

(No Model.)

M. ZECK.

FEED WATER HEATER FOR LOCOMOTIVES.

No. 249,137.

Patented Nov. 1, 1881.

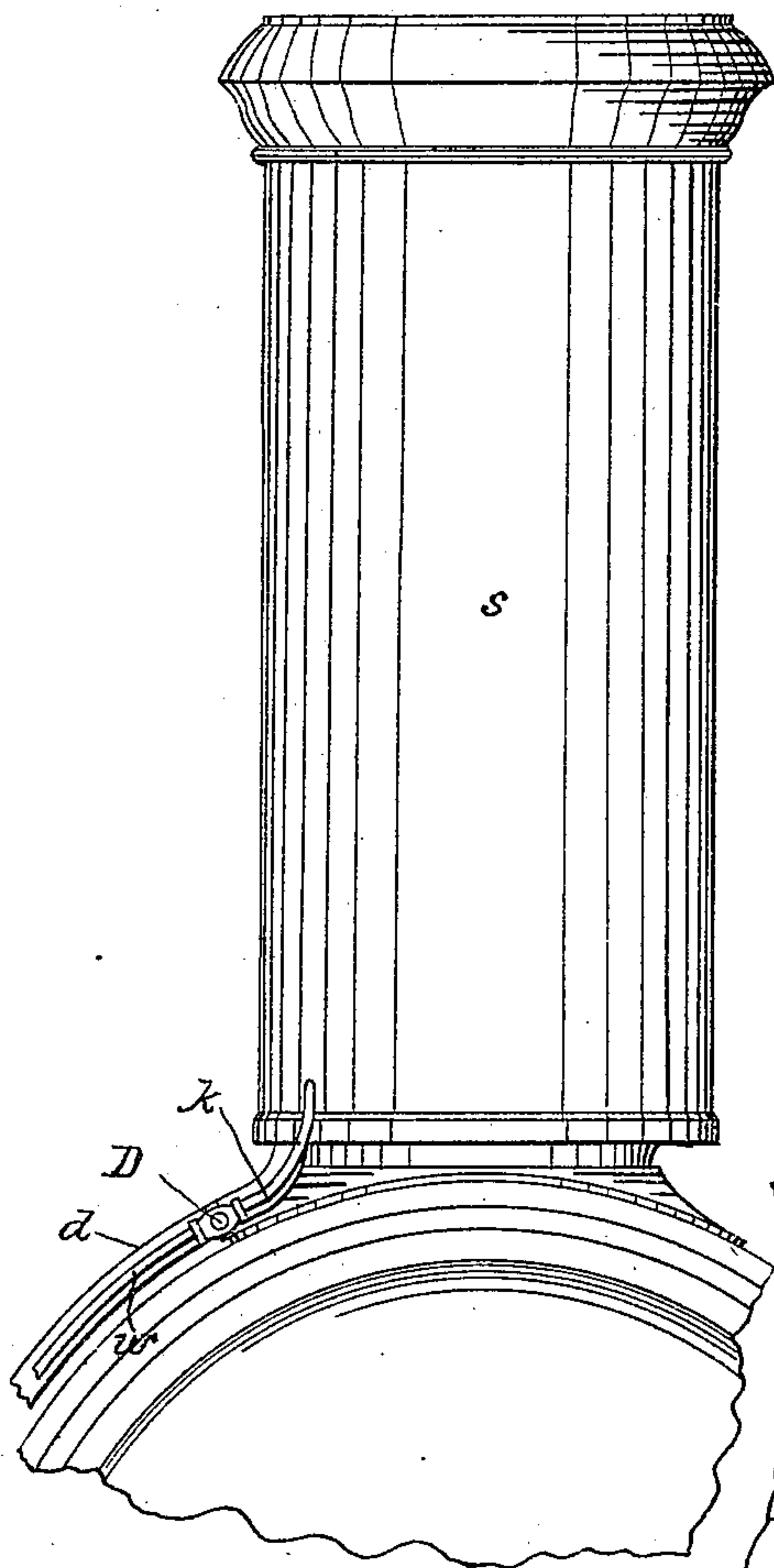


Fig. 3.

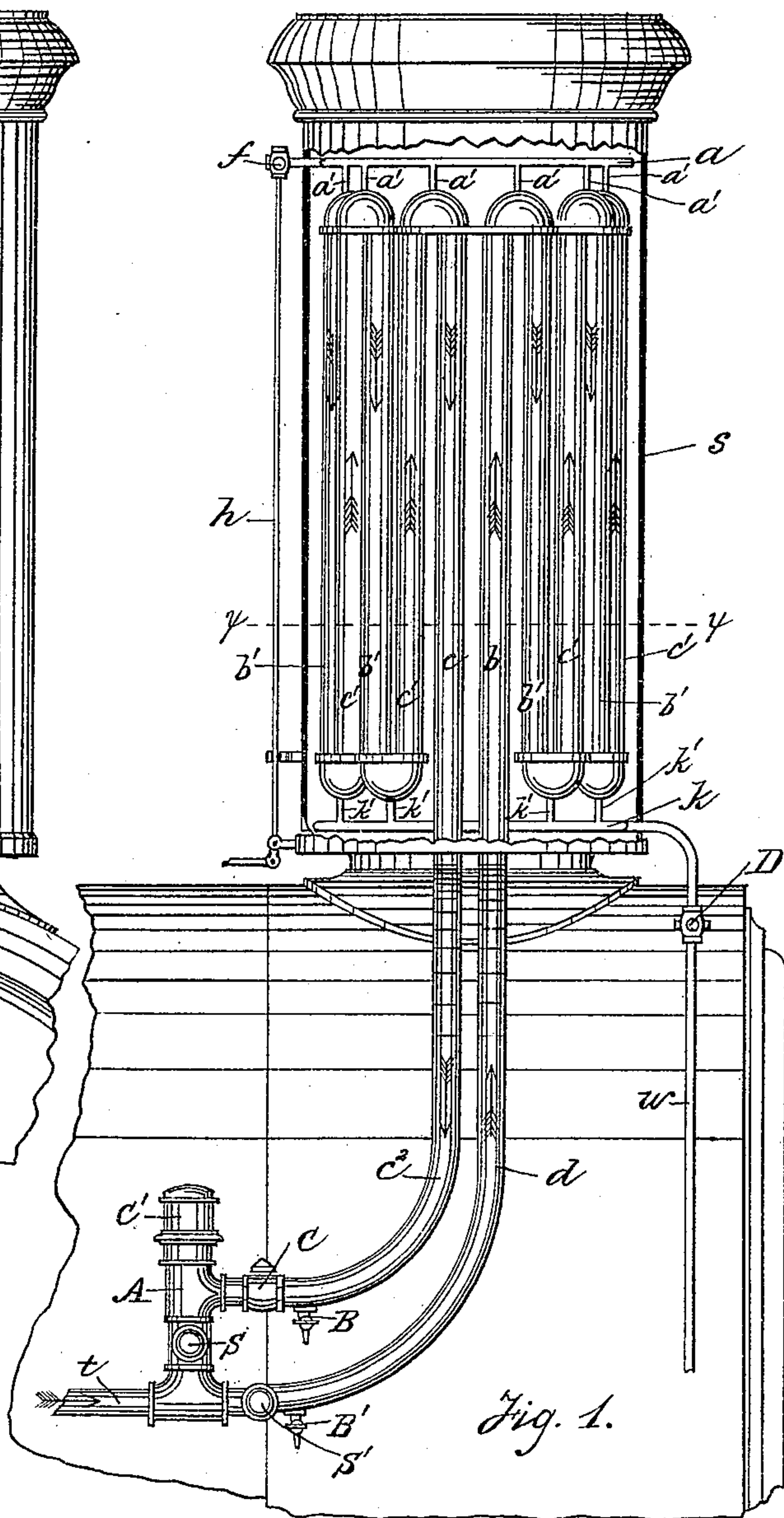


Fig. 1.

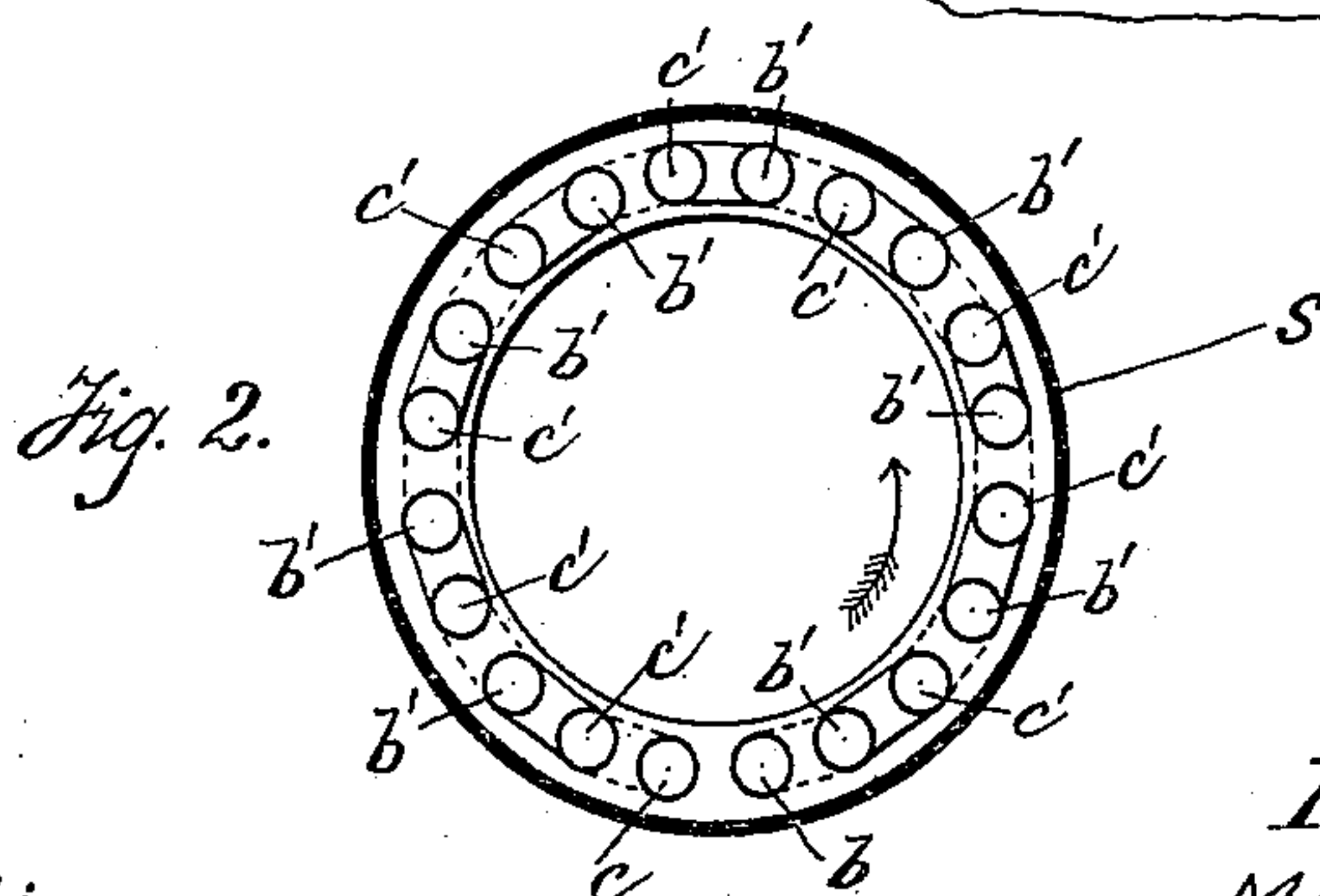


Fig. 2.

Witnesses:
H. G. Wadlin.
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UNITED STATES PATENT OFFICE.

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FEED-WATER HEATER FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 249,137, dated November 1, 1881.

Application filed March 11, 1881. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL ZECK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain Improvements in Feed-Water Heaters for Locomotives, of which the following is a specification.

This invention relates to feed-water heaters for locomotive-boilers in which the water before entering the boiler is conducted through pipes arranged within the smoke-stack of the locomotive for the purpose of utilizing the heat from the gases escaping through the stack, as well as the heat from the exhaust-steam.

My invention consists, first, in the provision of means whereby a constant and free circulation of water from the supply-pipe is insured through a series of pipes arranged within and around the smoke-stack for the purpose of heating said water before it reaches the boiler.

The invention consists, secondly, in an arrangement of valves and shut-offs whereby the water may be made to circulate through the pipes placed within the smoke-stack before entering the boiler, or may be caused to enter the boiler directly in the usual manner, as may be desired.

The invention also consists in certain details of construction and arrangement of parts whereby the more perfect and effective operation of a feed-water heater of this class is secured, all of which I will now proceed to describe and claim, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a side elevation of a feed-water heater embodying my invention applied to a locomotive, part of the stack being removed to show the arrangement of pipes within the same. Fig. 2 represents a section on line *x x*, Fig. 1. Fig. 3 represents a front elevation of the stack.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *c b b' c'* represent a series of pipes placed within and around the smoke-stack *s* of a locomotive. The pipe *b* is connected at its upper extremity by an elbow or bend with the adjacent pipe *b'*, the said pipe *b'* at its lower extremity by a similar elbow with the next pipe, *c'*, the pipe *c'* at its upper ex-

tremity with the next pipe, *b'*, this pipe *b'* at its lower extremity with the next pipe, *c'*, and so on around the stack in the direction indicated by the arrow, Fig. 2, the last pipe, *c'*, being connected at its upper extremity with the pipe *c*, which pipe extends downwardly through the base of the stack, and is connected with the boiler by means of the delivery-pipe *c²*. The pipe *b* also extends downwardly through the base of the stack, and is connected by means of the pipe *d* with the main supply-pipe *t*. It is apparent, from the described arrangement of the pipes around the inside of the stack, that water forced upwardly through the pipe *b* must necessarily pass from said pipe down the pipe *b'*, up the next pipe, *c'*, down the next pipe, *b'*, and so on through the entire series of pipes, and out through the pipe *c* into the pipe *c²* before it can enter the boiler, the course of the water being indicated by the arrows, Fig. 1. The pipes *c b b' c'* are subjected to the heat of the exhaust-steam and hot gases escaping through the stack, and by thus causing the water to circulate through the entire series it is adapted to receive a high degree of heat before reaching the boiler.

Hitherto in feed-water heaters of this class, whenever air collects within the hollows or bends of the elbow, connecting the upper extremities of the pipes placed within the stack, it interferes with the free circulation of the water through the same, and there being no way to remove this air, the apparatus is frequently rendered inoperative from this cause. My present invention overcomes this objection to the ordinary feed-water heaters by providing means whereby the air may be removed from the bends at the upper extremity of the pipes. To this end I provide an air-exhaust pipe, *a*, extending entirely around the stack, over the elbows connecting the upper extremities of the pipes *c b b' c'*, and connect this pipe *a*, by means of branch pipes *a'*, with the highest point of said elbows. The exhaust-pipe *a* has an outlet-valve at *f*, closed by means of a rod, *h*, extending downwardly to the base of the stack and operated by a suitable rod connecting with the cab of the locomotive. Whenever air collects within the upper bends of the pipes *c b b' c'* it may be afforded an outlet by opening the

valve *f*, the air being forced out through the pipes *a' a* by the pressure of the water circulating in the pipes around the stack. The apparatus is thus prevented from becoming in-
 5 operative and a free circulation of the water at all times secured.

In all apparatus of this class with which I am acquainted it is impossible to shut off the water from the pipes within the stack and al-
 10 low it to enter the boiler in the usual way when desired. This is especially inconvenient in case a leak occurs in any of the pipes within the stack. To remedy this I connect the supply-pipe *t* with a vertical branch, *A*, leading di-
 15 rectly to the boiler, and I place within said branch *A* a stop-valve, *S*, a similar stop-valve, *S'*, controlling the entrance to the pipe *d*. By closing the valve *S* and opening the valve *S'* water may be made to circulate through the
 20 pipes within the stack before entering the boiler. By closing the valve *S'* and opening the valve *S* water may be shut off from the stack and made to enter the boiler directly. *C C'* represent ordinary check-valves placed
 25 within the pipe *c²* and the branch *A*, respectively. A water-exhaust pipe, *k*, connected by branches *k'* with each of the lower elbows or bends of the pipes *c b b' c'*, enables the water to be entirely removed from said bends when
 30 it is desired to drain the pipes, the water being conducted away through the valve *D* into the waste-pipe *w*. The water-exhaust pipe *k* and waste-pipe *w* also enables any sediment that may accumulate in the lower portions of
 35 the pipes *c b b' c'* to be removed by introducing steam into the pipes, and thus blowing out the sediment through the pipes *k w*. In the same way the pipes *c²* and *d* may be drained by the blow-off cocks *B B'*, respectively, and
 40 also cleansed from sediment.

I do not claim, broadly, a series of pipes placed within the stack of a locomotive for the purpose of heating the water before it enters the boiler, as I am aware that such a device is
 45 not novel.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a feed-water heater for locomotives having a series of vertical pipes placed within the smoke-stack, the water being adapted to
 50 circulate through said pipes before entering the boiler, the air-exhaust pipe *a*, connected with the upper extremities of said pipes, and provided with an outlet valve or valves, substantially as and for the purpose set forth. 55

2. The combination of the stack, a series of pipes placed vertically within the same, said pipes being provided with an air-outlet at their upper extremities, the supply-pipe *d*, connected with the main supply-pipe, and adapted
 60 to admit water to said series of pipes, and the delivery-pipe *c²*, connecting said series of pipes with the boiler, as set forth.

3. The pipes *c b b' c'*, placed vertically within the stack, and having their upper and lower
 65 extremities connected by elbows, as set forth, in combination with the air-exhaust pipe *a*, provided with an outlet valve or valves, and the water-exhaust pipe *k*, provided with the outlet-valve *D*, substantially as and for the
 70 purpose set forth.

4. The combination of the series of feed-water-heating pipes located in the stack, the boiler-supply pipe having the branch *A*, the pipe *d*, connecting said branch *A* with one end of the
 75 series of feed-water-heating pipes, and provided with the stop-valve *S'*, the pipe *c²*, connecting the branch *A* with the opposite end of the series of feed-water-heating pipes, and the stop-valve *S*, located in the branch *A* between
 80 the pipes *d* and *c'*, all arranged and operating substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 28th day of February, 85
 A. D. 1881.

MICHAEL ZECK.

Witnesses:

C. F. BROWN,

H. G. WADLIN.