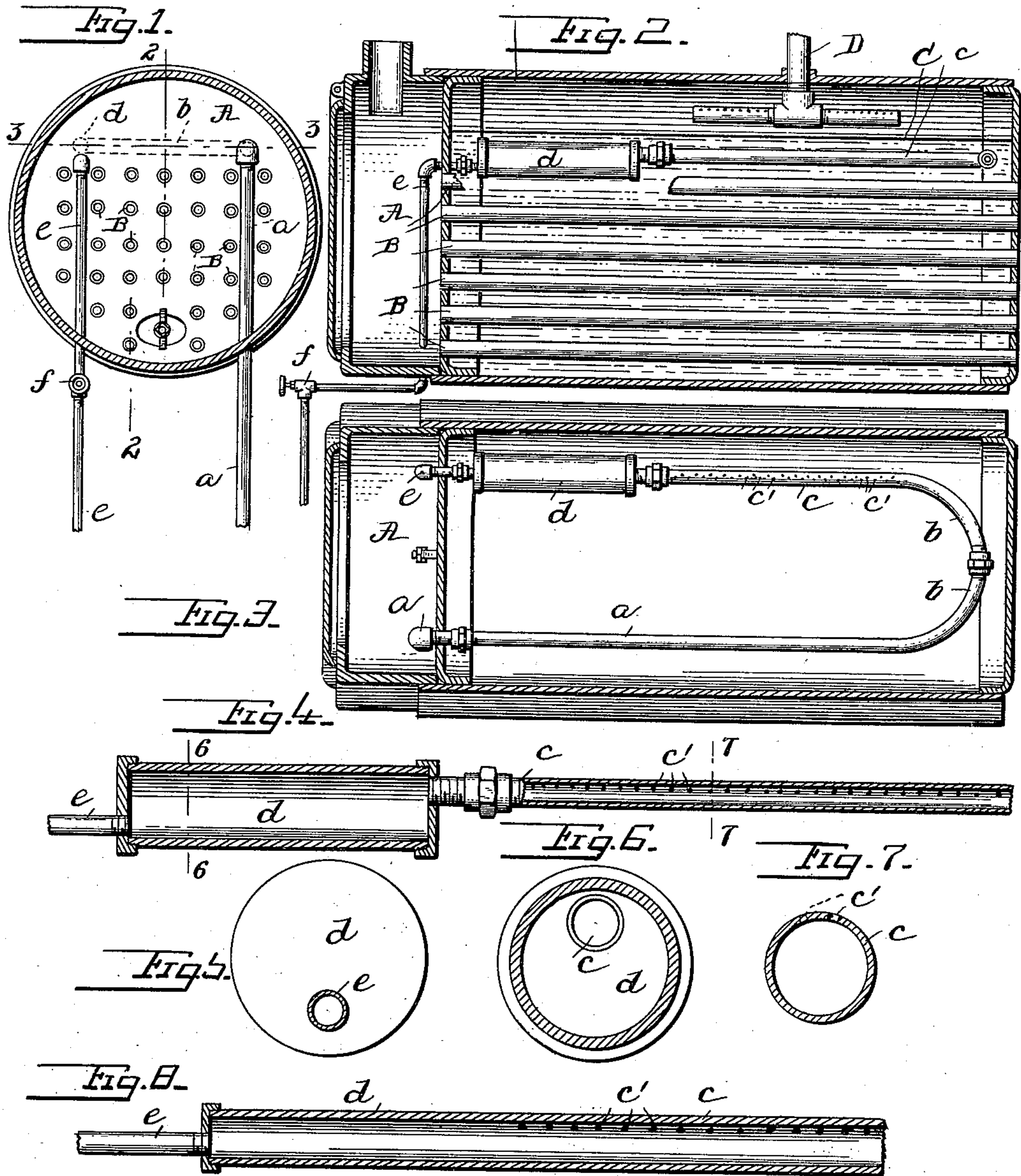


(No Model.)

A. B. WILLOUGHBY.
WATER FEED FOR BOILERS.

No. 601,693.

Patented Apr. 5, 1898.



WITNESSES:

Jesse B. Heller.
M. F. Ellis.

INVENTOR

Alfred B. Willoughby

BY

Handing & Handing
ATTORNEYS

UNITED STATES PATENT OFFICE.

ALFRED B. WILLOUGHBY, OF PHILADELPHIA, PENNSYLVANIA.

WATER-FEED FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 601,693, dated April 5, 1898.

Application filed May 18, 1897. Serial No. 637,035. (No model.)

To all whom it may concern:

Be it known that I, ALFRED B. WILLOUGHBY, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Water-Feeds for Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

In the ordinary construction now generally in use for feeding water to boilers a large amount of sediment is carried with the water into the boilers, causing loss of steam and also affecting the boiler-shell itself.

The object of my invention is a construction which will prevent the entrance of substantially all of the sediment or scale passing with the water into the boiler. I accomplish this in the following manner: Instead of the inlet water-pipe, as in the ordinary construction, delivering at an open end into the water-space in the boiler I continue the water-inlet pipe beyond the point where the water is to be discharged into the boiler, preferably enlarging the size of the tube beyond this point and providing an outlet beyond the shell of the boiler for this extension of the water-feed pipe, which outlet is normally closed by means of a cock. The water is delivered from the water-feed pipe at the desired point into the water-space in the boiler by means of perforations or orifices which are cut through the water-feed pipe above its horizontal center. The water passing with the scale or matter carried therein will pass through the water-inlet pipe, through the extension thereof until it reaches the closed cock, at which point it will back up, and the sediment being heavier than the water will deposit at the bottom of the extension and the water will be forced out through the orifices in the upper periphery of the pipe. Where the extension of the inlet water-pipe is of larger size than the inlet-pipe, I connect the inlet-pipe at or near the upper portion of the extension and connect the outlet from said extension to the lower portion of said pipe.

I will now describe the embodiment of my invention illustrated in the accompanying drawings, in which—

Figure 1 is a section through the smoke-box of a horizontal tubular boiler with my in-

vention applied thereto. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 1 with the tubes removed. Fig. 4 is an enlarged detailed section of a portion of the water-feed pipe and the extension thereof. Fig. 5 is an end view of the same. Fig. 6 is a section on the line 6 6, Fig. 4. Fig. 7 is a section on the line 7 7, Fig. 4. Fig. 8 is a view similar to Fig. 4 of a modified construction.

A is the smoke-box of the boiler, and B the horizontal tubes through which the products of combustion pass.

C is the water-level of the boiler, and D is the steam-outlet pipe.

The water-feed pipe consists of the sections *a*, *b*, and *c*, the section *a* entering the boiler, traversing the length of the boiler, the section *b* passing around the end and the section *c* back again toward the front of the boiler. In the upper periphery of the section *c*, which is slightly below the water-level of the boiler, are placed the orifices *c'*, which preferably are at or near the highest point of the pipe and are inclined slightly, so as to strike the water in the boiler at a slight inclination from the vertical in order not to disturb the level water-surface. The section *c* is connected by union with the section *b*, and the section *b* by means of the union with the section *a*. Beyond the section *c* is the enlarged extension *d*, the pipe *c* being connected with the section *d* at or near the highest point of the section *d*. Beyond the section *d* is the outlet-section *e*, which connects with the section *d* at or near the lowest point of the section *d*. This section *e* passes out through the boiler-shell and has the cock *f* attached thereto. If desired, in place of using the section *d* the section *c* may be prolonged of the same size and the section *e* connected directly to the prolonged section *c*, as shown in Fig. 8. The operation is as follows: The water entering the section *a* passes through the section *b* and the section *c* and initially passes through the sections *d* and *e* until it reaches the cock. When the water is backed up, sufficient back pressure is obtained to force the water at the end of the pipe *c* out through the orifices *c'*, the water passing through the pipe *c* into the pipe *d*. The solid matter will drop out of it and settle in the bottom of the pipe *d*, and as the level of

its bottom is considerably below the bottom of the pipe *c* the backing of the water will not carry the sediment back in and out of the orifices *c'*. From time to time the cock *f* is
 5 opened, which will cause a free flow of the water through the pipes *a*, *b*, *c*, *d*, and *e* and clean out the deposit collected in the chamber *D*.

With the construction shown in Fig. 8 the
 10 operation will be substantially the same except that with this construction very frequent cleaning would be required.

I do not intend to limit myself to the use of this water-feed construction in any particular
 15 type of boiler, it being merely shown with a return-flue boiler, that being one type of boiler to which it is adapted. Nor do I intend to limit myself to the precise location in the pipe *c*, in which the orifices *c'* are placed, or their
 20 direction, as they may be placed at any point above the horizontal center of the pipe and may have any desired inclination.

I do not intend to limit myself to any particular extent of water-feed pipe or the number of turns it makes in the boiler, as the pipe
 25 may be longer or shorter or have more or less turns than shown without departing from my invention.

By coupling the sections together as above
 30 described any section may be removed and replaced or the whole taken apart at any time with great facility, which may be necessary if the sedimentary deposit be very great.

Having now fully described my invention,
 35 what I claim, and desire to protect by Letters Patent, is—

1. In a boiler, a water-feed pipe having orifices in said pipe within the boiler at the desired point for delivery of the water, a pipe
 40 secured to and extending beyond said pipe, the water-feed pipe opening into said last-mentioned pipe at or near its upper end, said last-mentioned pipe extending below the adjacent section of the water-feed pipe, and a
 45 normally-closed discharge-pipe opening from said extension-pipe at or near its lower end.

2. In a boiler, a water-feed pipe having orifices in said pipe above the horizontal center of the pipe within the boiler at the desired
 50 point for delivery of the water, a pipe secured to and extending beyond said pipe, the water-feed pipe opening into said last-mentioned pipe at or near its upper end, said last-mentioned pipe extending below the adjacent
 55 section of the water-feed pipe, and a normally-closed discharge-pipe opening from said extension-pipe at or near its lower end.

3. In a boiler, a water-feed pipe having orifices in said pipe within the boiler at the desired point for delivery of the water, a pipe
 60 secured to and extending beyond said pipe, the water-feed pipe opening into said last-mentioned pipe at or near its upper end, said last-mentioned pipe extending below the adjacent section of the water-feed pipe, and a
 65 normally-closed discharge-pipe extending from said extension-pipe at or near its lower

end, and a valve upon the discharge-pipe adapted when operated to open said pipe.

4. In a boiler, a water-feed pipe having orifices in said pipe above the horizontal center of the pipe within the boiler at the desired point for delivery of the water, a pipe secured to and extending beyond said pipe, the water-feed pipe opening into said last-mentioned
 75 pipe at or near its upper end, said last-mentioned pipe extending below the adjacent section of the water-feed pipe, and a normally-closed discharge-pipe opening from said extension-pipe at or near its lower end, and a
 80 valve upon the discharge-pipe adapted when operated to open said pipe.

5. In a boiler, a water-feed pipe having orifices in said pipe within the boiler at the desired point for delivery of the water, an extension-pipe of larger diameter than the water-feed pipe and extending below the adjacent section of the water-feed pipe into which said feed-pipe opens, the discharge from said
 85 extension-pipe being normally closed.

6. In a boiler, a water-feed pipe having orifices in said pipe above the horizontal center of the pipe within the boiler at the desired point for delivery of the water, an extension-pipe of larger diameter than the water-feed
 95 pipe into which said feed-pipe opens, said extension-pipe extending below the adjacent section of the water-feed pipe, the discharge from said extension-pipe being normally closed.

7. In a boiler, a water-feed pipe having orifices in said pipe within the boiler at the desired point for delivery of the water, an extension-pipe of larger diameter than the water-feed pipe into which said feed-pipe opens, the said extension-pipe extending below the adjacent section of said water-feed pipe, the discharge from said extension-pipe being normally closed, a valve controlling the discharge from said extension-pipe and adapted when
 100 operated to open said pipe.

8. In a boiler, a water-feed pipe having orifices in said pipe above the horizontal center of the pipe within the boiler at the desired point for delivery of the water, an extension-pipe of larger diameter than the water-feed
 115 pipe into which said feed-pipe opens, said extension-pipe extending below the adjacent section of said water-feed pipe, the discharge from said extension-pipe being normally closed, a valve controlling the discharge from said extension-pipe and adapted when operated to open said pipe.

9. In a boiler, a water-feed pipe having orifices in said pipe within the boiler at the desired point for delivery of the water, an extension-pipe of larger diameter than the water-feed pipe into which said feed-pipe opens at or near its upper end, said extension-pipe extending below the adjacent section of the
 125 water-feed pipe, the discharge from said extension-pipe being normally closed.

10. In a boiler, a water-feed pipe having orifices in said pipe above the horizontal center

of the pipe within the boiler at the desired point for delivery of the water, an extension-pipe of larger diameter than the water-feed pipe into which said feed-pipe opens at or
5 near its upper end, said extension-pipe extending below the adjacent section of the water-feed pipe, the discharge from said extension-pipe being normally closed.

11. In a boiler, a water-feed pipe having or-
10 fices in said pipe within the boiler at the desired points for delivery of the water, an extension-pipe of larger diameter than the wa-

ter-feed pipe into which said feed-pipe opens at or near its upper end, said extension-pipe extending below the adjacent section of said
15 water-feed pipe, the discharge-pipe normally closed connecting with said extension-pipe at or near its lower end.

In testimony of which invention I have hereunto set my hand.

ALFRED B. WILLOUGHBY.

Witnesses:

FRANK S. BUSSE,
M. F. ELLIS.