No. 630,067. Patented Aug. 1, 1899.

W. McINTOSH.

BLOW-OFF COCK AND BOILER CHECK.

(Application filed Nov. 19, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

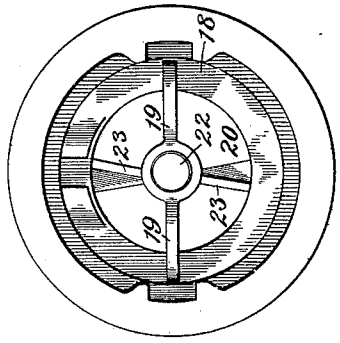
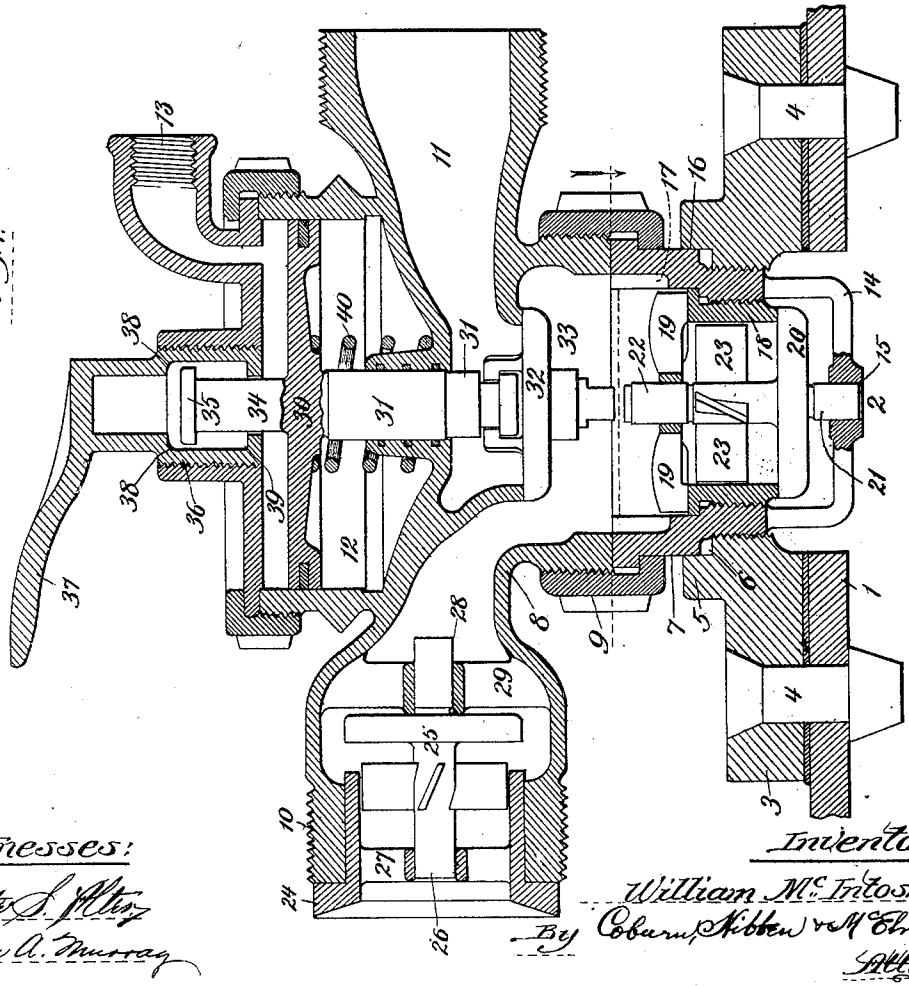


Fig. 1.



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Fig. 3.

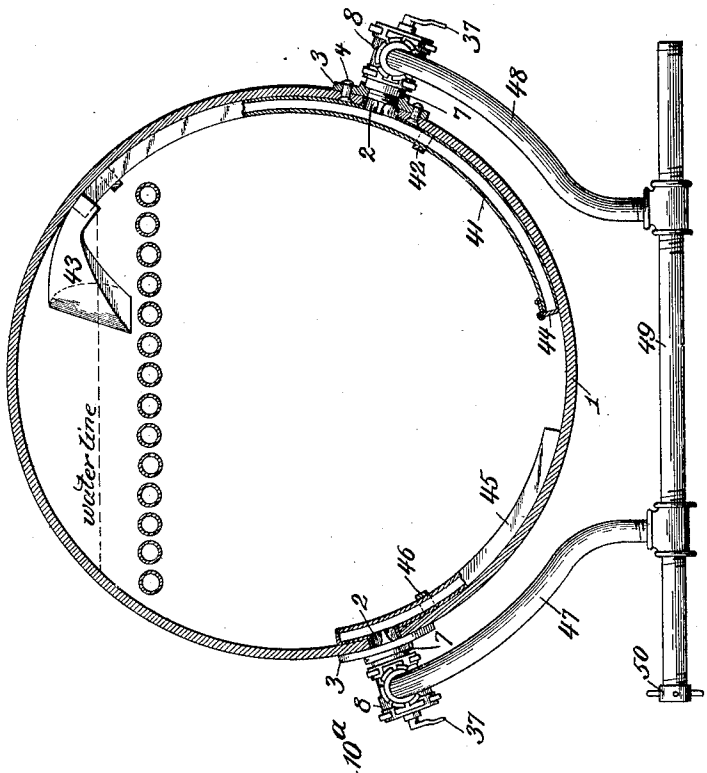
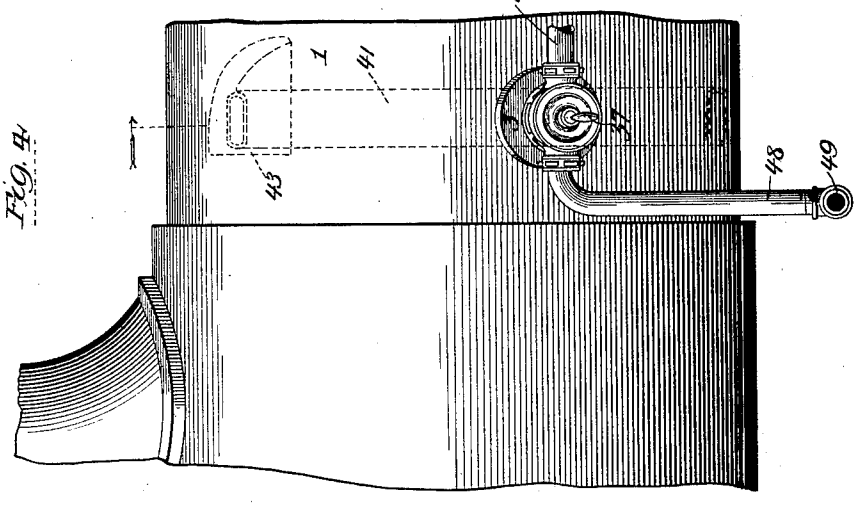


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM McINTOSH, OF WINONA, MINNESOTA.

BLOW-OFF COCK AND BOILER-CHECK.

SPECIFICATION forming part of Letters Patent No. 630,067, dated August 1, 1899.

Application filed November 19, 1898. Serial No. 696,855. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM McINTOSH, a citizen of the United States, residing at Winona, in the county of Winona and State of Minnesota, have invented certain new and useful Improvements in Blow-Off Cocks and Boiler-Checks, of which the following is a specification.

My invention relates to automatic blow-off cocks and boiler-checks; and its object is to provide an improved combined blow-off and boiler-check and also means for blowing off the boiler either from the top or surface or from the bottom of the boiler and for feeding the water at the bottom of the boiler.

My invention embodies other novel and advantageous features as regards the blow-off cock and boiler-check itself, which will be apparent from the description hereinafter given.

In the drawings, Figure 1 is a sectional elevation of the valve device proper; Fig. 2, a sectional plan on line 2 of Fig. 1; Fig. 3, a sectional view of a locomotive-boiler, showing my complete invention applied thereto; and Fig. 4, a side elevation of such boiler.

My combined blow-off cock and boiler-check may, if desired, be located at the usual feed-port of a boiler and any desired number of such devices may be employed.

My invention may be applied to any boiler and at any point thereon, and in the drawings I have shown it applied to a locomotive-boiler at its usual feed-ports without intention of limiting myself to such particular application or any particular location of such device or devices.

The boiler-shell 1 has the usual feed-port 2, which by the use of my invention also becomes a blow-off port. A flange 3 is secured to the shell by rivets 4 and provided with a screw-threaded opening registering with the port 2. The flange is provided with an annular extension 5, forming a shoulder 6 for a purpose hereinafter set forth.

The valve device proper comprises two casings—an inner or lower casing 7 and an outer casing 8—preferably held together by a clamping-ring 9. The outer casing has an injector-inlet or nozzle 10, a discharge-outlet 11, and a piston-chamber 12 with a fluid-pressure-supply pipe or passage 13. The inlet is preferably opposite the outlet, because by this arrangement the device is reversible, the same patterns answering for either side of the locomotive. The inner casing is screw-threaded both externally and internally and screws into the flange 6. The portion within the boiler is provided with a bridge or yoke 14, having a central guide-opening 15 to receive a flange-stem, as hereinafter described. This inner casing is also provided with a circular flange or shoulder 16, adapted to be received in the recess formed by the extension or flange 5. The inner casing is thus thickened and made stronger at this point and secured rigidly by said extension to guard against its breaking below the flange. In case of an accident the tendency will be to break above the flange, say at the dotted line 17, without interfering with the valve which governs the port 2.

A valve-seat device 18 is screwed or otherwise secured into the opening of the inner casing and provided across its top or outer portion with a bridge 19 to support and guide a valve-stem. The inner valve, which governs port 2, comprises a valve-body 20, having an inner stem 21, guided in the hole 15 in bridge 14, and having an outer stem 22, guided in the bridge 19, whereby such inner valve is freely rotatable in whichever way the casing is positioned on the boiler. The stem 22 is provided with a suitable number of spiral wings 23, so as to cause the valve to rotate freely under the influence of water passing in either direction. As shown in Fig. 1, the wings 23 are located a distance away from the face of the valve 20 equal to the lift or extreme movement of the valve, so that at full opening the inner end of the wings is flush with the face of the seat, thereby allowing the water to freely enter the valve-chamber, and thus avoid obstructing the flow, which would be the case if the wings were extended inward beyond the valve-seat. The two oppositely-extending stems 21 and 22 are supported by and journaled in the yoke and bridge, respectively, so that by reason of the wings the valve 20 is freely and positively rotated by the passage of water, &c., in either direction, whereby the valve-seat and passages are kept clean and free from incrusting matter. The stems of the valve being thus suspended, the valve is enabled to respond

to the slightest difference in pressure on either side and to rotate freely without regard to the position of the valve, whether vertical, horizontal, or otherwise.

The supply-inlet communicating with the usual injector is provided with a valve somewhat similar to the valve already described. The construction thereof is preferably as shown in the drawings. The seat 24 is not threaded, but is held in place by the usual pipe-nut when coupled to the injector or supply-pipe 10^a. The valve 25 is also provided with spiral wings and has a stem 26, supported and guided by the bridge 27 on the valve-seat, and a stem 28, supported and guided by the bridge 29, which is preferably, though not necessarily, integral with the body of the casing.

Within chamber 12 is a piston 30 or other equivalent movable abutment having an inner stem 31, carrying and actuating a valve 32, which governs the passage from chamber 33 to the outlet-port 11. The piston has an outer stem 34, provided with an enlarged end flange 35. This stem travels in a hollow screw-threaded nut or plug 36, having an operating-handle 37. The purpose of this plug or nut device is to furnish a simple and effective means of operating the valves when no fluid-pressure is available or of closing the outer valve in case such valve or the piston should become so stuck or clogged that boiler-pressure would not operate the valves. By screwing the nut inward the internal shoulder 38 of the nut will contact the head 35 of the stem and actuate the piston to operate the valves, and by screwing the nut outward the shoulder 39 will contact under the head 35 and restore the piston and valve to normal position.

The device as thus described may be applied to a boiler so as to feed directly therein; but I prefer to use the same in connection with the parts about to be described.

Locomotives are provided with two injectors and with two water-inlets, and consequently I prefer to employ two of my valve devices, as shown in Fig. 3. I use one of these valve devices to obtain a surface blow-off and another to obtain a bottom blow-off.

To obtain a surface blow-off, I use a pipe or tube 41, secured to the inside wall of the boiler-shell and outside of the flues by means of a clamp 42 or otherwise and communicating through a side opening with the port 2. This pipe is provided at its upper end with a funnel-shaped device or skimmer 43 and at its lower end with a flap-valve 44. It will be understood that the valve device shown in Fig. 1 is to govern the port 2, which communicates with said pipe or tube 41. To obtain a bottom blow-off, I employ a similar valve device to govern the inlet-port 2 on the left-hand side, Fig. 3, of the boiler, which port communicates with a pipe 45, also secured to the inner wall of the shell by a clamp 46 or otherwise. This pipe is closed at its top, but communicates freely at its lower end with the boiler, at the bottom thereof. Discharge-pipes 47 and 48 communicate with the outlet-nozzles of the left and right hand valve devices, respectively, as shown in Fig. 3, and connect with a common discharge-pipe 49, which extends horizontally and is provided with an end cap 50 or equivalent means, such as plug or stop-cock. This cap can be changed and applied to either end of such pipe, so as to secure a blow-off either to the right or left. This arrangement is particularly desirable when the devices described are used on locomotives, so as to prevent the wind from blowing the discharge over the locomotive and train when in motion. The discharge can thus be made with the wind and not against it.

When a surface blow-off is desired, fluid under pressure (air or steam) is admitted through pipe 13, and the piston or movable abutment 30 is actuated to open valve 32 and by contact of such valve to open valve 20. Scum, floating impurities, &c., will then be drawn from the surface of the water in the boiler through funnel 43, pipe 41, and past valves 20 and 32, through nozzle 11 and discharge-pipes 48 and 49, and blown out either to the right or left, according to the location of the end cap 50. It is obvious that the blow-off will be entirely from the surface, because the flap-valve 44 will remain closed. The valve 20, being supported and provided with spiral wings, will rotate, and the deposit of any impurities in the ports or among the valve devices will be prevented.

When a bottom blow-off is desired, the left-hand valve device is operated similarly to the right-hand device, as above stated, and the water and impurities will be drawn off from the bottom of the boiler at a point where such foreign matters settle, and they will then pass upward through pipe 45 and out through the blow-off device and finally through the discharge-pipes 47 and 49.

It is well understood among steam users that when a boiler is fired hard and the water is in violent ebullition all of the lighter impurities and considerable of the incrusting or heavier matter are carried to the surface of the water, while when firing is suspended, or in case of a locomotive when the steam is shut off, this action ceases and the incrusting matter in suspension settles to the bottom. It is obvious, therefore, that the device shown on the right-hand of Fig. 3 is capable of removing the impurities in the first instance and that the device on the left-hand side is capable of blowing out the impurities in the second instance.

In the blowing-off operation the valve 25 is closed and operates as a check-valve to prevent any water from entering the injector or water-supply pipe. This valve will also prevent water which may by accident leak past valve 20 from entering the injector-pipe from chamber 33 or arrest any back pressure that would work against the injector.

When it is desired to feed into the boiler, the injector is operated as usual, or water admitted through the supply-pipe, and the water will force open valves 25 and 20 and enter the boilers and pass downward through pipes 41 and 45 to the bottom of the boiler, the flap-valve 44 permitting such passage of water through its pipe. It is well known that the natural course of the colder water entering a boiler is downward and along the bottom toward the fire-box, where it is heated and passes upward and forward in continuous circulation. Ordinarily water is injected into the boiler directly among the flues, and incrusting matter under the influence of heat will settle and adhere to the flues. With my extensions by pipes leading to the bottom of the boiler the water is sufficiently heated when it reaches the bottom of the boiler to precipitate the incrusting matter to the bottom, where a considerable proportion (all the heavier particles) remain out of the influence of circulation and is blown out from the bottom, never coming in contact with the flues.

My valve device in its preferable form is a quadruplex valve, inasmuch as the device is supplied with three valves and has the additional functions of a surface and bottom blow-off. In its preferable form it also possesses features of safety which are especially desirable where it is used on locomotives and exposed to greater dangers of accidents than on stationary boilers. In case of accident the valve-case would be stripped off and broken most likely at line 17 and the valve 20, being protected, will remain intact and uninjured, thereby preventing the blowing off of the boiler in such event.

Although I have described more or less precise forms and details of construction, I do not wish to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts, and the substitution of equivalents as circumstances may suggest or render expedient and without departing from the spirit of my invention.

I claim—

1. The combination with a boiler having a port through its shell, of a casing communicating with such port, a supply-pipe communicating with such casing, a combined boiler-check and blow-off cock arranged in the casing and adapted to control the boiler-feed and the blow-off and a check-valve governing the port or passage from said supply-pipe.

2. The combination with a boiler having a port through its shell, of a casing communicating with such port and a valve device forming a combined boiler-check and blow-off cock arranged in such casing and adapted to control the boiler-feed and the blow-off, said valve device being suspended on its opposite sides to permit free rotation and having wings whereby to cause such rotation on passage of water in either direction.

3. The combination with a boiler having a port through its shell, of a casing communicating with such port, a valve forming a combined boiler-check and blow-off cock arranged in such casing and adapted to control the boiler-feed and the blow-off, said valve being suspended on its opposite sides to permit free rotation and having spiral wings whereby to cause such rotation on passage of water in either direction and fluid-pressure mechanism for opening said valve to blow off the boiler.

4. The combination, with a boiler having a water-supply pipe and having a port through its shell, of a casing having three openings, the first communicating directly with said opening through the shell, the second being a water-inlet from the supply-pipe and the third being a discharge-outlet to the atmosphere, a valve governing both the water from the supply-pipe and the blow-off of the boiler to the atmosphere through said port and a check-valve in the water-inlet.

5. The combination, with a boiler having a water-supply pipe and having a port through its shell, of a casing having first an opening communicating with said port, second a water-inlet from the supply-pipe, and third an outlet to the atmosphere, a winged valve device governing said port and constituting a combined boiler-check and blow-off cock and adapted to control the boiler-feed and the blowing off, said valve device being adapted to rotate by the passage of water in either direction, and a winged check-valve governing said water-inlet and adapted to close to prevent back pressure into the supply-pipe and to open and rotate in the feeding operation.

6. The combination with a boiler having a port through its shell, of a casing communicating with such support, a supply-pipe communicating with such casing, a rotatable valve having a stem on either side and also having wings, and bridges or supports for said valve-stems respectively whereby the valve will rotate on the passage of water in either direction, said valve governing said port and constituting a combined boiler-check and blow-off cock.

7. The combination, with a boiler having a port through its shell, of a casing communicating with such port and provided with a yoke or bridge within the boiler, a supply-pipe communicating with the casing, a valve-seat arranged within the casing and provided at its top with a bridge, and a double-stemmed valve arranged between the bridges to govern said port and having its stems supported and guided by such bridges, said valve governing said port and constituting a combined boiler-check and blow-off cock.

8. The combination, with a boiler having a port through its shell, of a casing communicating with such port and provided with a water-inlet and an outlet, a valve governing said port and forming a combined boiler-check and blow-off, such valve having wings and also having oppositely-extending stems, bridges

to receive and guide such stems, and a winged check-valve governing the water-inlet and having oppositely-extending stems and bridges to receive and guide such stems, the latter valve being rotatable in the feeding operation only and the other valve being rotatable in both the feeding and blowing-off operation.

9. The combination, with a boiler having a port through its shell, of a flange secured to the shell and provided with an opening registering with said port, such flange having an annular extension around said opening and forming a recess, a casing secured in such flange and provided with an annular flange received by the recess, and a valve in said casing below said flange on the casing for governing said port whereby the valve is protected and the tendency of breakage is located above the valve.

10. The combination, with a boiler having a blow-off port through its shell, a valve governing said port, and a pipe or conduit located within the boiler and extending substantially to the water-line of the boiler, such pipe communicating with said port whereby a surface blow-off is obtained.

11. The combination, with a boiler having a blow-off port through its shell, of a pipe located within the boiler and communicating with said port, a funnel or skimmer on the top end of said pipe at the water-line and a blow-off valve for governing said port.

12. The combination, with a boiler having a port through its shell, of a pipe located within the boiler and extending substantially to the water-line of the boiler, such pipe communicating with said port and a combined boiler-check and blow-off cock governing said port.

13. The combination, with a boiler having a port through its shell, of a pipe or conduit within the boiler extending substantially to the water-line and communicating with said port, such pipe being open at its upper end, means for normally closing the lower end of the pipe in blowing off the boiler and valve mechanism governing said port.

14. The combination, with a boiler having a port through its shell, of a pipe or conduit within the boiler extending substantially to the water-line and communicating with said port, such pipe being open at its upper end, a flap or check valve at the lower end of the pipe substantially at the bottom of the boiler to prevent blowing off at such point and valve mechanism governing said port to admit water at the bottom of the boiler and to blow off the boiler from the water-line.

15. The combination, with a boiler having a port through its shell, of a pipe or conduit within the boiler closed at its upper end and open at its lower end and extending substantially to the bottom of the boiler and valve mechanism governing said port to admit water and to blow off the boiler substantially at the bottom thereof.

16. The combination, with a boiler having a port through its shell, of a pipe or conduit outside the flues and adjacent to the inner wall of the shell, such pipe being closed at its upper end and open at its lower end and communicating with such port and extending substantially to the bottom of the boiler and a valve for controlling said port.

17. The combination, with a boiler having a port through its shell, of a substantially vertical pipe or conduit within the boiler and communicating with said port, a valve-casing adjacent to said port, a valve therein governing such port, an outlet-pipe from the casing, a substantially horizontal discharge-pipe connected with said outlet-pipe and extending transverse of the boiler and means for closing one or the other end of such discharge-pipe to obtain a discharge on either side of the boiler.

18. The combination, with a boiler having ports through its shell, of a pipe within the boiler communicating with one of such ports, a second similar pipe communicating with the other of such ports, and valve mechanism controlling said ports.

19. The combination, with a boiler having ports through its shell, of a pipe within the boiler communicating with one of such ports and normally open only at the water-line of the boiler, a second similar pipe communicating with the other of such ports and open only at its lower end substantially at the bottom of the boiler and valve mechanism governing said ports to blow off the boiler from the top and from the bottom.

20. The combination, with a boiler having ports through its shell, of a pipe within the boiler communicating with one of such ports and normally open only at the water-line of the boiler, a second similar pipe communicating with the other of such ports and open only at its lower end substantially at the bottom of the boiler, valve mechanism governing said ports to blow off the boiler from the top and from the bottom, separate outlet-pipes, a common discharge-pipe to which the outlet-pipes are connected and means for closing one or the other end of such discharge-pipe.

21. The combination, with a boiler having ports through its shell, of separate pipes within the boiler, each communicating with one of the ports, one of such pipes open only at its lower end substantially at the bottom of the boiler and the other of such pipes open at its upper end substantially at the water-line but having its lower end check-valved against passage of water outward at such point and similar valve mechanism governing each port, such mechanism not only admitting water to the boiler at the bottom thereof through the lower ends of each pipe but also blowing off the boiler, from the surface as to one pipe and from the bottom as to the other pipe.

22. The combination, with a boiler having a port through its shell, of a pipe or conduit

located within the boiler and communicating with such port, a funnel on the upper end of such pipe at the water-line, a valve governing said port and fluid-pressure mechanism for operating such valve to blow off the boiler from the surface.

23. The combination, with a boiler having a port through its shell, of a pipe or conduit located within the boiler and closed at its upper end but open at its lower end which approaches the bottom of the boiler, such pipe communicating with such port, a valve governing the port and fluid-pressure mechanism for operating such valve to blow off the boiler from the surface.

24. The combination, with a boiler having a port through its shell and a water-supply pipe, of a casing communicating with such port and with such pipe, valve mechanism therein for governing said port and a second valve governing the passage between such pipe and the casing.

25. The combination, with a boiler having a port through its shell and a water-supply pipe, of a casing communicating with such port and with such pipe, valve mechanism therein for governing said port and a rotatable valve governing the passage between such pipe and the casing.

26. In a fluid-pressure blow-off cock, the combination with a boiler having a port or passage from the boiler to the atmosphere, of a valve for governing said passage, a fluid-pressure-actuated piston traveling in a chamber for operating said valve, an outer stem carried by such piston, and a hollow nut or cap adapted to be moved into and out of said chamber and to engage said stem to positively operate the piston.

27. In a fluid-pressure blow-off cock, the combination with a boiler having a port or passage from the boiler to the atmosphere, of a valve for governing said passage, a fluid-pressure-actuated piston traveling in a chamber for operating said valve, an outer stem carried by such piston and having an enlarged head and a hollow nut or cap adapted to be moved into and out of the chamber and having internal shoulders to engage said stem to move the piston independently of fluid-pressure.

28. In a fluid-pressure blow-off cock, the combination with a boiler having a port or passage from the boiler to the atmosphere, of a valve for governing said passage, a fluid-pressure-actuated piston traveling in a chamber, a stem 34 carried by the piston and having a flange 35, and a hollow screw-threaded nut or plug 36 in whose interior the stem is received, such nut having shoulders 38 and 39 engaging the flange in the inward and outward movements respectively of the nut.

29. The combination, with a boiler having a port through its shell, of a casing communicating by a passage with such port, a valve-seat at such port, a rotatable valve governing such port and normally resting on such seat to close the port, and wings connected to the valve-stem and whose inner ends are separated from the valve a distance equal to the extreme lift of the valve whereby in extreme movement of the valve the said ends of the wings will be substantially flush with the valve-seat.

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