

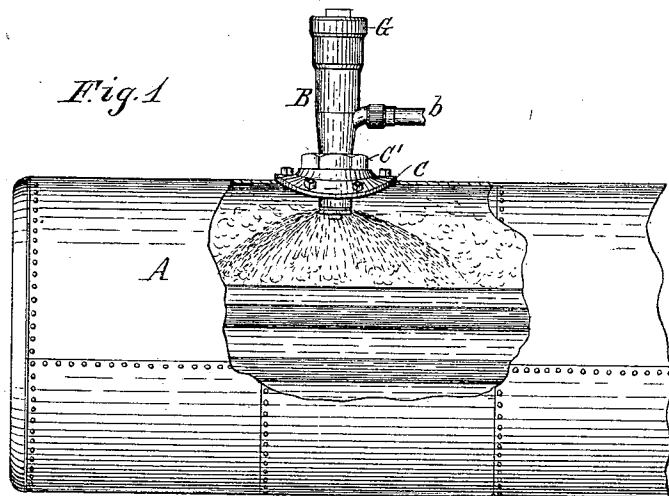
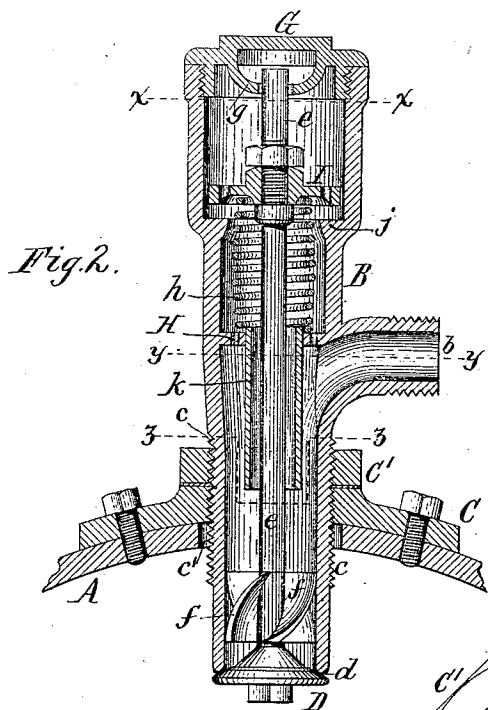
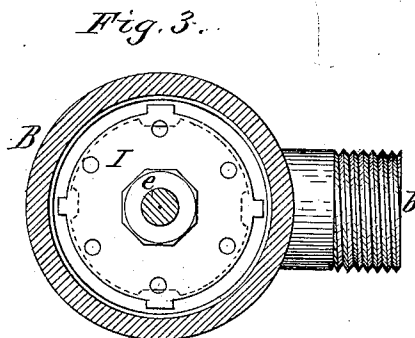
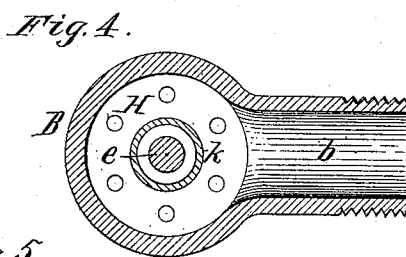
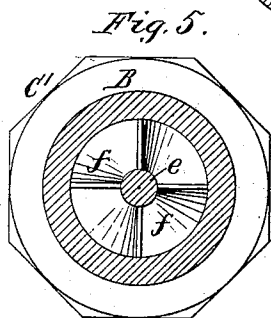
(No Model.)

E. J. HALL.

FEED WATER HEATER FOR STEAM BOILERS.

No. 272,684.

Patented Feb. 20, 1883.



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# UNITED STATES PATENT OFFICE.

EDWARD J. HALL, OF BUFFALO, NEW YORK.

## FEED-WATER HEATER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 272,684, dated February 20, 1883.

Application filed October 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. HALL, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Feed-Water Heaters for Steam-Boilers, of which the following is a specification.

This invention relates to improvements in that class of feed-water heaters which consists of a feed-water-discharge tube terminating in the steam-space of the boiler, and provided at its lower end with a valve which opens under the pressure of the feed-pump or other feed device and permits the feed-water to issue into the steam-space of the boiler in a spray, and which closes when the impulse of the feed-pump ceases and prevents the steam from entering the feed-pipe.

The object of my invention is to render the feed device more compact and convenient and reliable in use; and my invention consists, to that end, of the particular improvements which are hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 represents my improved heater applied to a steam-boiler. Fig. 2 is a sectional elevation of the feed device. Fig. 3 is a horizontal section in line *x x*, Fig. 2. Fig. 4 is a horizontal section in line *y y*, Fig. 2, looking upward; and Fig. 5 is a horizontal section in line *z z*, Fig. 2.

Like letters of reference refer to like parts in the several figures.

A represents the shell of a cylindrical or other steam-boiler.

B represents the tubular body of the feed device, provided above the boiler with a water-inlet, *b*, which is connected with the feed-pipe by a union or other suitable coupling.

*c* is an external screw-thread formed on the tubular body B, below the inlet *b*, and C is a collar or flange secured to the outside of the boiler, around the opening *c'*, which is formed in the boiler for the reception of the feed-nozzle. The collar C is provided with an internal screw-thread, which receives the threaded portion *c* of the feed device. By turning the feed device in the collar C the former can be adjusted so as to bring the inlet *b* in line with the feed-pipe, and after having been so adjusted the feed device is secured in position by a jam-nut, C'. The flange C is preferably

constructed of soft brass, to enable it to adapt itself to the curvature of the boiler.

D represents a conical valve, which closes against a seat, *d*, formed at the lower end of the tubular body B of the feed device.

*e* is the valve-stem, which extends upwardly through the tubular body B, and which is provided near the valve with curved wings *f*, which bear against the inner side of the tubular body B and guide the valve, and at the same time cause the valve to turn at every movement, so as to change its seat.

G represents a cap or cover, which closes the upper enlarged end of the tubular body B, and which is provided on its under side with a perforated bridge, *g*, in which the upper end of the valve-stem *e* is guided. The latter is in this manner guided near both of the extremities, and the proper movement and position of the valve with reference to its seat are thereby insured.

*h* is a spiral spring, which surrounds the stem *e* and tends to close the valve, and rests with its lower end on a perforated diaphragm, H, formed in the body B above the inlet *b*, and bears with its upper end against a disk, I, which is secured to the valve-stem *e*. The disk I is preferably provided on its under side with an annular recess, which forms a seat for the spring *h*. The disk I is arranged at a short distance above an annular shoulder or offset, *j*, which is formed on the inner side of the body B, at the lower end of the enlarged upper portion thereof, and which limits the downward movement of the disk I. The latter is so adjusted on the valve-stem *e* that the space between the under side of the disk and the shoulder *j* is equal to the full movement of the valve D from its seat, so that the disk I prevents the valve from opening farther than desired, thereby preventing undue compression of the spring *h*, and insuring the immediate return of the valve when the impulse of the feed mechanism ceases. The disk I may be perforated; or it may be replaced by arms, or otherwise constructed so that the water can pass freely into and out of the space above the disk.

*k* represents a tube which surrounds the valve-stem *e*, opposite the water-inlet *b*, and which is secured with its upper end to the perforated diaphragm H. This tube protects the valve-stem against the lateral pressure of the

water which enters the body B from the inlet *b*, and which tends to press the stem toward the opposite side of the body B, and causes binding of the stem and valve and interferes with the free movement of the valve. The tube *k* projects sufficiently above the diaphragm H to form a core, which prevents the lateral displacement of the lower end of the spring *h*. Upon releasing the jam-nut C' and disconnecting the inlet *b* from the feed-pipe the device can be removed from the boiler and cleaned, which is very important, as with some kinds of water slimy deposits are liable to occur in these feed devices, which would impair or entirely suspend the operation of the device if not removed from time to time. The water entering the body B through the inlet *b* depresses the valve D and issues into the steam-space in a spray all around the lower end of the tubular body B until the impulse of the feed device ceases, when the valve immediately returns to its seat. The spiral wings *f* extend each over a fourth of a revolution and compel the valve to turn about its axis in opening, thereby insuring constant change in the contact-surfaces of the valve and its seat and preventing uneven wear and leakage. The arrangement of the spring within the body B, above the valve, dispenses with

the supporting parts formerly employed below the valve, and renders the device more compact and less liable to get out of order.

I claim as my invention—

1. The combination, with the tubular body B, of a valve, D, seated against its lower end, a valve-stem, *e*, extending upwardly into the body B, and a spring, *h*, arranged within the body B and applied to the valve-stem so as to hold the valve against its seat, substantially as set forth.

2. The combination, with the tubular body B, provided with a shoulder, *j*, of a valve, D, seated against the lower end of the body B, and valve-stem *e*, provided with a stop device, I, and a spring, *h*, substantially as set forth.

3. The combination, with the tubular body B, provided with a lateral inlet, *b*, of a valve, D, stem *e*, and protecting-tube *k*, surrounding the stem, substantially as set forth.

4. The combination, with the tubular body B, provided with a lateral inlet, *b*, of a valve, D, stem *e*, spiral wings *f*, spring *h*, stop device I, and protecting-tube *k*, substantially as set forth.

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Witnesses:

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