

(No Model.)

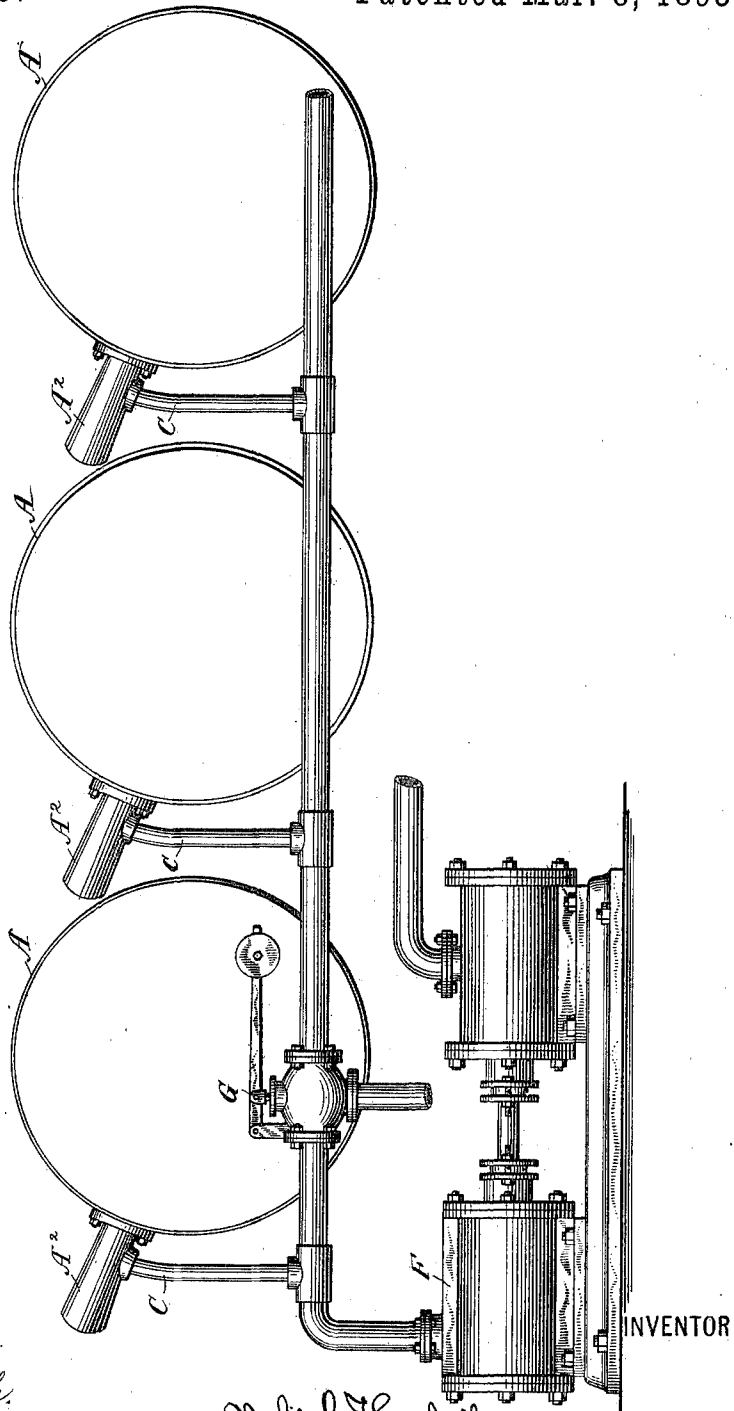
2 Sheets—Sheet 1.

N. G. HERRESHOFF.  
ATTACHMENT FOR STEAM BOILERS.

No. 600,223.

Patented Mar. 8, 1898.

Fig. 1.



WITNESSES:

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INVENTOR

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Fig. 2.

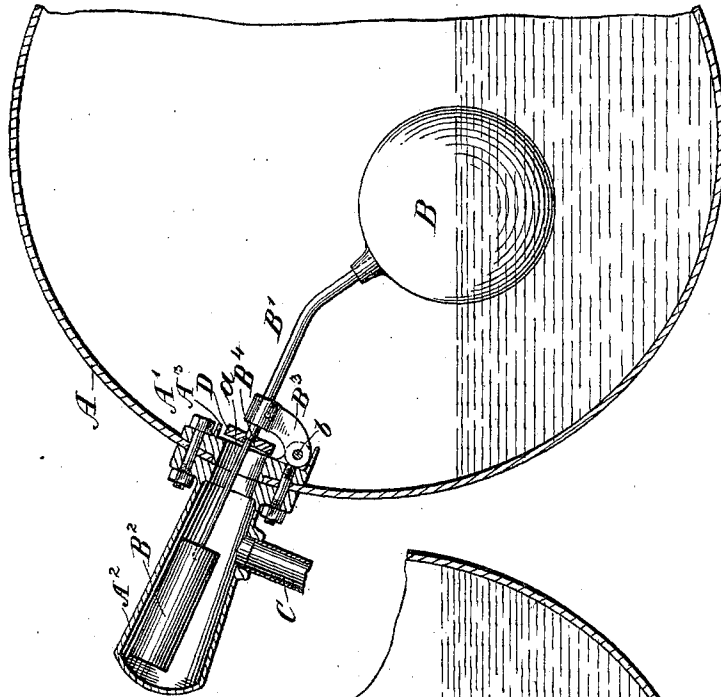
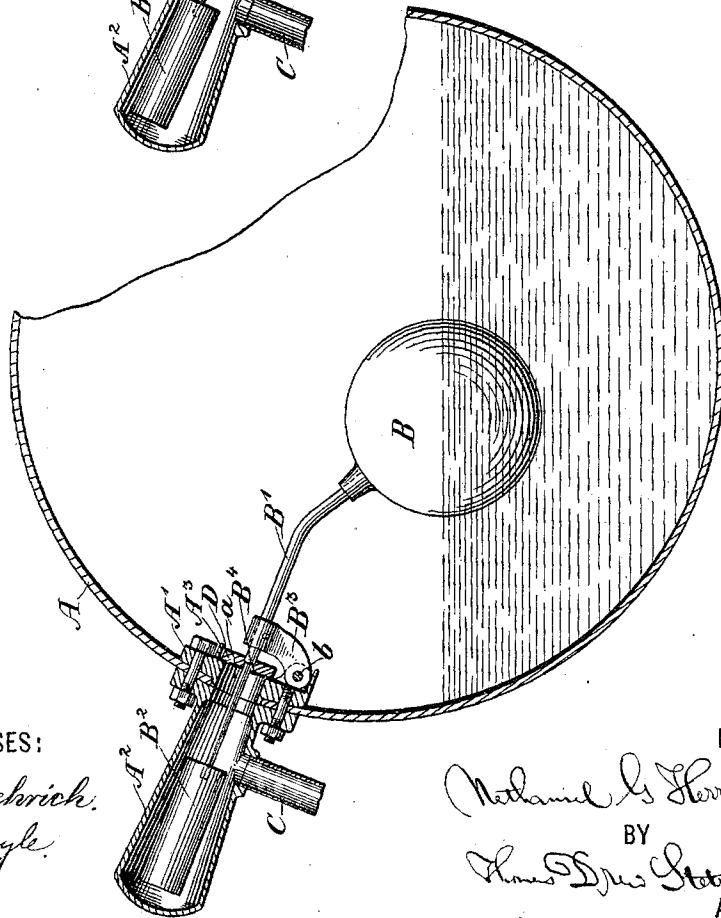


Fig. 3.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

NATHANIEL GREENE HERRESHOFF, OF BRISTOL, RHODE ISLAND, ASSIGNOR  
TO THE HERRESHOFF MANUFACTURING COMPANY, OF SAME PLACE.

## ATTACHMENT FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 600,223, dated March 8, 1898.

Application filed August 11, 1897. Serial No. 647,810. (No model.)

*To all whom it may concern:*

Be it known that I, NATHANIEL GREENE HERRESHOFF, a citizen of the United States, residing at Bristol, in the county of Bristol and State of Rhode Island, have invented a certain new and Improved Attachment for Steam-Boilers, of which the following is a specification.

I operate a valve by means of a float supported on the water in the boiler and thereby restrain the admission of the feed-water with a yielding force which increases as the water-level in that boiler rises. It is intended more particularly for use in sets of two or more boilers supplied by a single feed-pump or analogous water-forcing device. The arrangement allows the valve to serve also as a check-valve. The float is connected by means of a lever turning on a center near the orifice through which the feed-water is admitted. The buoyancy of the float is aided by a weight on the opposite arm of the lever extending out through the feed-orifice and inclosed within a suitably-formed chamber exterior to the main cylindrical portion of the boiler. When the apparatus is working in the ordinary manner and the feed-pump is supplying feed, this chamber is filled with water at a pressure a little above that in the boiler. The valve resists the feed with a moderate pressure if the water is high and opens to allow a free flow if the water is low. It should be understood that all the boilers fed are discharging steam into the same main and are subjected to about the same steam-pressure.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is an end elevation of a series of boilers arranged side by side and provided with my attachment and supplied by branches from a single feed-pipe. Fig. 2 is a vertical section showing the water low and the feed being admitted freely. Fig. 3 is a corresponding section showing the water high and the admission of feed subjected to increased restraint by the partial closing of the valve.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is a portion of the boiler, represented as

cylindrical. It may be understood to be the main body or supporting-chamber of a sectional boiler having water-tubes below. (Not shown.) It is important that the water-level be maintained at about the position indicated. A casting A' is fitted on the interior of the boiler surrounding the feed-water aperture *a* and presenting a suitable seat for a disk or puppet valve opening inward, to be described farther on. A sector-shaped or conical chamber A<sup>2</sup> is fitted on the outside, into which a feed-pipe C connects.

B is a float, and B' a lever extending out through the sufficiently capacious feed-orifice *a* and carrying a weight B<sup>2</sup> on or near its outer end. This lever turns on a center *b*, to which it is connected by an inclined arm B<sup>3</sup>. The lever is provided with a spherical shoulder B<sup>4</sup> at a point nearly abreast of the axis of motion *b* and receives on that shoulder a loosely-mounted disk valve D, which is adapted to close tightly against the seat on the inner face of the adjacent casting A'. The center *b* is nearly frictionless and presents but little resistance to the motion of the lever B', with its attachments. The feed-water should be supplied constantly at a pressure which is capable of rising somewhat above that in the interior of the boiler. Its pressure against the valve D tends to open it inward, thereby tilting the lever B' and depressing the float B and raising the weight B<sup>2</sup>. Any change in the level of the water varies the condition in this regard. A sinking of the water-level allows this motion to proceed further and the valve D to open farther, admitting the feed-water more freely, and a rising of the water-level rocking the lever B' in the opposite direction and partially closing the valve D and thereby obstructing the admission of the water.

When the invention is applied to a series of boilers side by side or to a series of sections in a sectional boiler, which sections I will refer to as "boilers," each is provided with my invention and the several feed-pipes C are connected together and supplied by a single feed-pump F. When by reason of an inclination of the vessel on which the boilers are used or for any other cause the water-level rises in the lowermost boiler or in any one of the series, the valve D in that boiler

will be more nearly closed than the corresponding valve in each of the other boilers, so that no boiler will receive an excess. When the water-level is sufficiently raised in all the  
5 boilers, and consequently the resistance to the admission to all the boilers is sufficiently increased, a safety-valve G on the feed-pipe C allows the water to escape idly, returning to be pumped again.

10  $A^3$  is a rim on the casting  $A'$  a little larger than the valve-seat. It serves to arrest and deflect inward the thin sheet of feed-water spread by the valve D and to insure a prompt action in the rare cases where such valve is  
15 required to serve as a check-valve to arrest a flow of water or steam in the opposite direction.

When from accident or other cause there might be liberty for the water and steam from  
20 the boiler to escape through the feed apparatus, the pressure of the water inward against the valve D being stopped, the pressure of the water and steam in the interior of the boiler forces the valve outward, the buoyancy of the float B and the gravity of the  
25 weight  $B^2$  being reinforced immensely by the pressure of the steam, so that the valve is certain to press fairly and tightly on its seat  $A'$ . When this occurs, the float will rise a very little higher than is shown in Fig. 3, the  
30 float being raised higher even if the water-level is low and the valve D being forced into tight contact with its seat  $A'$ .

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. Parts may be used without the whole. In some cases it may be expedient to have the valve D fixed rigidly on the lever  $B'$ , taking care to confine  
40 it, so that it will bear fairly when closed. Such a modification would decrease the number of joints and loose parts. Other modes of allowing the valve a little looseness may be employed. The shoulder at  $B^4$  may be a  
45 partial cylinder instead of a partial sphere. The boilers may be arranged otherwise than side by side. The invention may be depended on to maintain about the proper quantity in each if there is considerable difference in  
50 the level of the second boiler of a set.

I claim as my invention—

1. In combination with a steam-boiler A and feed-pipe C, a valve D having an interior resting on the boiler-shell and arranged to be  
55 opened by the force of the entering water and to restrain its entrance with varying force according as its position is changed, and a float B connected thereto through a lever  $B'$  extending both within and outside of the boiler  
60 and turning on a center  $b$ , and a weight  $B^2$  adapted to promote the closing movement of the valve, the valve being governed by the rising and sinking of the water-level, requiring but little buoyancy in the float, all substantially as herein specified.

2. In combination with a steam-boiler A, and feed-pipe C, a valve D having an interior resting on the boiler-shell and arranged to be opened by the force of the entering water and to restrain its entrance with varying force according as its position is changed, a lever  $B'$   
75 extending both within and outside of the boiler and turning on an adjacent axis or center  $b$ , and a lever or universal joint  $B^4$  connecting the valve to such lever with liberty  
75 to allow it to accommodate itself to its seat, so as to close it and serve as a check-valve when required, and a float B connected thereto and affected by the rising and sinking of the water-level, all substantially as herein  
80 set forth.

3. In combination with a steam-boiler A and feed-pipe C, a valve D having an interior resting on the boiler-shell and arranged to be opened by the force of the entering water and  
85 to restrain its entrance with varying force according as the position is changed, a float B connected thereto through a lever  $B'$  extending both within and outside of the boiler and turning on a center  $b$ , a weight  $B^2$  adapted  
90 to promote the closing movement of the valve, and a chamber  $A^2$  on the exterior of the boiler inclosing the weight with liberty for its motion and subject to the pressure in the connected feed-pipe, all adapted to serve substantially as herein set forth.

4. In combination with a steam-boiler A, chamber  $A'$ , and feed-pipe C, a valve D, having an interior seating on the boiler-shell, a lever  $B'$  turning on an adjacent center or axis  
100  $b$ , said lever passing through the valve and extending both into the boiler and chamber  $A'$ , a float B on the lever within the boiler, and a weight on the said lever within the chamber  $A'$ , the arrangement being such that  
105 the valve will be seated by forces operating both within and externally to the boiler, substantially as herein specified.

5. In combination with a steam-boiler A, chamber  $A'$  and feed-pipe C, a valve D having  
110 an interior seating on the boiler-shell, a float B mounted on a lever  $B'$  turning on an adjacent center or axis  $b$  and provided with a conical shoulder in free bearing contact with a corresponding recess in the valve, said  
115 lever passing through said valve and extending both into the boiler and chamber  $A'$ , a weight  $B^2$  on the said lever within the chamber  $A'$ , the arrangement being such that the valve will be seated by forces operating both  
120 within and externally to the boiler, substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

NATHANIEL GREENE HERRESHOFF.

Witnesses:

C. W. YOUNG,  
H. T. CARD.