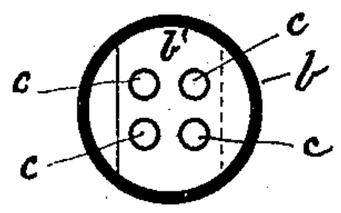
(No Model.)

D. C. STILLSON.

FEED WATER HEATER.

No. 277,075. Patented May 8, 1883.

Fig. 2.



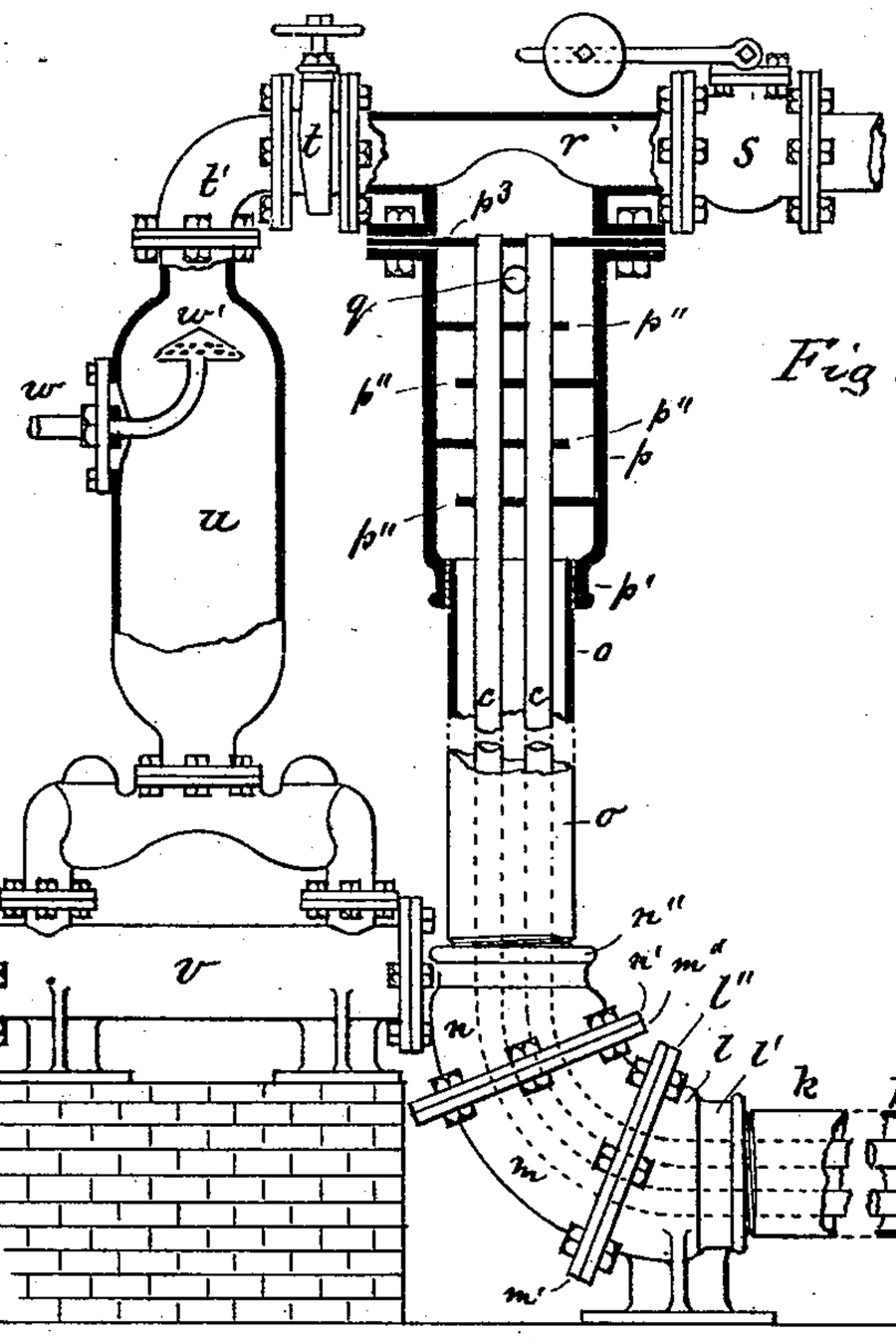
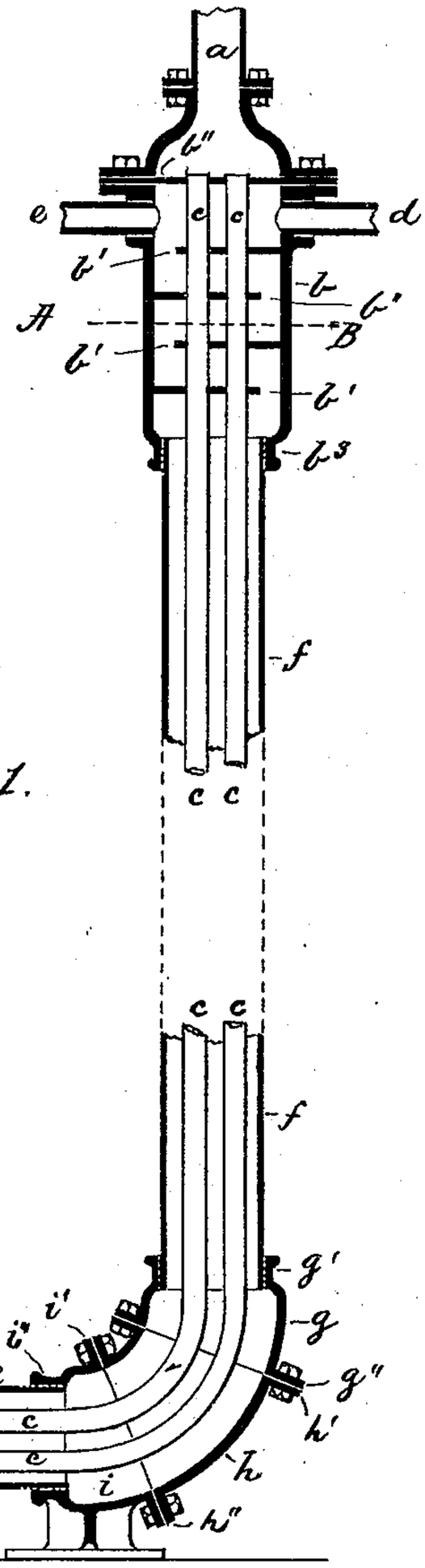


Fig 1.



Witnesses.

John H. Foster.

Henry Chadbourn.

Inventor.

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UNITED STATES PATENT OFFICE.

DANIEL C. STILLSON, OF SOMERVILLE, MASSACHUSETTS.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 277,075, dated May 8, 1883.

Application filed February 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, DANIEL C. STILLSON, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Feed-Water Heaters; and I do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

This invention relates to improvements in feed-water heaters for steam-boilers, and particularly on the patent granted to me on December 19, 1882, No. 269,243; and it is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a longitudinal section of my improved feed-water heater; and Fig. 2 represents a cross-section on the line A B, shown in Fig. 1.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

a is the inlet for the exhaust-steam, and *b* is the upper head or chamber, with the horizontal walls or braces *b' b'*, extending alternately from two opposite sides, as shown, so as to insure a more intimate contact between the heating-pipes and the feed-water in a like manner as shown and described in my aforesaid Letters Patent.

c c c c are the steam-pipes, passing through perforations in the walls *b' b'* and upper plate, *b''*, that closes the top of the head or chamber *b*, as usual.

d is the pipe leading from the chamber *b* to the boiler, and *e* is the blow-off pipe leading from said chamber *b*, as usual. The lower end of the chamber *b* is made cylindrical, and provided with an internal screw-thread b^3, into which is screwed the cylindrical pipe or casing *f*, the lower end of which is screwed into the upper end of the elbow part *g*, which has for this purpose an internal screw-thread at *g'*, and is provided with a flange, *g''*, by means of which it is bolted to the elbow part *h* and its flange *h'*. The elbow part *h* has a second flange, *h''*, bolted to the flange *i'* on the elbow part *i*, the latter having in its lower horizontal end an internal screw-thread *i''*, into which one end of the horizontal casing *k* is screwed, the latter being made in the form of a cylindrical pipe, like the vertical casing *f*, and screwed in its opposite end into the internal screw-thread *l'* in the elbow part *l*, which latter is provided with a flange, *l''*, by means of which it is bolted to the flange *m'* on the elbow part *m*, having a second flange, *m''*, bolted to the flange *n'* on the elbow part *n*, that is provided in its upper end with an internal screw-thread *n''*, into which the lower screw-threaded end of the vertical pipe or cylindrical casing *o* is screwed. The upper end of the said pipe or casing *o* is screwed into the internal screw-thread *p'* in the lower end of the head or chamber *p*, the latter being provided with perforated partitions or walls *p''* *p''*, through which the steam-pipes *c c c c* project, such walls *p''* extending alternately from two opposite sides of the chamber *p* in a similar manner and for a similar purpose as heretofore described in relation to the head *b* and its walls *b' b'*.

p^3 is the diaphragm or cover of the chamber *p*, which is provided with suitable perforations, through which the ends of the heater-pipes *c c c c* project.

By making the casings *f*, *k*, and *o* cylindrical and screw-threaded in their ends I am enabled to use ordinary pipes for such casings, and to connect them in a simple and durable manner to their respective heads and segmental elbows, as shown, and by making the elbows of the respective segmental flanged parts *g h i* and *l m n*, I am enabled to dispense with any and all joints upon the heater-pipes *c c*, each one of which may consequently be made as one continuous piece extending from the chamber *b* to the chamber *p*, and thus to prevent such pipes from leaking, which is liable to occur in proportion to the number of joints or connections used on such pipes, and this the more so as such heater-pipes are not exposed to view, being inclosed within the casings and elbows, and it is therefore difficult to locate a leak in jointed pipes, except by taking the whole of the casings and elbows to pieces. This objection is entirely obviated by my improved construction, which enables me to use continuous and non-jointed heater-pipes, as described.

q is the inlet for the water in the head or chamber *p*, which is to be heated by contact with the heater-pipes *c c* in its passage through the casings and elbows aforesaid to the pipe *d*, leading to the boiler.

To the top of the head or chamber *p* is bolted

the branch pipe *r*, having secured to one of its open branches the back-pressure valve *s*, of any ordinary construction, and to its other end is bolted a suitable regulating and stop valve, *t*, as shown in Fig. 1. The valve *t* is connected by means of short pipe or branch *t'* to the cold-water condensing-chamber *u*, the lower end of which is connected to a suitable air-pump, *v*, as usual in condensing apparatus.

w is a cold-water pipe entering through one side of the condenser *u*, and terminating inside the latter as a perforated case or bulb, *w'*, through the perforations of which a spray of cold water is forced against the descending steam to effect a thorough condensation of the latter, and is pumped from the condenser by means of the air-pump *v* as fast as it is condensed. I close the valve *t* and allow the steam from the pipes *c c* to pass through valve *s* in case it is desired to use the steam for heating purposes.

I wish to state that, though I prefer to force the feed-water in the head *p* through pipe *q* and casings *o k f*, elbows *l m n g h i*, head *b*, and pipe *d*, and the steam through the pipes *c c c c*, still I may, if so desired, force the feed-water through the pipes *c c c c* and the steam through the said casings and elbows, the inlets and outlets for the steam and water being transposed accordingly.

Having thus fully described my invention, I wish to secure by Letters Patent, and claim—

1. In a feed-water heater, the heads *b p*, and segmental elbows *g h i* and *l m n*, with screw-threaded ends to receive the cylindrical casings *f*, *k*, and *o*, and inclosing the steam-pipes *c c c c*, as and for the purpose set forth.

2. In a feed-water heater, the heads *b p*, segmental elbows *g h i* and *l m n*, casings *f k o*, internal pipes, *c c*, air-pump *v*, condenser *u w w'*, stop-valve *t*, and connections to the chamber *p*, as and for the purpose set forth.

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

DANIEL C. STILLSON.

Witnesses:

ALBAN ANDRÉN,

HENRY CHADBOURN.