

(No Model.)

C. H. MAGOON.
FEED WATER HEATER.

No. 298,006.

Patented May 6, 1884.

Fig. 1.

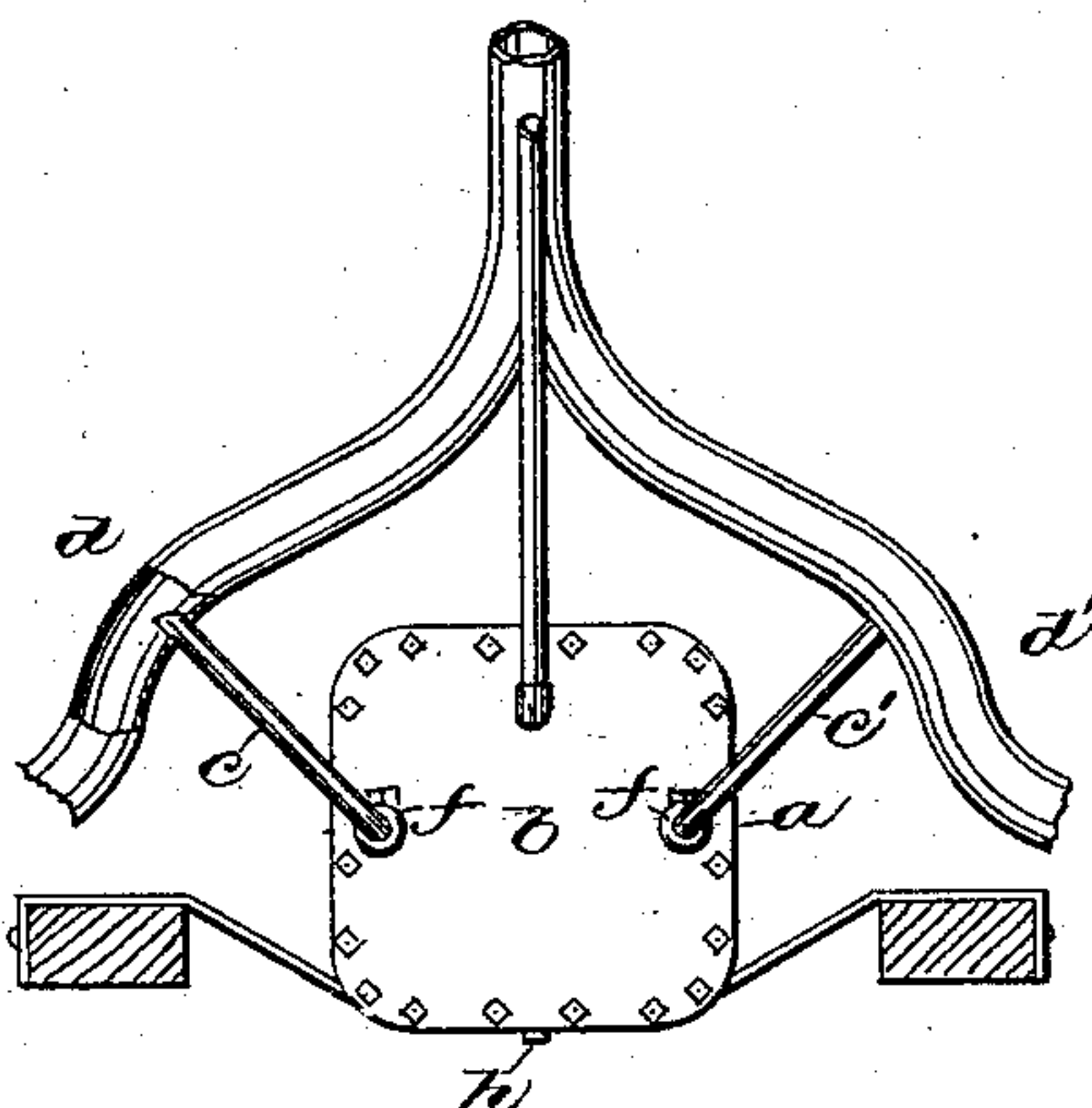


Fig. 2.

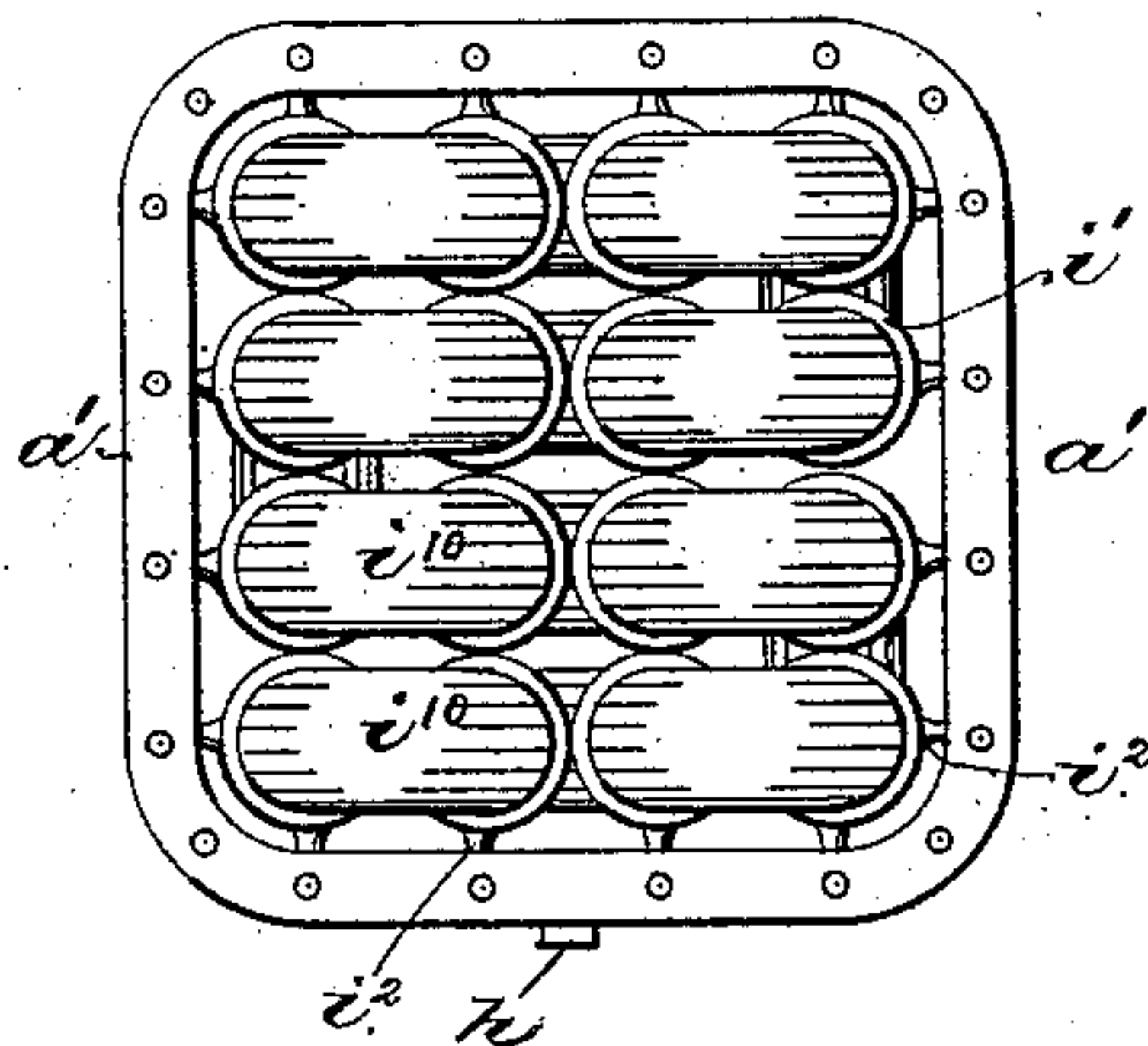
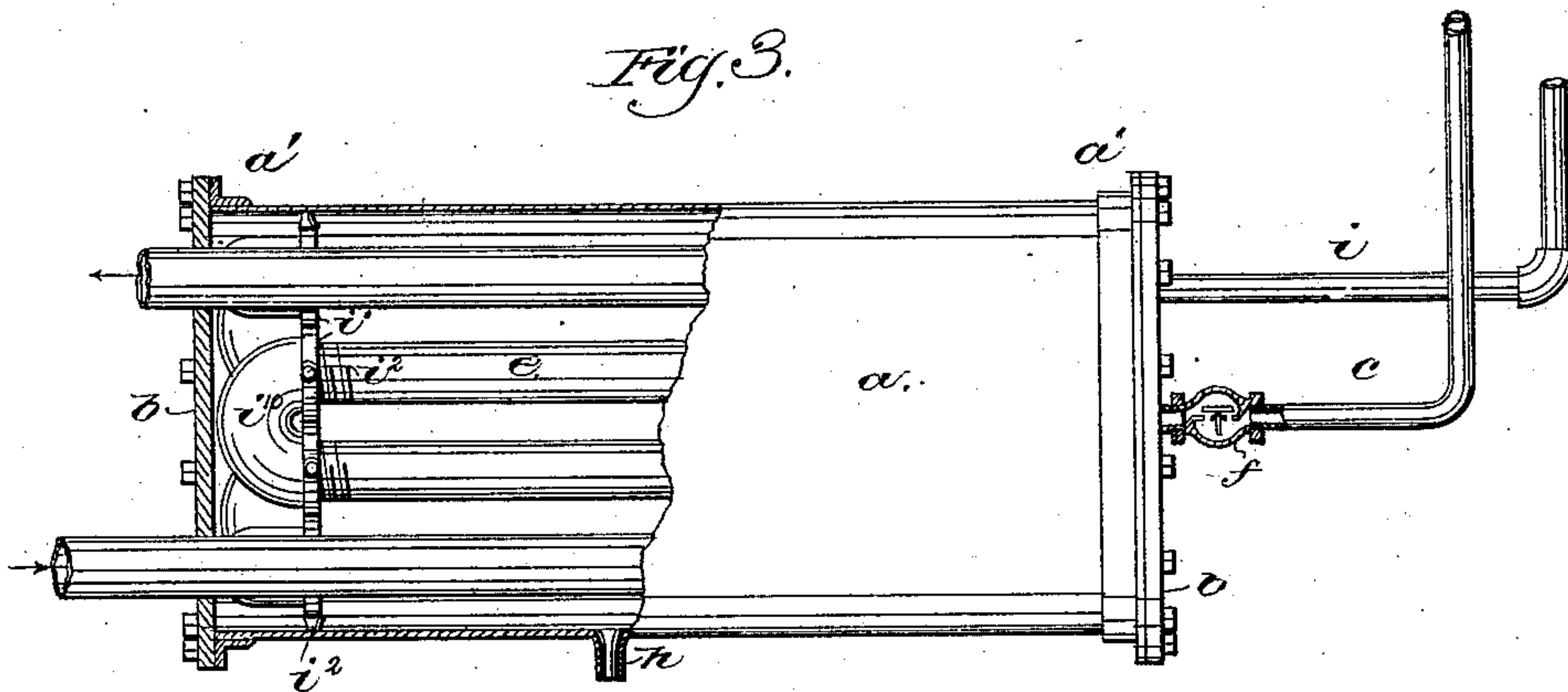


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

CHARLES H. MAGOON, OF MUSKEGON, MICHIGAN.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 298,006, dated May 6, 1884.

Application filed November 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. MAGOON, of Muskegon, county of Muskegon, State of Michigan, have invented an Improvement in Feed-Water Heaters, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention, relating to a feed-water heater, is intended as an improvement on the apparatus for which Letters Patent No. 230,190 were granted to me July 20, 1880, the said apparatus consisting, essentially, of a chest or case supported beneath the forward part of the boiler, and having inlet-pipes leading from the exhaust-pipes of each cylinder of the engine, the chest also containing a coil of pipe, through which the feed-water circulates on its way to the boiler. In the said patent the inlet-pipes through which the exhaust-steam passes into the heater chest or case were either open pipes or contained stop-cocks, by which the admission of steam could be prevented, if desired. As the pressure in the exhaust-pipe varies at different parts of the stroke of the engine, the exhaust-steam will be introduced into the chest or case in a series of impulses alternating from one side to the other, and when the chest or case is receiving steam at the maximum pressure from the exhaust-pipe leading from one cylinder, a portion of the said steam will pass from the chest or case and enter the exhaust-pipe leading from the other cylinder, where it will tend to increase the back-pressure in the other cylinder.

The present invention consists, partly, in providing the passages or pipes leading from the exhaust-pipes into the chest with check-valves, which are open when the pressure is greatest, permitting the steam to enter, but which do not permit the steam to escape from the chest through the said inlet-pipes, so that the pressure may be maintained in the chest more nearly uniform and about equal to the maximum pressure derived from impulses of the exhausting steam. Novel means are also employed for supporting the water-circulating pipes in the chest or case, by which the construction is simplified, and the cost of making and putting together the heater is reduced.

Figure 1 is a front elevation of a feed-water heater embodying this invention, showing also

a portion of the frame-work and exhaust-pipes of the locomotive; Fig. 2, an enlarged end view of the heater with one of the bonnets removed, showing the circulating-pipes within it, and Fig. 3 is a side elevation, partly in section, also showing one of the steam-inlet pipes, partly in section.

The chest or case *a*, the sides of which are preferably composed of boiler-iron riveted to frames *a'* of angle-iron at its ends, to which the heads or bonnets *b* may be bolted, may be attached to the engine, as described in my former patent referred to, and is likewise provided with steam-inlet pipes *c c'*, leading from the exhaust-pipes *d d'*, and contains a coil of circulating-pipes, *e*, through which the water is caused to pass on its way to the boilers. The pipes *c c'* are provided with check-valves *f*, of any suitable or usual construction, opening toward the case *a*, so that they will permit steam to pass into the case when the pressure is greater in the pipe *c* than in the case, but will not permit the steam to escape from the case *a* through the said pipes *c c'*, so that the steam may be maintained at a higher pressure and temperature in the said case than when the said check-valves are not employed. The case is provided with a drip-pipe, *h*, for the escape of the water produced by the condensation of the steam in the heater, and the case may be, if desired, provided with an outlet steam-pipe, *i*, having a more or less contracted orifice in proper position with relation to the smoke-stack of the engine to produce a jet, and thus assist in stimulating the draft of the engine when a considerable amount of steam is forced into the case. The circulating-pipes *e* pass longitudinally through the case *a*, forming several tiers, and are connected at their ends to form a continuous duct or passage by means of U-shaped elbows *i'*, having flanges *i''* where the pipes are connected with them, the said flanges being sufficiently large to come in contact with one another, as shown in Fig. 2, while supporting the pipes at a sufficient distance apart to permit the steam to pass freely around and in contact with them. The said flanges form a solid and sufficient support for one another, and for the pipes connected by them.

In order to afford sufficient space between the pipes and walls of the casing *a*, the elbows

i^{10} are preferably provided with lugs or projections i^2 , which just fit within the sides of the casing, thus affording a proper support for the elbows and pipes in the casing, which they fit accurately, as shown in Fig. 2. By this arrangement, when the bonnet b of the case is removed, the entire coil of circulating-pipes can be withdrawn from or inserted in the case, as may be desired, and when in the case the pipes are firmly supported, so as not to shake or jar within the case. This enables the apparatus to be made and put together with much less expenditure of time and labor than when independent supporting-straps are employed to sustain the circulating-pipes within the casing.

I claim—

1. The combination of the exhaust-pipes of a locomotive with a feed-water heater consisting of a case or chest and circulating-coil for the feed-water, and steam-inlet pipes leading from each of the exhaust-pipes of the locomotive to the said case, and check-valves within the said pipes opening toward the case, substantially as and for the purpose set forth.

2. In a feed-water heater, the combination of the chest or case to receive steam with the circulating-pipes for the feed-water, the said

pipes being connected at the ends of the case by elbows resting in contact with one another and with the walls of the case for supporting the said circulating-pipes, substantially as described.

3. The combination of the exhaust-pipes of the locomotive with the heater-case and circulating-pipes for feed-water therein, the steam-inlet pipes $c c'$, leading from the exhaust-pipes to the case, and the outlet-pipe i , leading from the said case into the smoke-box of the engine, substantially as described.

4. The combination of the case a , circulating-pipes e therein, flanged elbows i , connecting the said pipes, and having their flanges in contact with one another, the said elbows being provided with lugs i^2 , affording a support for the said pipes from the interior of the case, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES H. MAGOON.

Witnesses:

JOS. P. LIVERMORE,
W. H. SIGSTON.