

No. 644,152.

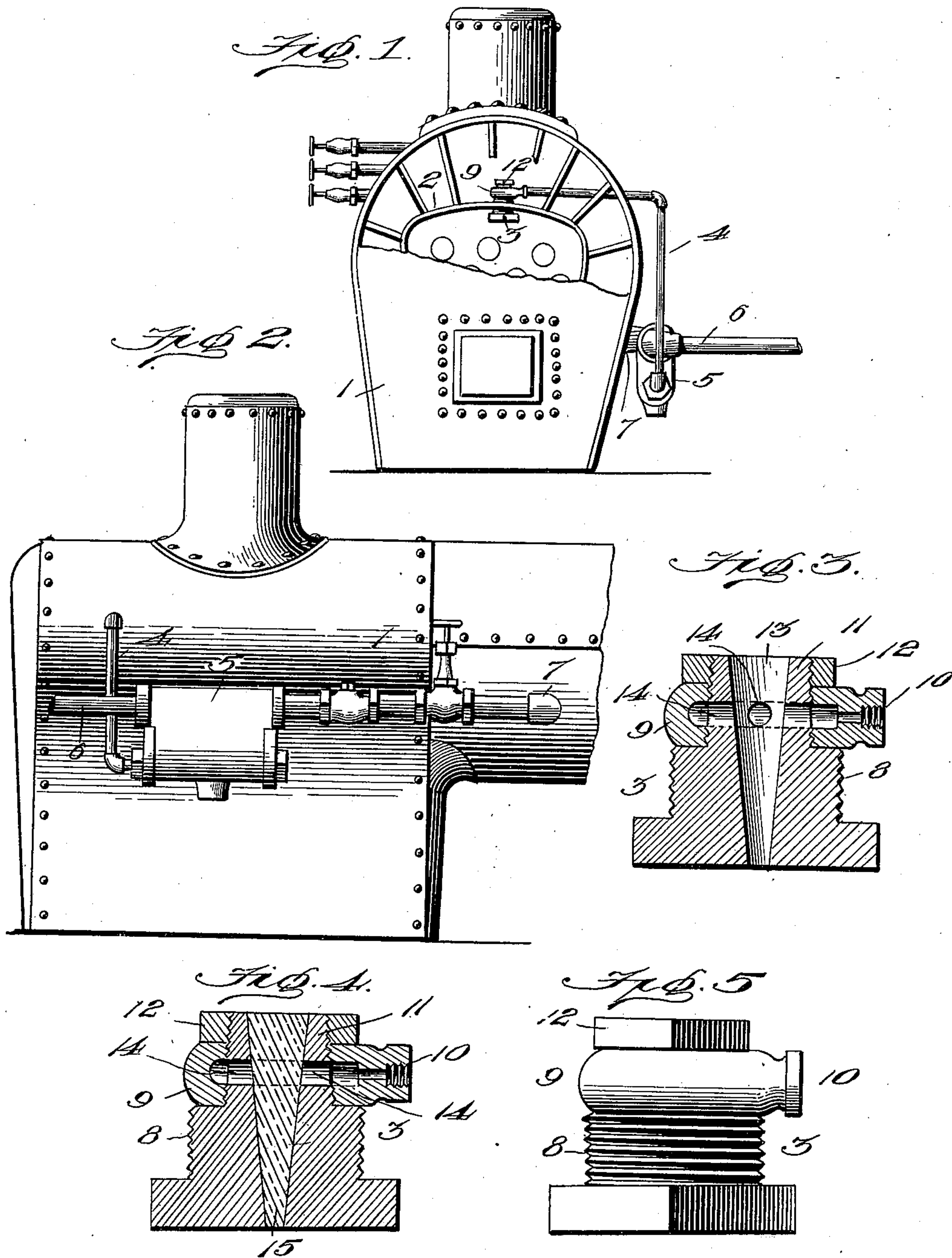
Patented Feb. 27, 1900.

W. M. SMITH.  
BOILER.

(Application filed Aug. 11, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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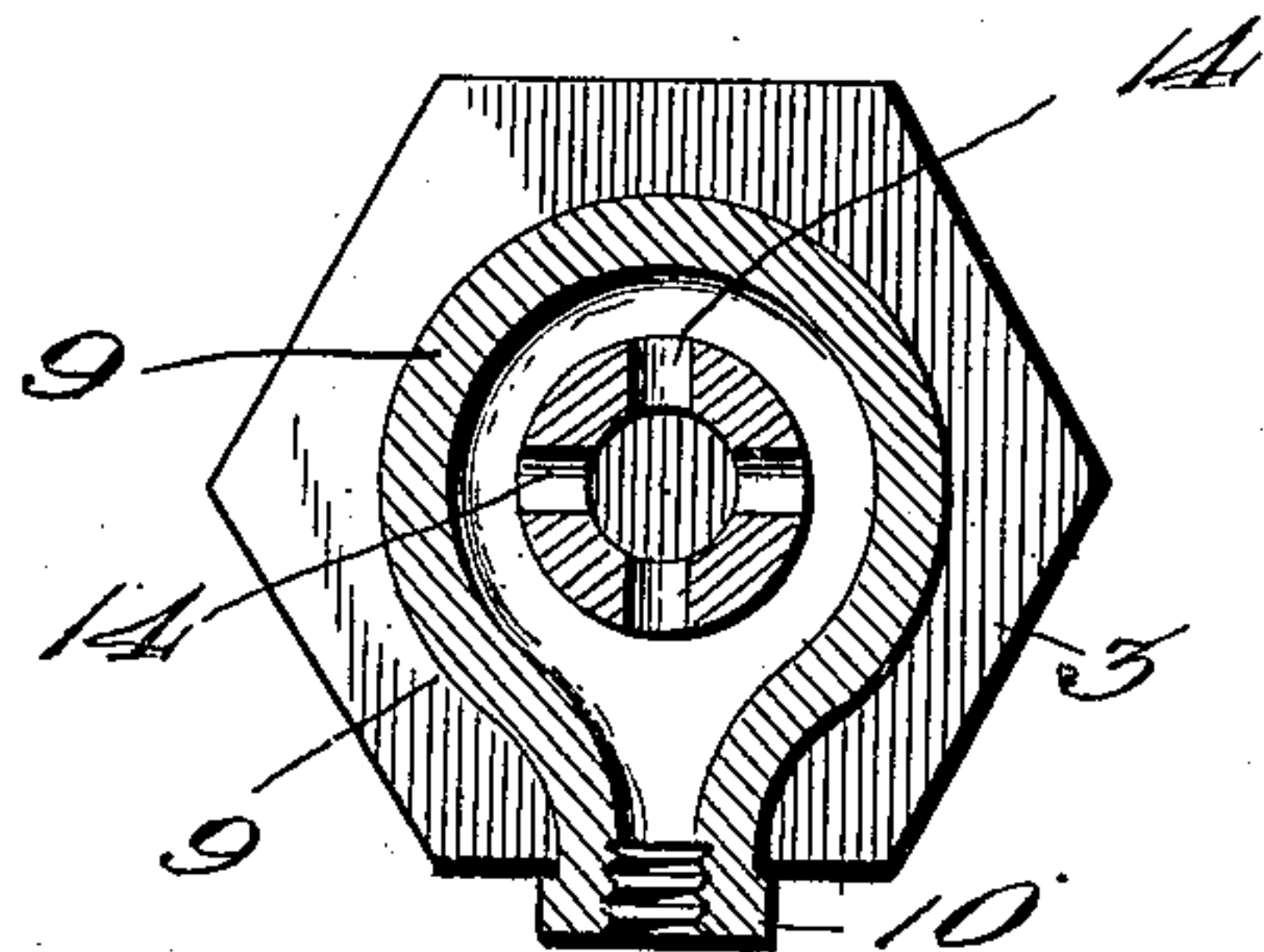
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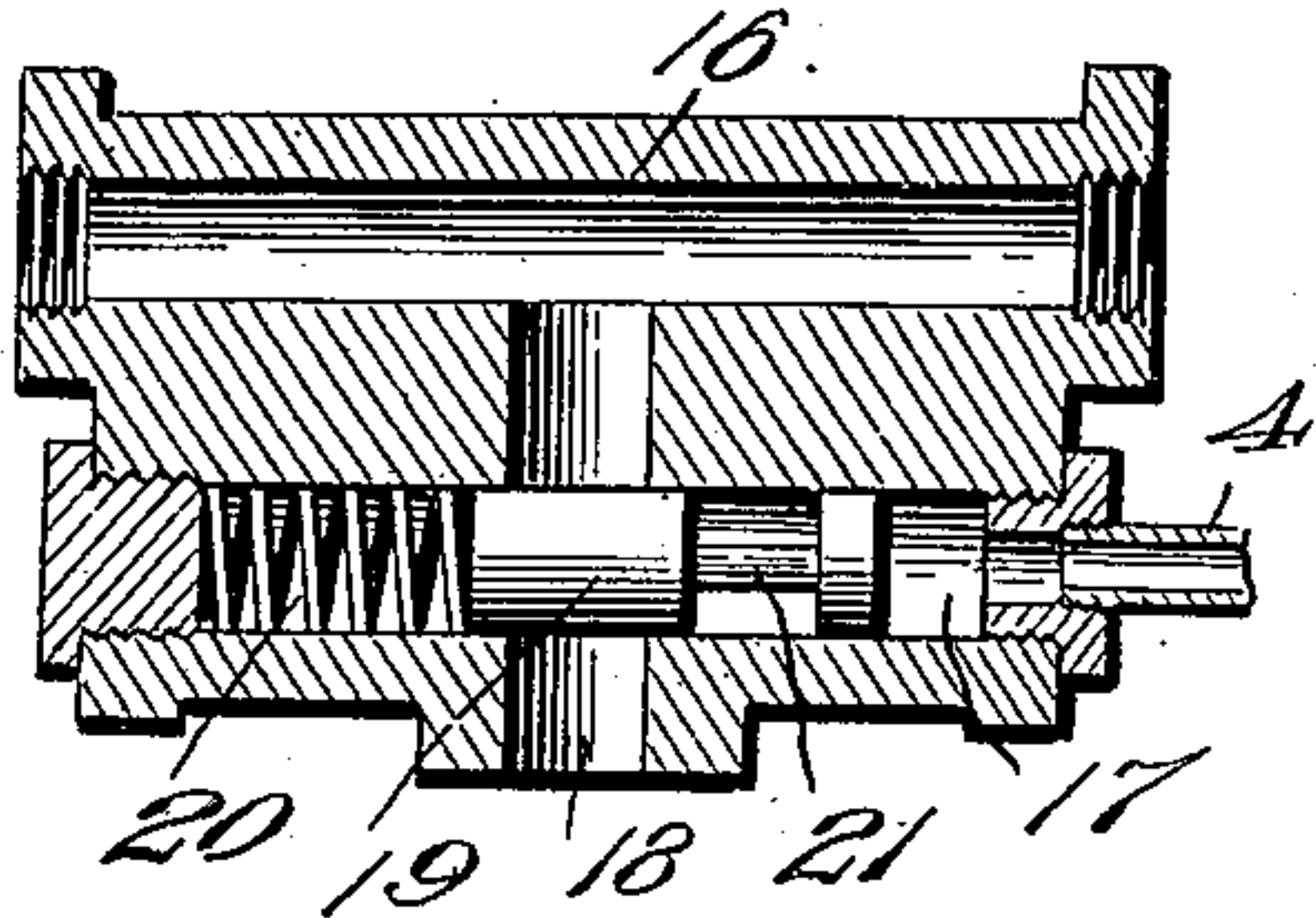
(No Model.)

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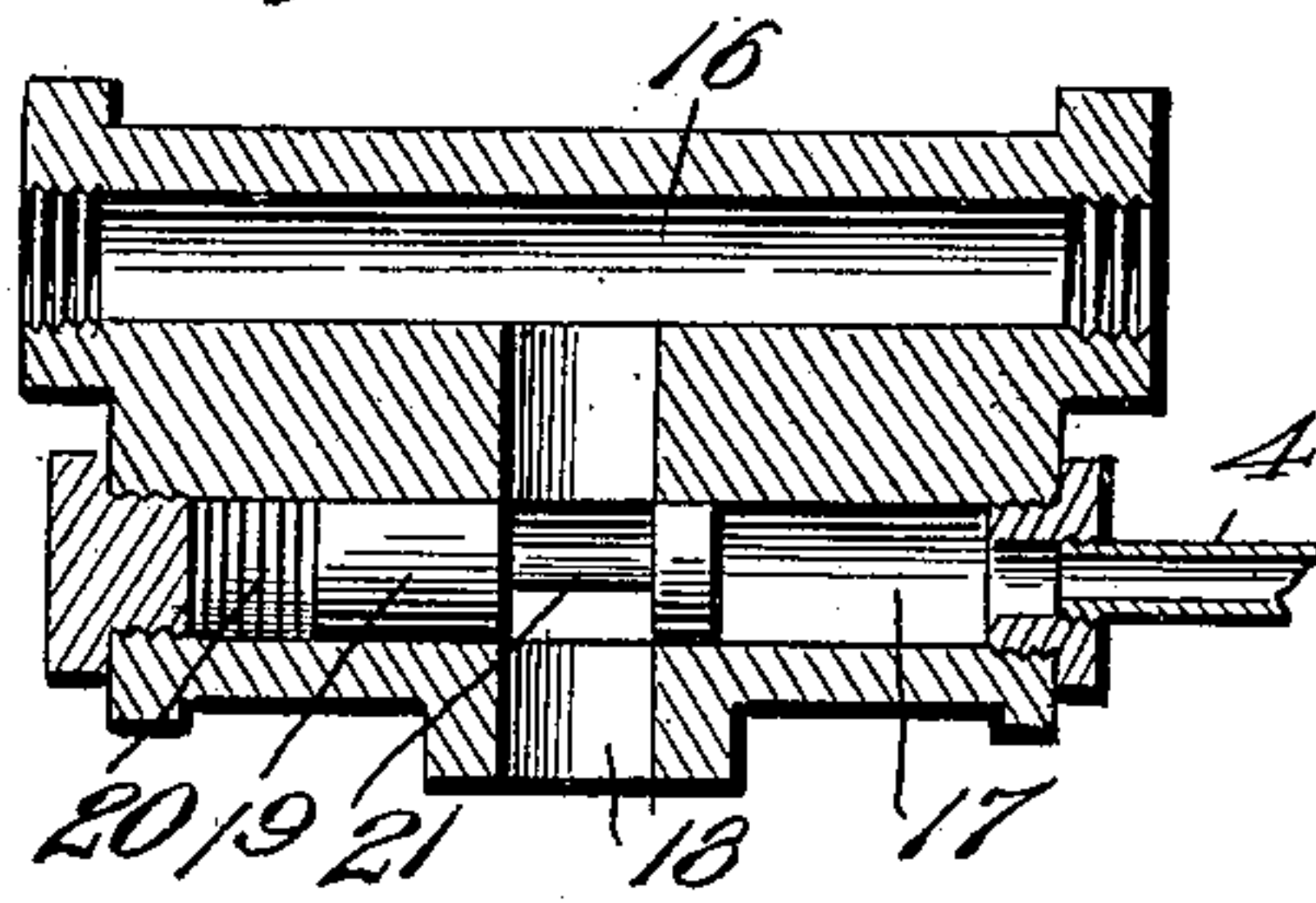
*Fig. 6.*



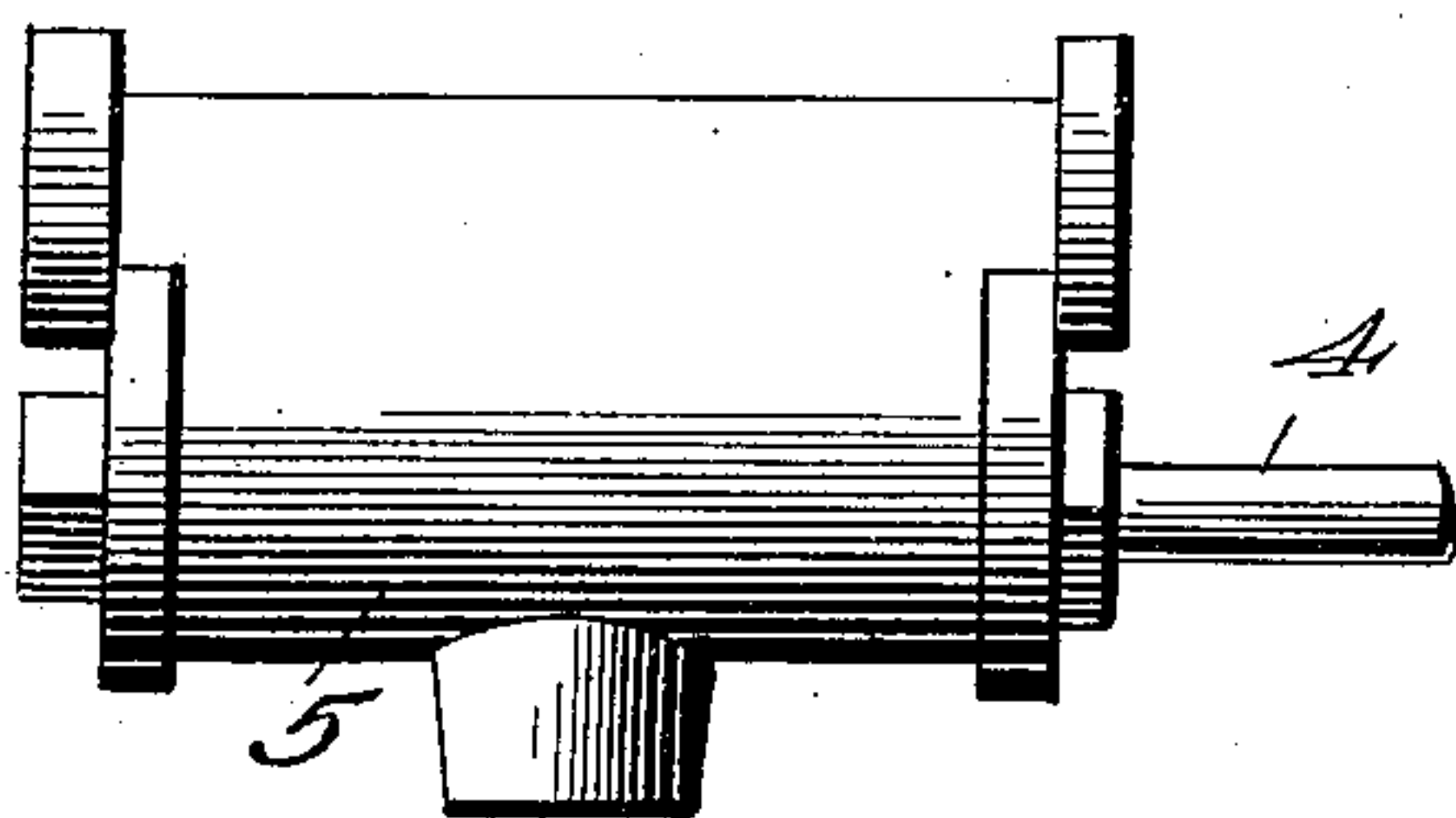
*Fig. 7.*



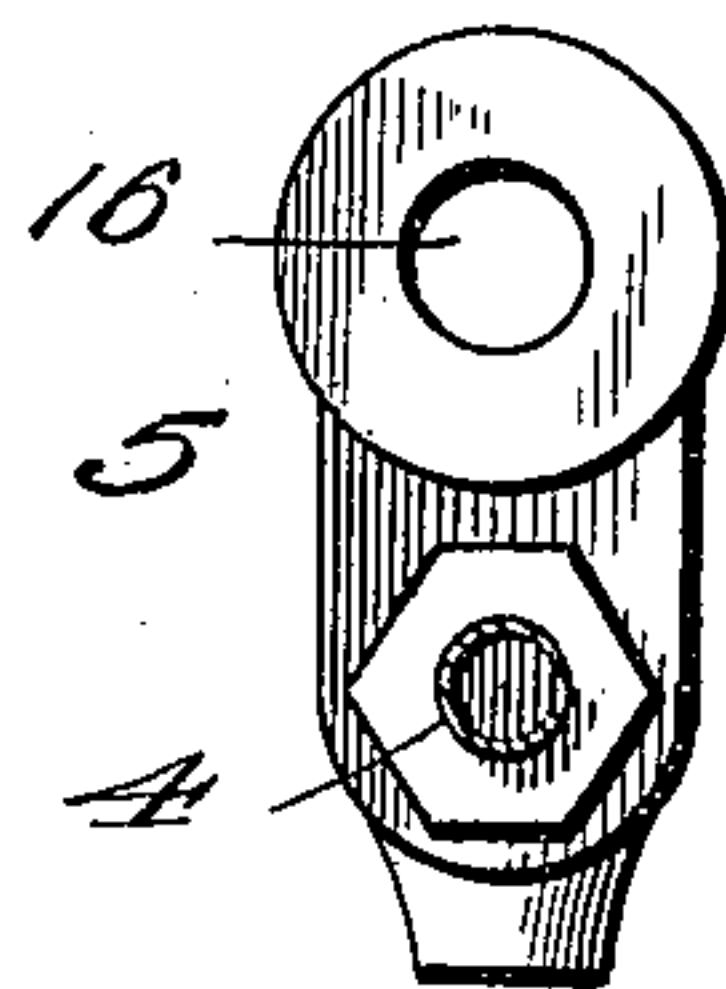
*Fig. 8.*



*Fig. 9.*



*Fig. 10.*



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# UNITED STATES PATENT OFFICE.

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SHERMAN M. HAUSSERMANN, OF SAME PLACE.

## BOILER.

SPECIFICATION forming part of Letters Patent No. 644,152, dated February 27, 1900.

Application filed August 11, 1899. Serial No. 726,947. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM M. SMITH, a citizen of the United States, residing at Evansville, in the county of Vanderburg and State of Indiana, have invented certain new and useful Improvements in Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to automatic safety devices for steam-boilers designed to prevent the feed of water into the boiler when the water-line has dropped to a dangerously-low position.

In the practical operation of steam-boilers it is a well-known fact that the sudden entrance of cold water to the boiler when the water therein has dropped below the danger-line will very likely cause an explosion.

The object of the present invention is to provide an automatically-acting valve of improved construction on the crown-sheet of the boiler, in connection with a novel form of steam-actuated valve in the feed-water pipe, which will coöperate when the water-line has dropped sufficiently far in the boiler to render the introduction of cold water dangerous to allow the steam-pressure to cut off or deflect the supply of feed-water and prevent it from entering the boiler.

Having this object in view the invention comprises an improved normally-closed thermostatic valve on the boiler crown-sheet, which is opened by the abnormal heat it is subjected to when the water-line is dangerously low, an improved normally-closed steam-actuated valve in the feed-water pipe adapted to prevent the water from entering the boiler when said valve is actuated, and a pipe connection between the two valves, whereby opening of the thermostatic valve will admit the steam-pressure to the feed-water valve and actuate it for the purpose described.

In the accompanying drawings, Figure 1 is an end elevation of a steam-boiler, partly broken away to disclose the interior, equipped with my improvements; Fig. 2, a side eleva-

tion; Fig. 3, a longitudinal section of the thermostatic valve with the fusible plug out; Fig. 4, a similar view with the plug in position. Fig. 5 is a side elevation thereof. Fig. 6 is a cross-section of the valve; Fig. 7, a longitudinal section of the feed-water valve, showing the piston in normal position; Fig. 8, a similar view showing the piston pushed back by the steam; Fig. 9, a side elevation of the valve, and Fig. 10 an end view thereof.

The numeral 1 designates a portion of an ordinary type of steam-boiler having crown-sheet 2.

My improved automatic thermostatic valve 3 is screwed in the crown-sheet, and from it there extends a steam-pipe 4, leading to the shell or casing of the improved feed-water valve 5 on feed-water pipe 6, which enters the boiler at 7.

The body 3 of the thermostatic valve is of plug shape and has screw-threads 8, by which it is secured in the crown-sheet. A hollow annular steam-chest 9, having a nipple 10 for connection with pipe 4, is screwed on the reduced threaded portion 11 of the valve body or shell, where it is held by a nut 12. The valve-body 3 has a passage or chamber 13, extending through it from end to end, which tapers gradually, beginning at the upper end of said body, and radial steam passages or ducts 14 lead out therefrom to communicate with the interior of the steam-chest. A tapering plug 15, of fusible composition, fits snugly in the passage 13 and keeps it normally closed. The broader end of the plug being above the crown-sheet and in the steam-generating space the pressure will tend to keep it held tightly seated under normal conditions on account of its tapering shape. This plug is, however, of such a composition that it will melt out when the crown-sheet becomes red-hot on account of the fall of the water to the danger-line or below, whereupon the steam in the boiler will have access to the steam-chest, as shown by the arrows in Fig. 3, and will then pass through pipe 4 to the automatic valve, which controls the supply of feed-water to actuate the same and prevent the cold water from entering the boiler. The steam will also pass through the valve-body and damp the fire in the fire-box.



The automatic feed-water valve is shown in detail. In the upper part of the valve-casing 5 is the passage 16, through which the feed-water normally passes. In the lower  
 5 part of the casing is a valve-chamber 17, which is in communication with passage 16 by a branch passage 18, through which the water can pass and discharge without entering the boiler when the valve is actuated by the steam. A cylinder-valve 19 is  
 10 located in the chamber 17 and normally held across the branch 18 to close the same by a coil-spring 20, seated on a screw-plug. The valve has a peripheral groove 21, which when  
 15 alined with the passage 18 permits the feed-water to pass by. Assuming that the plug 15 has fused on account of the high temperature of the crown-sheet, the steam will act on valve 19 and press it back, as shown, where-  
 20 upon the water entering passage 16 will be deflected into passage 18 and be carried off by suitable waste-piping and not enter the boiler, thus preventing an explosion.

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

1. The combination with a boiler, of a feed-water pipe therefor, a valve-casing interposed in said pipe having a main passage ordinarily  
 30 permitting the free flow of water to the boiler and having a branch outlet-passage leading from said main passage, a valve normally closing said branch outlet-passage, a pipe for conveying steam from the boiler to actuate  
 35 and open said valve, and means in the boiler controlling the supply of steam to said pipe.

2. The combination with a boiler, of a feed-water pipe therefor, a valve-casing interposed in said pipe having a passage permitting the free flow of water ordinarily and having a  
 40 branch outlet-passage leading from said passage, a spring-actuated valve normally closing said branch outlet-passage, a pipe for conveying steam from the boiler to said valve to press it back and open the branch passage,  
 45 and a fusible device normally closing the steam-receiving end of said pipe.

3. A safety device for boilers consisting of a body or casing having a main passage extending longitudinally therethrough and a  
 50 branch passage extending laterally there-through, of a fusible plug fitted in said main longitudinal passage.

4. A safety device for boilers consisting of a body or casing having a steam-passage, a  
 55 steam-chest screwed on the body and communicating with the steam-passage and a fusible plug in said body.

5. A safety device for boilers consisting of a body or casing having a main steam-passage  
 60 and branch steam-passages, a hollow steam-chest screwed on the body and communicating with the branch passages, a nut screwed on the body and holding the steam-chest in position and a fusible plug in said main steam-  
 65 passage.

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

WILLIAM M. SMITH.

Witnesses:

SHERMAN M. HAUSSELMANN,  
 WILLIAM LE MASTERS.