

(No Model.)

2 Sheets—Sheet 1.

S. P. HINCKLEY & M. S. PIERCE.

CIRCULATION IN STEAM BOILERS.

No. 547,787.

Patented Oct. 15, 1895.

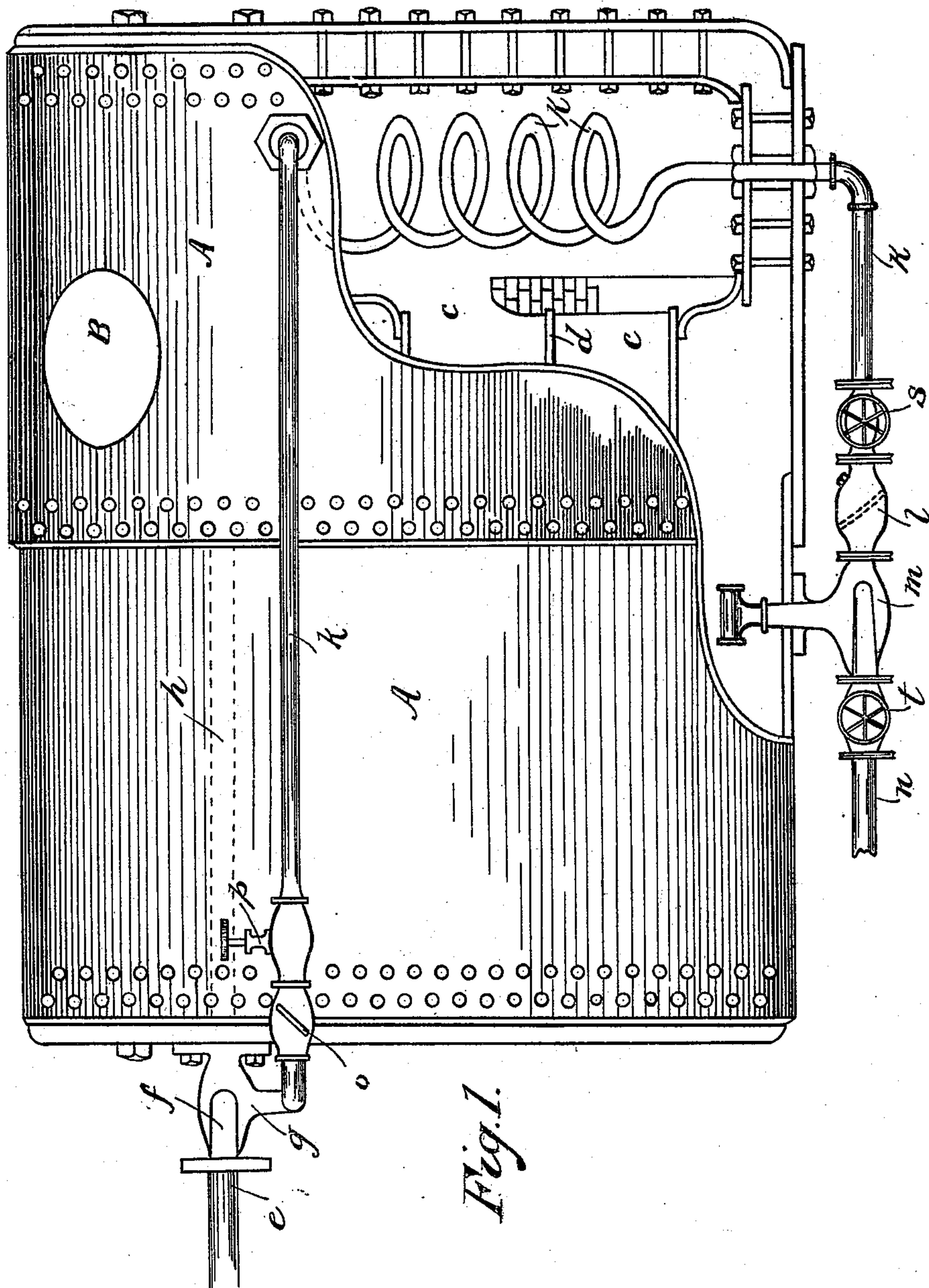


Fig. 1.

Witnesses.

M. B. Bullard.  
A. C. Perry.

Inventors  
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Attorney.

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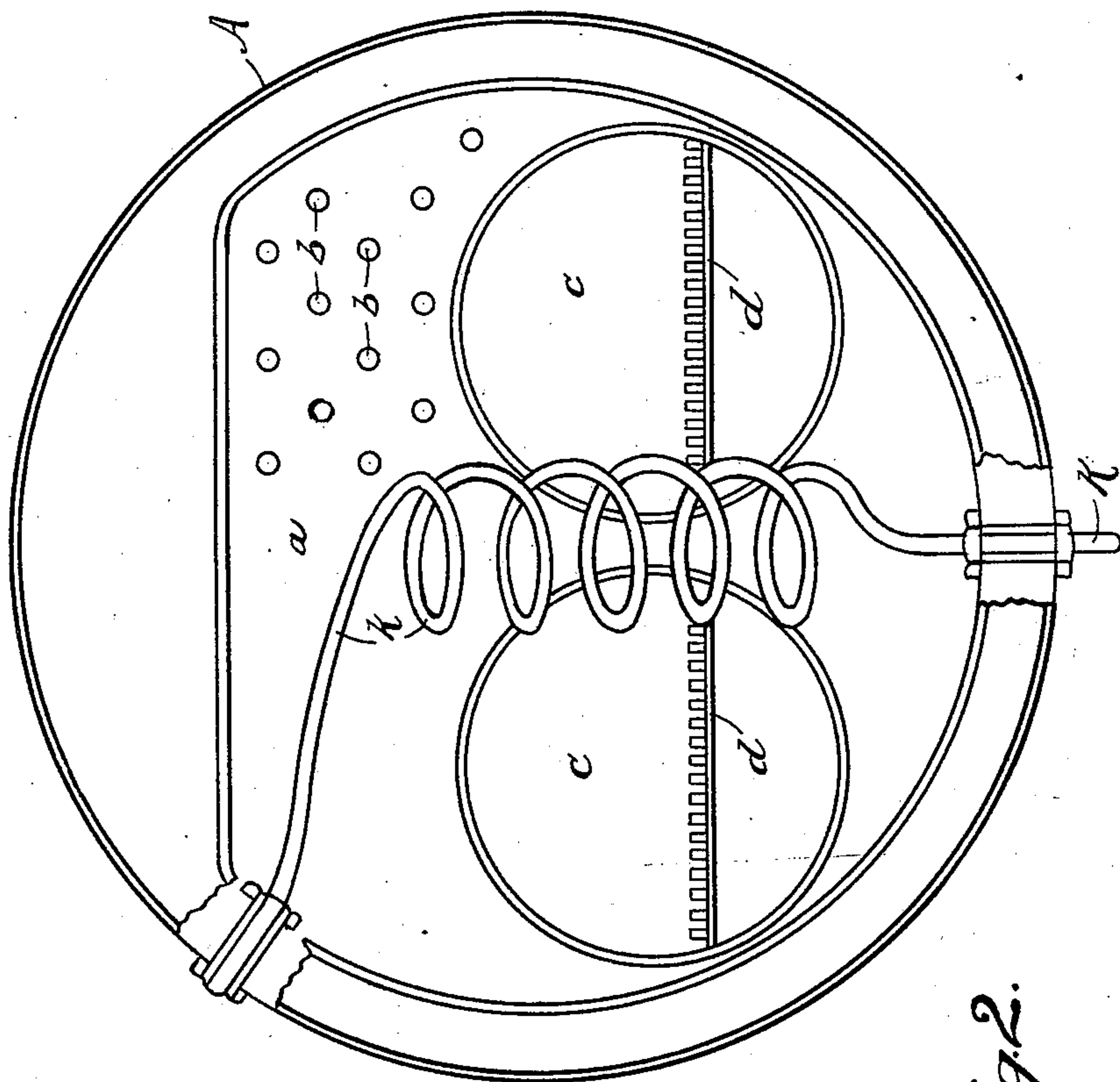


Fig. 2.

Witnesses.

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# UNITED STATES PATENT OFFICE.

SAMUEL P. HINCKLEY AND MORRILL S. PIERCE, OF BATH, MAINE.

## CIRCULATION IN STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 547,787, dated October 15, 1895.

Application filed January 21, 1895. Serial No. 535,743. (No model.)

*To all whom it may concern:*

Be it known that we, SAMUEL P. HINCKLEY and MORRILL S. PIERCE, citizens of the United States, residing at Bath, in the county of Sagadahoc and State of Maine, have invented certain new and useful Improvements in Circulation in Steam-Boilers; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to steam-boilers, and more particularly to that class of boilers known as "Scotch" boilers, or boilers provided with tubes through which the products of combustion pass.

It consists of a device by means of which the circulation of water in the boiler, when the fire is first started or when the fire is about to be started, may be produced or accelerated before the heat from the furnace has had an appreciable effect upon the great body of water in the boiler, means in connection with the same for cutting off the use of this device in case of accident, and a device by which the pipes are carried from the outside to the interior of the boiler.

In the drawings, Figure 1 is a side elevation of the boiler with our improvement attached, a portion of the front of the boiler being broken out to show the interior of the fire-box. Fig. 2 is an end view of the back of the boiler, the end being removed to show the interior of the fire-box.

The shell A is of the ordinary construction. Within it is the tube-sheet a, provided with ordinary tubing b b, and the fire-box c c, with grate d d, as usual.

e represents the feed-water pipe, which enters the siphon g near the upper part of the boiler, (see Fig. 1,) the point of the pipe e extending considerably more than one-half the length of the siphon g into the same. The siphon g communicates with the pipe h within the boiler. (Shown in Fig. 1 in dotted lines.) The siphon g has on the middle of its lower side an outlet which is connected with the pipe k, which extends outside the boiler nearly its whole length, when it enters the rear of the fire-box or its back connection and passes downward in a coil or by a zigzag arrangement of pipes through the lower part of

the boiler and outside the same to a point near the center of the length of the boiler, where it terminates in the check-valve l, which in turn is connected either with the pipe which enters directly into the lower part of the boiler, or, as shown in Fig. 1, with the siphon m, the upper part of which is connected with and enters the lower part of the boiler. This siphon m may be connected at its rear end with a pipe n, the end of which projects into the siphon m considerably more than one-half of the length of the latter. The pipe k is provided near the point at which it is connected with the siphon g, with a check-valve o, beyond which is a stop-cock p, (see Fig. 1,) or this stop-cock may be placed on the other side of the check-valve. The pipe k is also provided with a stop-cock s at a point just before it enters the valve l, and the pipe n is also provided with a stop-cock p just outside the siphon m. The valve o is so constructed that it automatically closes the pipe k against the passage of water descending from the siphon g, as also is the case with the valve l.

As shown, the improvement may be used either with or without a subsidiary steam-supply. When used without such a supply, the fire is started in the fire-box, and heating the water in the coil of the pipe k causes it to ascend and pass through the siphon g and pipe h into the boiler, its place being necessarily supplied by the cold water from the lower part of the boiler passing through the valve l. As the fire increases, the rapidity of the circulation is increased and the heat is distributed more quickly throughout the mass of water than would be the case when a boiler not provided with this attachment is used. In case a steam-supply is at hand, it is connected with the pipe n and the valve t is opened, admitting the steam into the siphon m. The passage of steam through the siphon m causes a vacuum, which tends to draw the water from the lower part of the boiler through the pipe k. The steam mingling with the water in the pipe k heats it and induces circulation upward through the pipe k and the pipe h into the upper part of the boiler, which gradually raises the temperature of the water in the boiler to such a degree that the fire may be lighted in the fire-box and steam made in a comparatively short time. The circulation



of the water throughout the pipe *k* and pipe *h* is also accelerated by means of the feed-water entering into the siphon *g*, a vacuum being formed which tends to increase the circulation. The stop-cocks *p* and *s* are for use in event of accident—as, for instance, should the pipe *k* burst in any part. In such case the stop-cock *s* should be instantly closed, when the check-valve *o* would close automatically, preventing any considerable loss of water from the boiler and closing the pipe *k* to the passage of water until it could be repaired. In passing the pipe *k* through the double walls or water-space of the boiler, we make use of a hollow stay-bolt, as shown in Figs. 1 and 2. The stay-bolt for this purpose is provided with an opening through its length slightly larger than the diameter of the exterior of the pipe which it surrounds and is secured in place in the same manner as ordinary stay-bolts.

What we claim is—

1. In combination with a tubular boiler, a pipe extending from the interior of the lower part of the boiler through the shell of the boiler, entering and passing through the combustion chamber to the outside thereof, and thence extending to the upper part of the boiler where it unites with the feed-water pipe, whereby the water from the boiler circulating in said first named pipe enters the boiler in conjunction with the feed-water, substantially as described.

2. In combination with a tubular boiler, a

pipe extending from the interior of the lower part of the boiler through the shell of the boiler, entering and passing through the combustion chamber to the outside thereof, and thence extending to the upper part of the boiler where it unites with the feed-water pipe, said first named pipe communicating, at or near its exit from the lower part of the boiler, with a steam pipe connecting with a steam supply independent of said boiler, substantially as described.

3. In combination with a tubular boiler, a pipe extending from the interior of the lower part of the boiler through the shell of the boiler, entering and passing through the combustion chamber to the outside thereof, and thence extending to the upper part of the boiler where it unites with the feed water pipe, said first named pipe being provided near its upper end with a check valve and near its lower end with a stop cock whereby, in case of a break in said pipe, the feed water is automatically shut off therefrom and it may be closed against the entrance of water from the lower part of the boiler, substantially as described.

In testimony that we claim the foregoing as our invention we have hereunto set our hands this 10th day of January, A. D. 1895.

SAMUEL P. HINCKLEY.

MORRILL S. PIERCE.

In presence of—

JOHN H. RAYMOND,

JOHN H. RAYMOND.