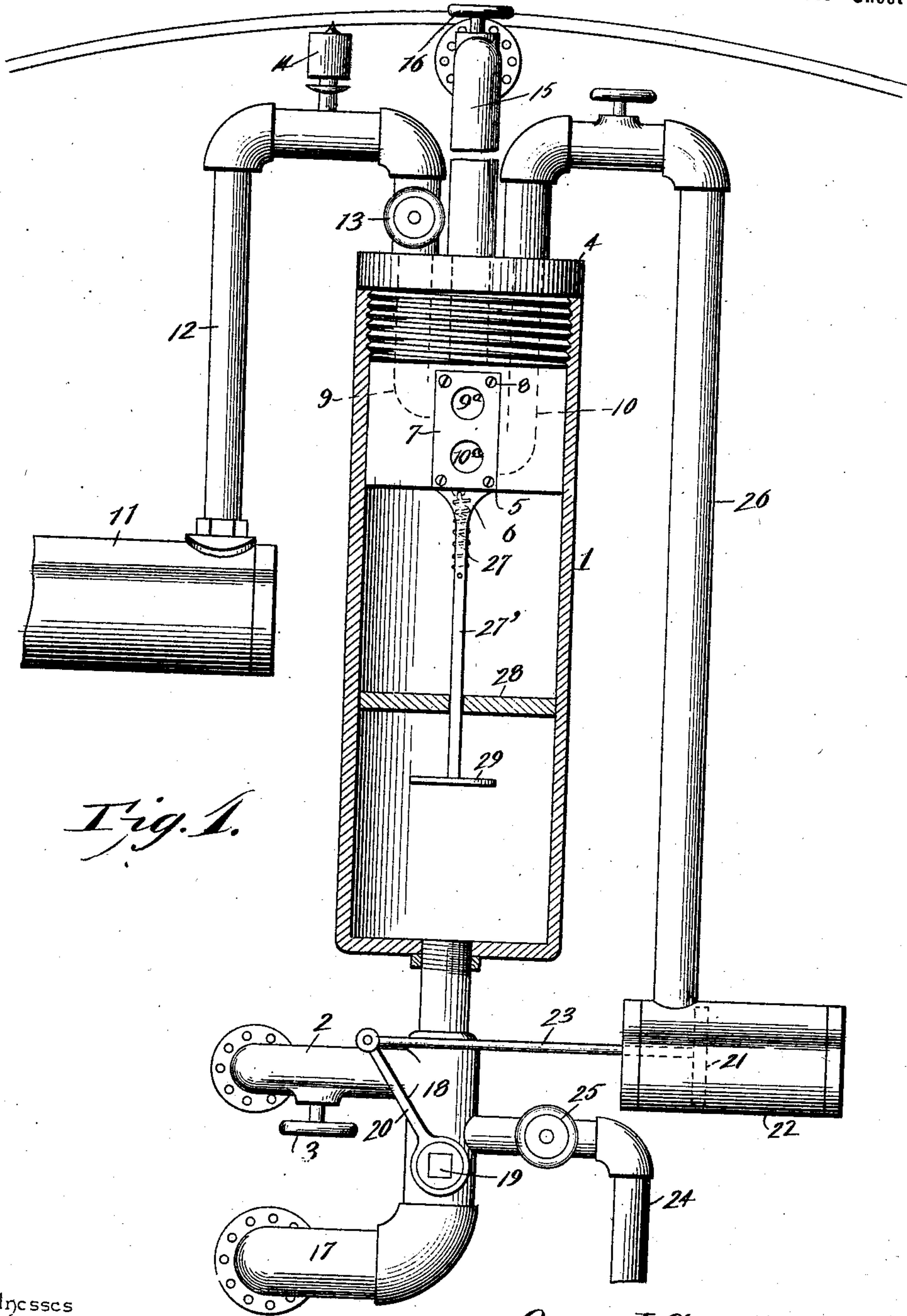


Fig. 1.

Witnesses

L. Z. Walker.

Joe Garner

By *Fritz* Attorneys.

Owen J. Coughlin Invento

Chas. Knowlton.

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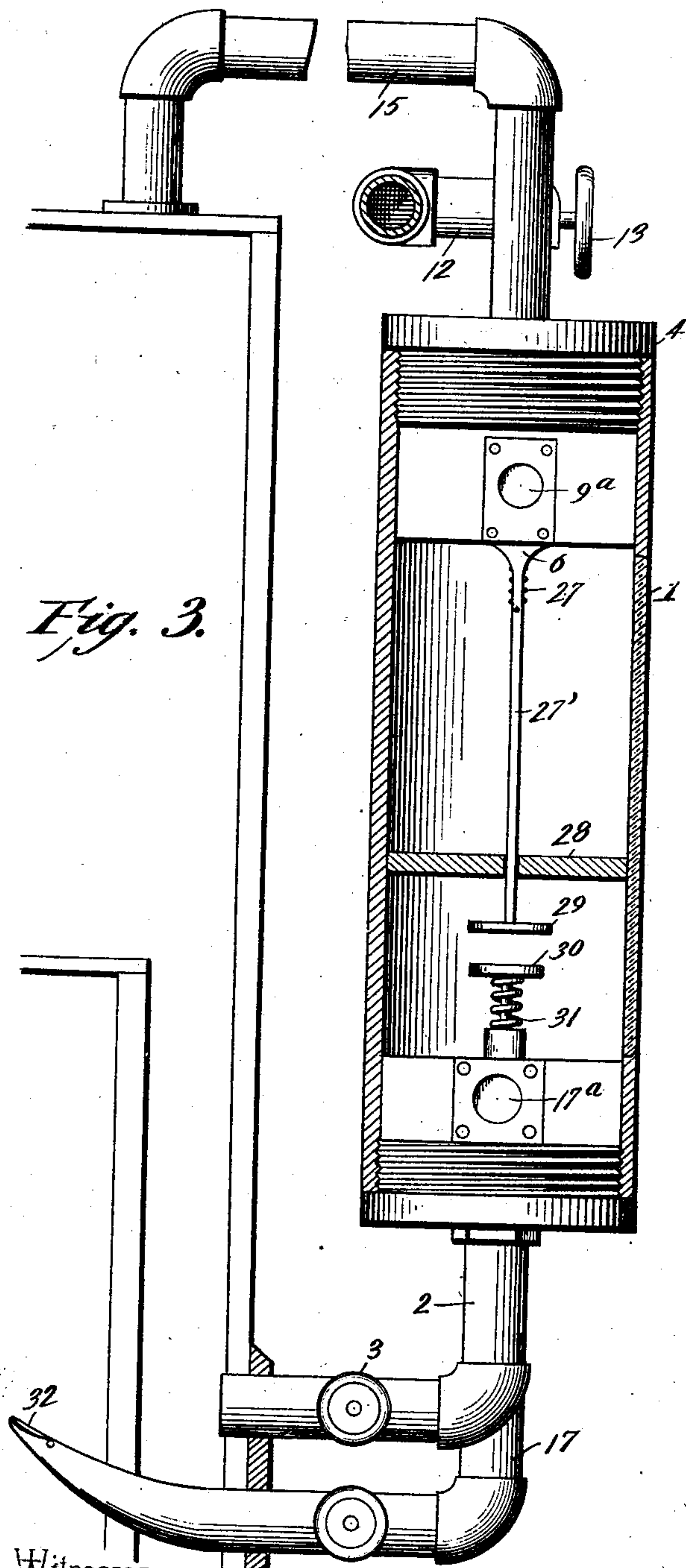
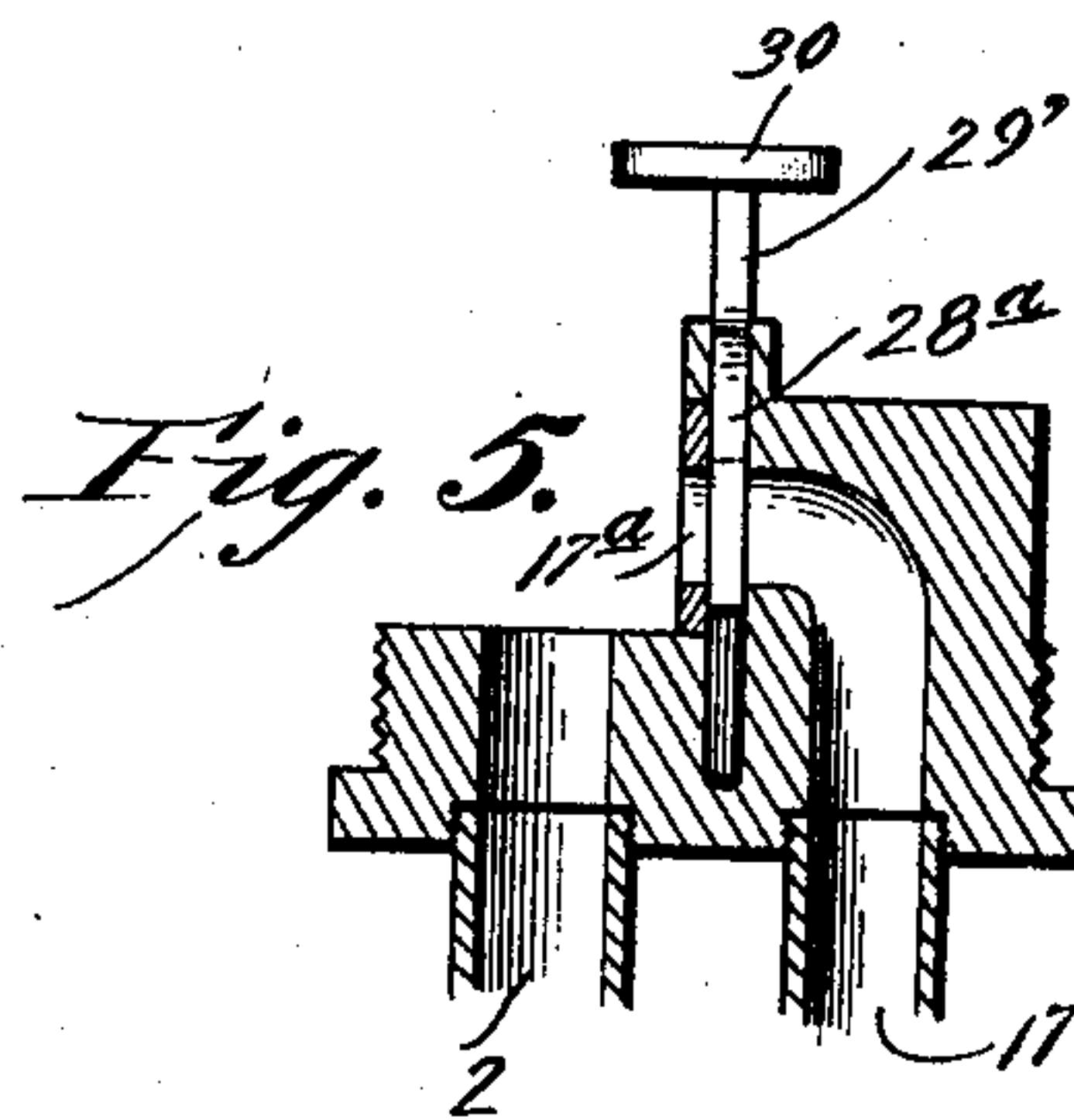
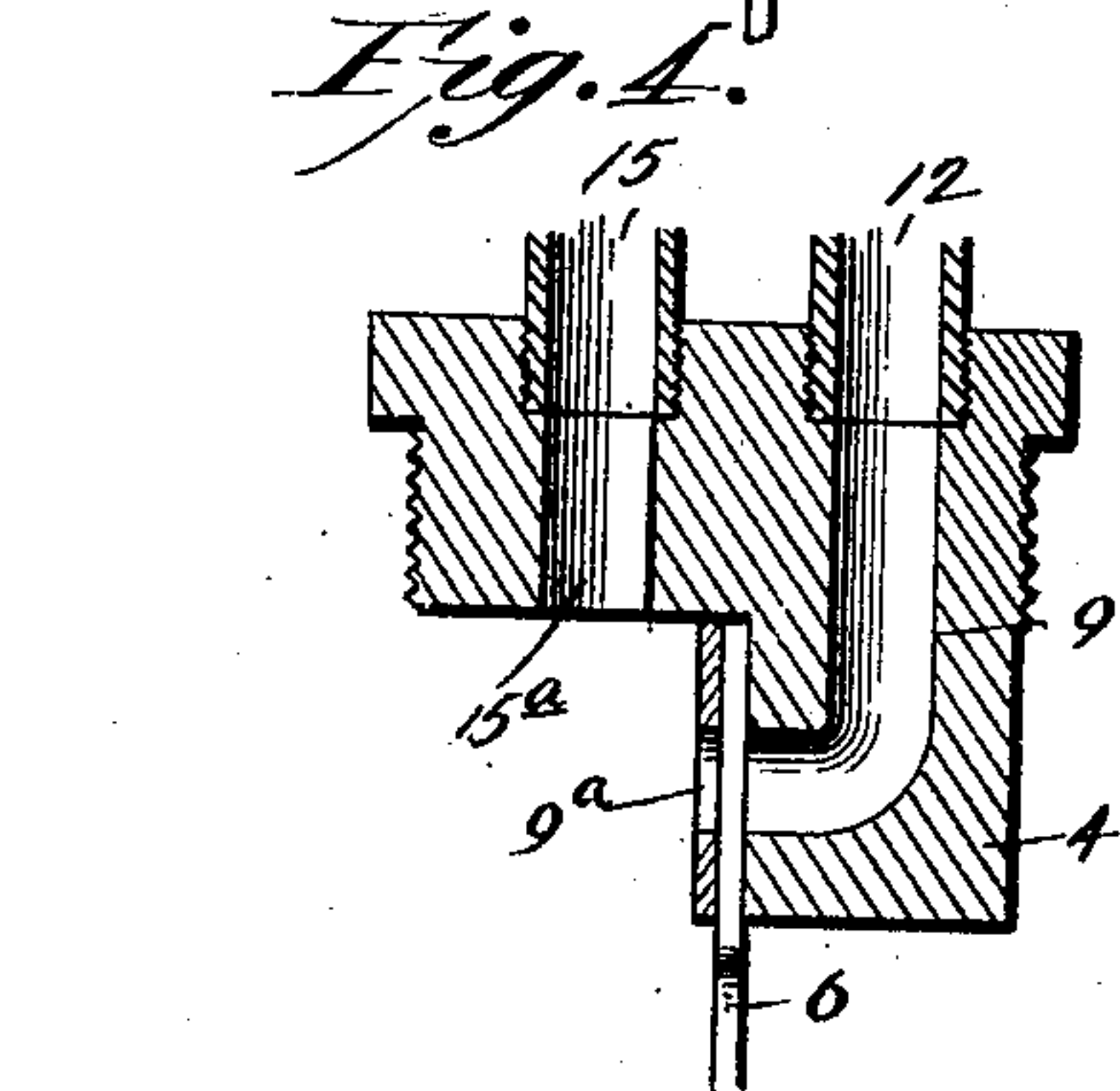
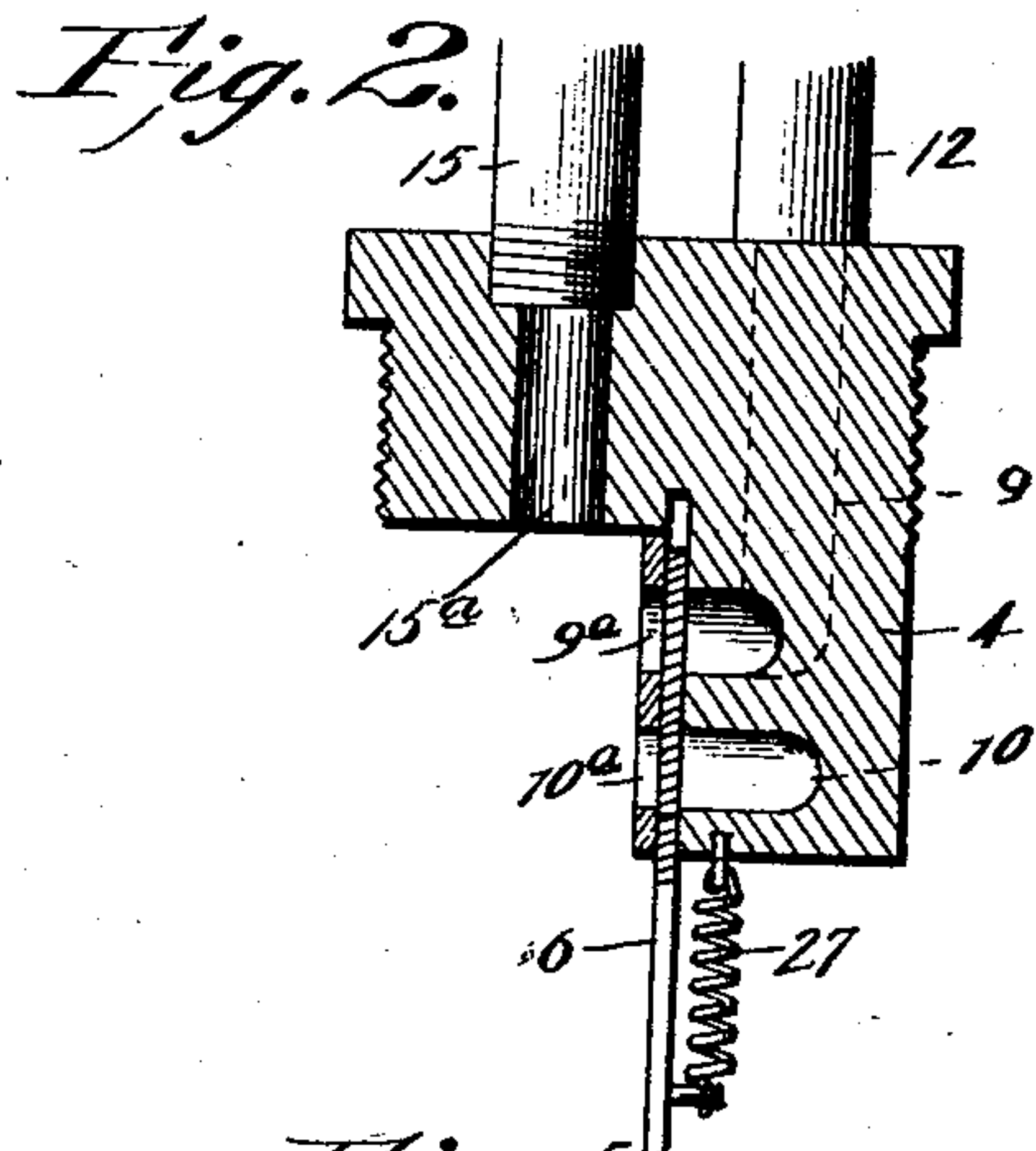


Fig. 3.



Witnesses
F. H. Walker
J. W. Garner

Owen J. Coughlin Inventor
By His Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

OWEN JOHN COUGHLIN, OF JOLIET, ILLINOIS.

AUTOMATIC WATER-FEED APPARATUS FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 673,113, dated April 30, 1901.

Application filed March 2, 1900. Serial No. 7,095. (No model.)

To all whom it may concern:

Be it known that I, OWEN JOHN COUGHLIN, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented a new and useful Automatic Water-Feed Apparatus for Steam-Boilers, of which the following is a specification.

My invention is an improved automatic water-feed apparatus for steam-boilers adapted to automatically set in operation a steam-boiler feed-water pump, injector, or siphon when the water in the boiler becomes low and to admit water from the boiler into the fire-box thereof, and thereby extinguish the fire when the water becomes dangerously low in the boiler, hence avoiding danger of boiler explosions and injury to the crown-sheet of the fire-box.

To this end my invention consists in a chamber having steam and water connections with the boiler and feed-water and fire-extinguisher ports, a valve (one or more) to open and close said feed-water and fire-extinguisher ports, and a float and connections whereby said valve or valves may be automatically operated by said float.

My invention further consists in the peculiar construction and combination of devices hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of an automatic water-feed apparatus embodying my improvements. Fig. 2 is a detail sectional view illustrating the construction of the cylinder head or plug, the valve-seat, and steam-ports and connections therein and the valve. Fig. 3 is a sectional view of a modified form of my improved automatic water-feed apparatus. Figs. 4 and 5 are detail sectional views of the same.

In the embodiment of my invention I employ a chamber 1, which is preferably cylindrical in form and vertically disposed, as here shown. With the lower end of the cylinder communicates a pipe 2, which leads from the boiler below the normal water-line therein, and said water-pipe has a cock or valve 3. The upper end of the cylinder is closed by a suitable cap 4, which is here shown as a screw-plug, which has its lower portion cut away dia-

metrically through the center and provided with a vertical valve-seat 5 for a vertically-movable slide-valve 6. A plate 7 on the outer side of said valve and secured to the plug by means of screws, as at 8, or by other suitable means serves to retain the valve in its seat. Steam-channels 9 10 communicate with the valve-seat and terminate there in ports 9^a 10^a, respectively. A feed-water pump, injector, or siphon for the steam-boiler (indicated at 11) communicates with the steam-channel 9 through the pipe 12, in which is a valve or cock 13 and with which also communicates a steam-whistle 14.

A steam-pipe 15 communicates with the boiler at a point within the steam-space therein and is connected with a steam-inlet port 15^a in the cylinder cap or plug, and said pipe 15 is provided with a valve or cock 16.

A water-pipe 17 communicates with the union 18, which connects the water-pipe 2 of the boiler with the lower end of the chamber or cylinder 1, said pipe 17 leading to and being adapted to discharge water in the fire-box of the boiler. A valve 19 is located in the union 18 at a point between the pipes 2 and 17 and is normally closed. Said valve in the form of my invention illustrated in Fig. 1 is provided with an arm 20, by means of which it may be opened and closed, and said arm is connected to a piston 21 in a cylinder 22 by a rod 23. A blow-off pipe 24 communicates with the union 18 at a point above the valve 19 and is provided with a blow-off valve or cock 25. A pipe 26 connects the steam-channel 10 with the cylinder 21 and is adapted to convey steam from the cylinder or chamber 1 to said cylinder 21 for the purpose presently described herein.

A valve 6 is normally closed in its seat to its full extent by a spring 27, which may be either of the form here shown or of any other suitable form, and said valve is by the said spring caused to normally close the ports 9^a 10^a, and thereby serves to normally cut off communication between the boiler feed-water pump, injector, or siphon and the cylinder or chamber 1 and to also cut off communication between said cylinder or chamber 1 and the cylinder 21.

An operating-stem 27 depends from the

slide-valve 6 and passes through a central opening in a disk 28, which is adapted to float on the column of water in the lower portion of the cylinder or chamber 1 and to rise and fall as the water-level rises and falls within the boiler and within said cylinder or chamber. To the lower end of the said stem is secured a head or stop 29.

The operation of my invention is as follows:

10 The apparatus being attached to the boiler A by means of the pipe 15 and pipe 2, and being also adapted to communicate with the interior of the fire-box through the pipe 17, and the valve 19 being closed and the valves or
15 cocks in the pipes 12, 15, and 26 open, steam enters the upper end of the cylinder or chamber through the pipe 15 and water enters the lower end thereof through the pipe 2, the valve 3 therein being open. The normal water-level is at some distance above the head
20 29 of the valve-operating stem, and the float or disk 28 being maintained on the surface of the column of water in the lower end of the cylinder or chamber the valve remains
25 closed by means of the spring 27 under normal conditions. As the water decreases in the boiler the water column in the cylinder or chamber 1 lowers correspondingly, thereby lowering the disk or float 28, and when the
30 latter contacts with the head or stop 29 on the valve-stem 27, the column of water continuing to decrease in height, the steam-pressure on the upper side of said float or disk will as the water recedes cause the said float
35 or disk to operate the valve by moving the same downwardly, so as to uncover the port 9^a in whole or in part, and thereby admit steam from the cylinder or chamber 1 under pressure from the boiler through the pipe 12
40 into a cylinder, (indicated at 11,) in which it will act upon a piston connected operatively with a valve of a feed-water pump, siphon, or injector, and thereby start the same in operation and replenish the supply of water in the boiler. At the same time the whistle 14
45 is sounded, as will be readily understood, and said whistle continues to sound until the water in the boiler reaches its normal level, the ascending column of water raising the disk or float 28 and permitting the spring 27 to close the valve in its seat, and thereby cut off the port 9^a.

If from any cause the feed-water pump, injector, or siphon should fail to work after the
55 valve thereof has been opened, as above described, by steam-pressure set in action by the descending disk or float 28 and the valve 6, the latter will be caused by the said disk or float as the latter continues to descend to
60 not only open the port 9^a, but to also open the port 10^a, and the parts of my improved apparatus are so proportioned that this port 10^a will be opened when the water in the boiler is at a dangerously-low stage. When said
65 port 10^a is opened by the valve 6, steam under boiler-pressure is admitted through the

pipe 26 to the cylinder 21 and caused to exert pressure upon the piston in said cylinder, thereby moving said piston and causing the same through the connections 23 20 to
70 open the valve 19 in the union 18, thereby establishing communication between the boiler, water-pipe 2, and the pipe 17, which leads to the interior of the fire-box, and hence water from the boiler will be forced under
75 boiler-pressure through the pipe 17 and introduced to the interior of the fire-box, where it will speedily extinguish the fire therein, thus rendering an explosion of the boiler impossible and also preventing the fire from
80 burning or injuring the crown-sheet of the fire-box should the latter become uncovered by the decrease of the water in the boiler.

It is well known to engineers, firemen, and boiler-owners that even in the event that
85 upon a dangerously-low stage of water in the boiler the latter should fail to explode material injury would nevertheless be likely to be caused by the burning of the crown-sheet of the fire-box, the replacing of which involves an expenditure also as great as the
90 cost of a new boiler. My improved automatic feed-water apparatus not only obviates danger of a boiler explosion resulting from a low stage of water in the boiler, but also obviates
95 injury to the crown-sheet of the fire-box resulting therefrom.

In the modified form of my invention (illustrated in Figs. 3, 4, and 5) I dispense with the cylinder 22, the piston therein, valve 19,
100 connections between the same and the piston, pipe 26, and channel and port 10^a, and in lieu thereof I connect the pipe 17, which leads to the fire-box directly with the lower end of the cylinder or chamber 1, through a port
105 17^a, and provide a valve 28^a for said port. Said valve has a stem 29, which rises therefrom and terminates in a head or stop 30 and is kept normally closed over the port 17^a by a spring, as at 31. In this form of my invention
110 when the water becomes dangerously low in the boiler the head 29 of valve 6, by the continued descent of the disk or float 28, will contact with the head 30, and thereby depress the valve 17^a and cause the same to
115 open the port and establish communication between the interior of the cylinder or chamber and the interior of the fire-box, whereupon water from the boiler will pass through the pipe 2 into the lower end of the cylinder
120 or chamber 1, and from the latter through the pipe 17 and nozzle 32, at the lower end thereof, into the interior of the fire-box, for the purpose hereinbefore stated.

When my improved automatic water-feed
125 apparatus is used in connection with a boiler having a furnace in which oil is used as the fuel, the valve 19 may be employed in the oil-feed pipe leading to the furnace, so that when said valve is moved or turned by the means
130 hereinbefore described when the water in the boiler is at a dangerously low stage, said valve

may be caused to cut off the supply of oil or other liquid fuel to the furnace, and hence cause the fire therein to be extinguished and prevent injury to the crown-sheet and avoid danger of exploding the boiler.

I do not desire to be limited to the precise form and construction of devices hereinbefore described, as it is evident that modifications may be made therein without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. The combination of a steam-boiler, a feed-water apparatus (as a pump or the like) a steam-pressure cylinder, a chamber, a pipe extending from the lower end thereof to the fire-box of the boiler, a valve in said pipe, connections between said valve and the piston in the pressure-cylinder, a water-pipe uniting said pipe, at a point between the said chamber and valve, to the water-space of the boiler, a cap in the upper end of the chamber having steam connection with the boiler, and steam-channels communicating respectively with the feed-water apparatus and the pressure-cylinder, said channels terminating in ports, disposed one above the other, a slide-valve supported in said cap, to open said ports successively on the descent thereof, and a float connected to said valve, to operate the same, substantially as described.

2. In combination with a steam-boiler and a feed-water apparatus, (as a pump or the like,) a chamber having steam and water connections at its upper and lower ends respectively with said boiler, and a steam-channel leading to the feed-water apparatus and having a port, a slide-valve to open and close said port, said valve having a depending rod provided with a head, a spring to normally close said valve, and a float, movable on the said rod independently thereof, and adapted on the descent of the float to engage the head of

the said rod and open said valve, substantially as described.

3. In apparatus of the class described, a chamber having a steam-channel provided with a port, a valve to open and close said port, a spring to normally retain said valve in a closed position, a rod depending from said valve and having a head, and a float, movable on said rod, independently thereof, said float engaging said head on the descent of the float, to open said valve, substantially as described.

4. The combination of a steam-boiler, a feed-water apparatus (as a pump or the like), a steam-pressure cylinder, a chamber having steam connection with the boiler and steam-channels communicating respectively with the feed-water apparatus and pressure-cylinder, said channels terminating in ports disposed one above the other, a slide-valve to open said ports respectively on the descent thereof, said valve having a depending rod, a spring to normally retain said valve in a closed position over said ports, a float, in the said chamber, movable independently of said rod and adapted on the descent of the float to engage said rod and open said valve, a pipe connecting the lower end of said chamber with the fire-box of the boiler, a valve in said pipe, connections between said valve and the piston in the pressure-chamber, and a water-pipe connecting said pipe, at a point between said chamber and valve, to the water-space of the boiler, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

OWEN JOHN COUGHLIN.

Witnesses:

L. COUGHLIN,
JOHN CASSIDY.