

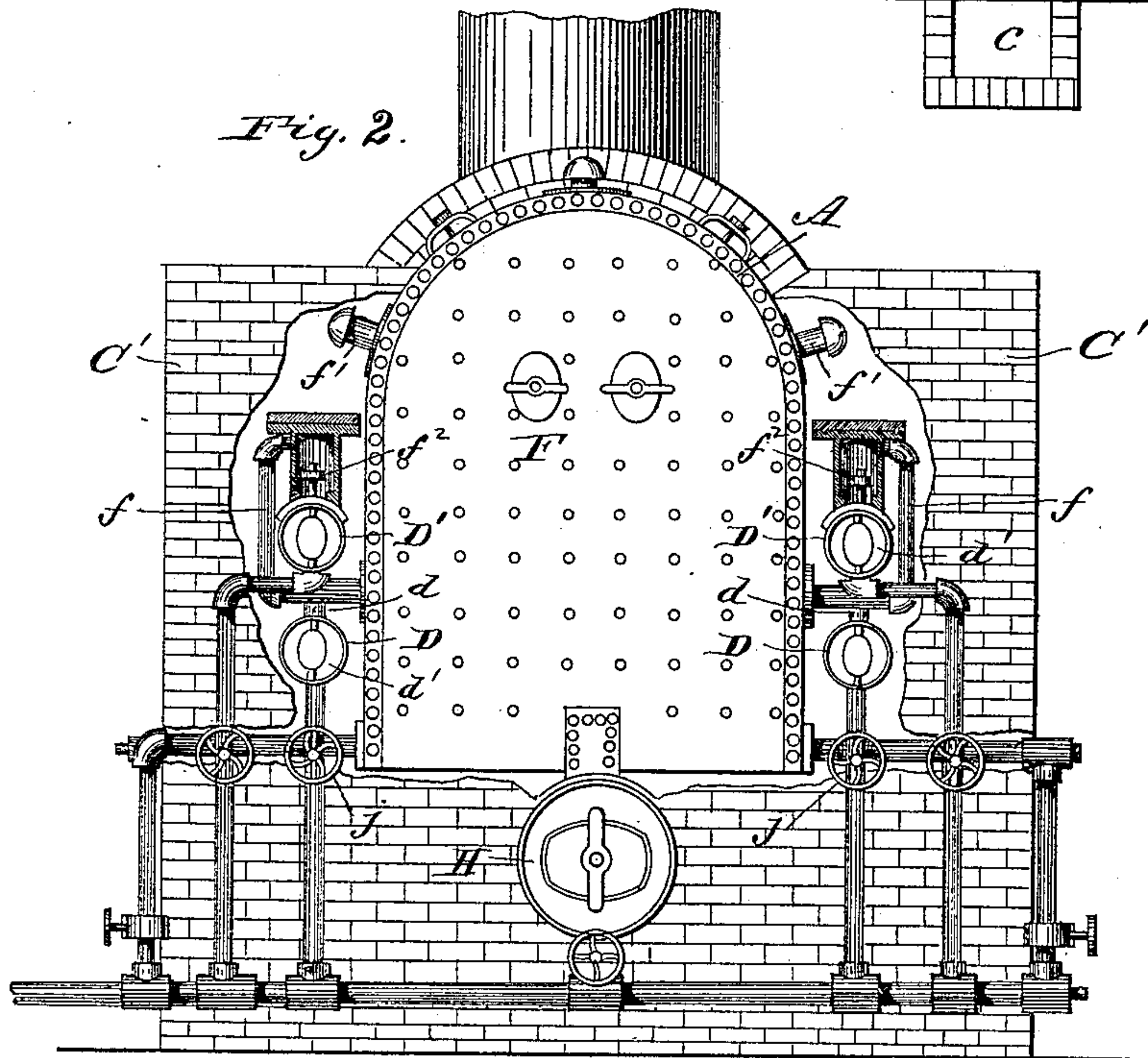
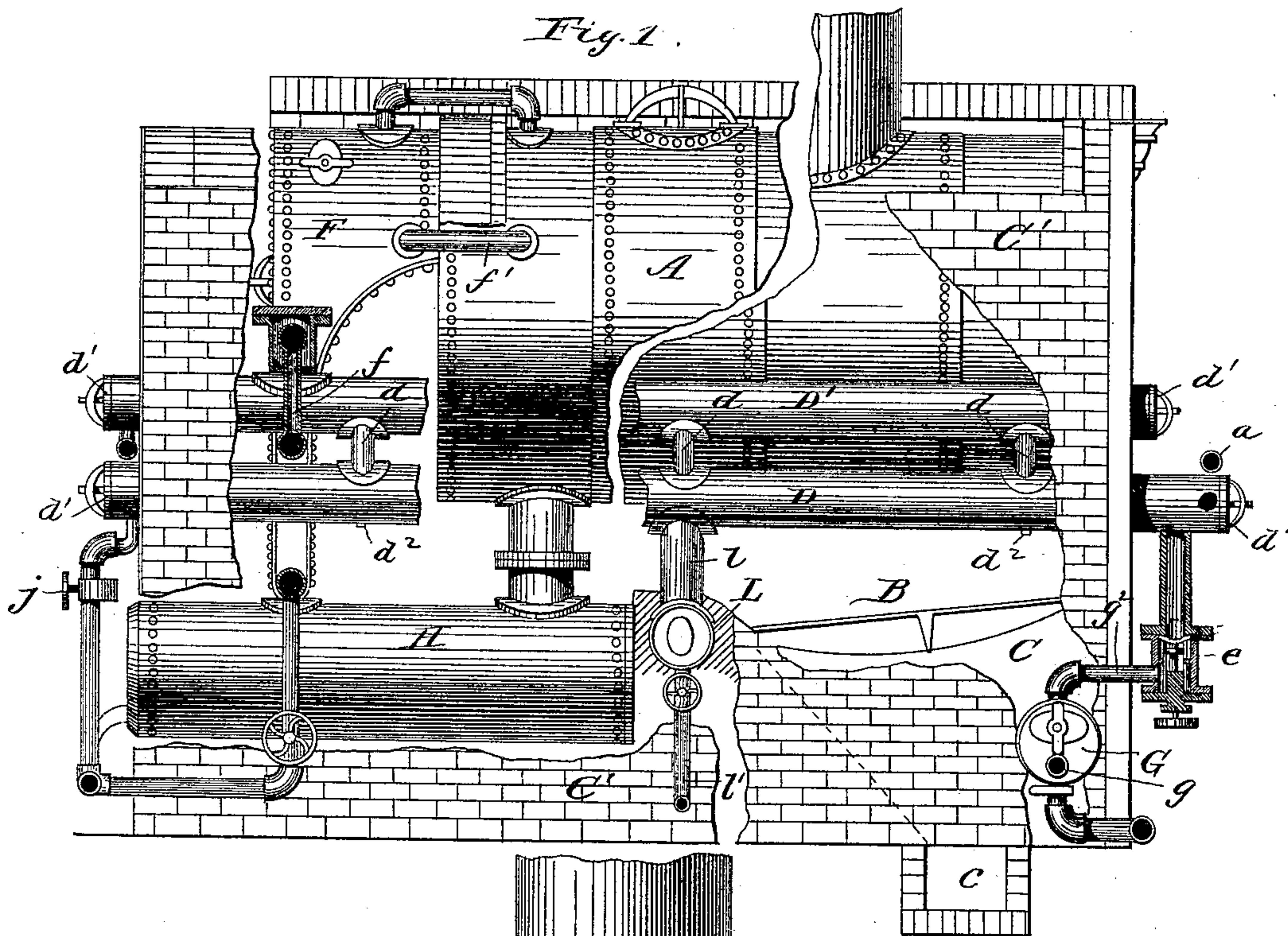
(No Model.)

3 Sheets—Sheet 1.

W. M. FERRY.
FEED WATER HEATER FOR STEAM BOILERS.

No. 350,820.

Patented Oct. 12, 1886.



Witnesses:
Chas. L. Taylor
C. E. Doyle

Inventor:
William M. Ferry
by J. H. Houghton,
att'y.

(No Model.)

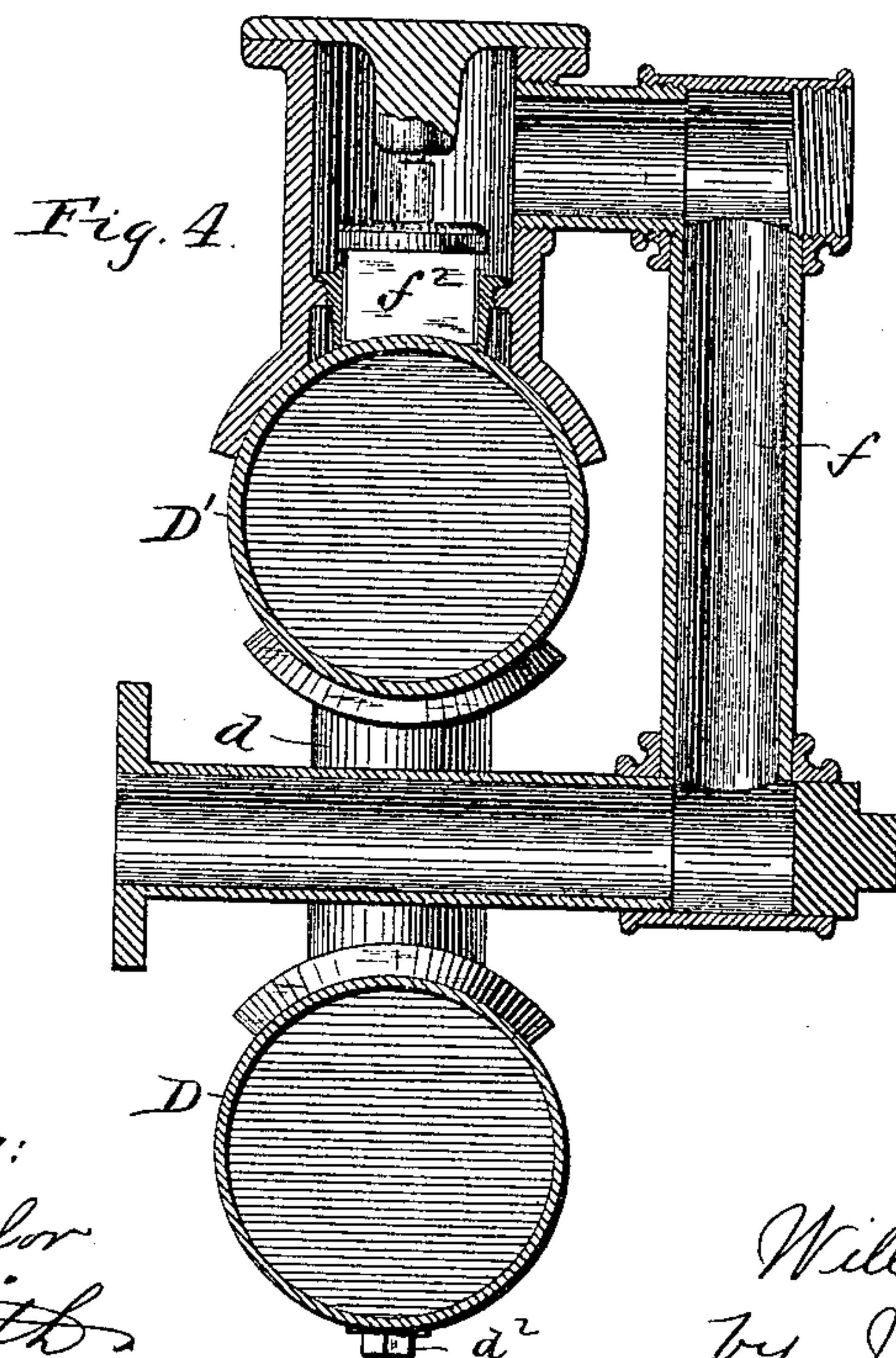
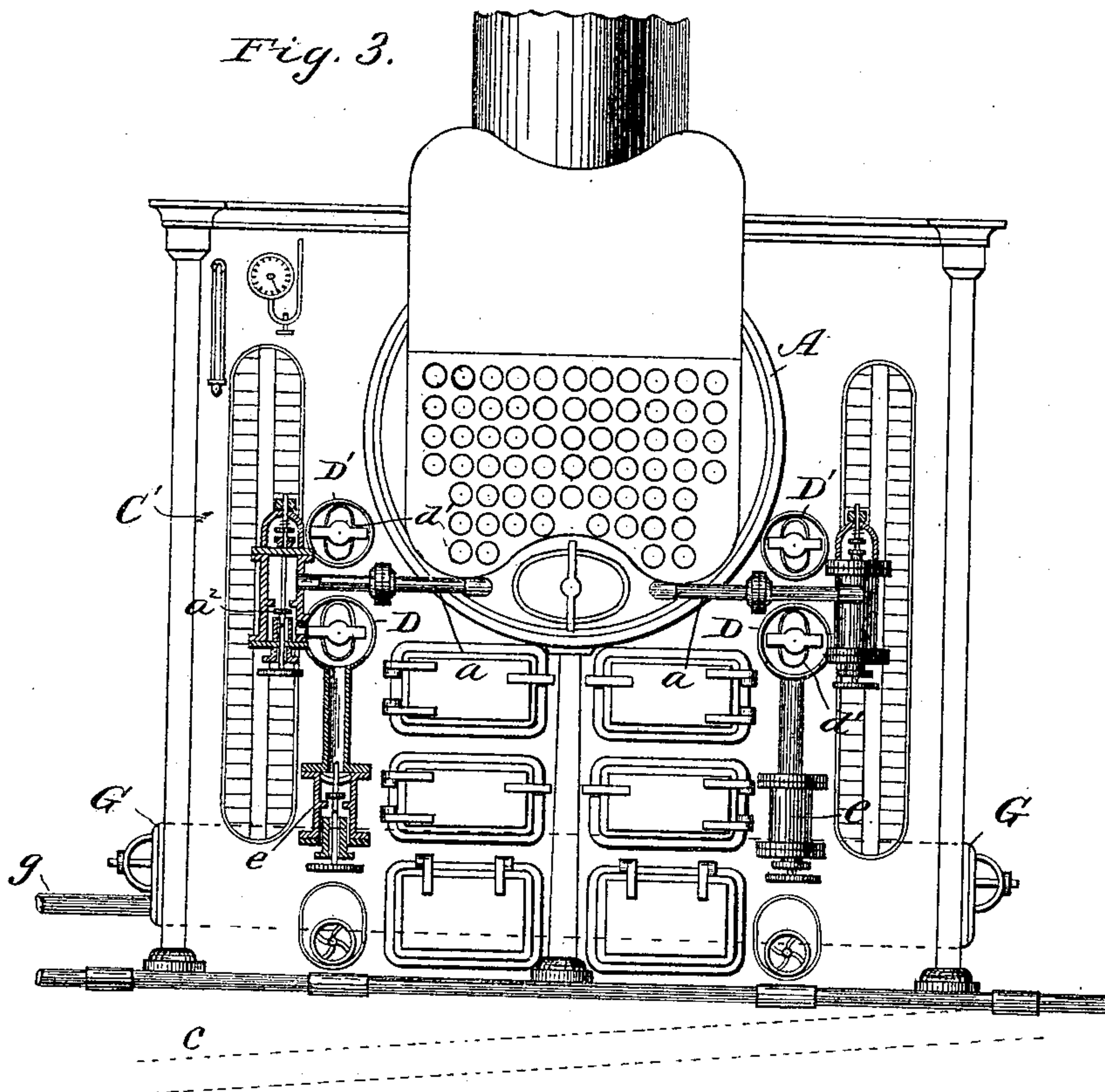
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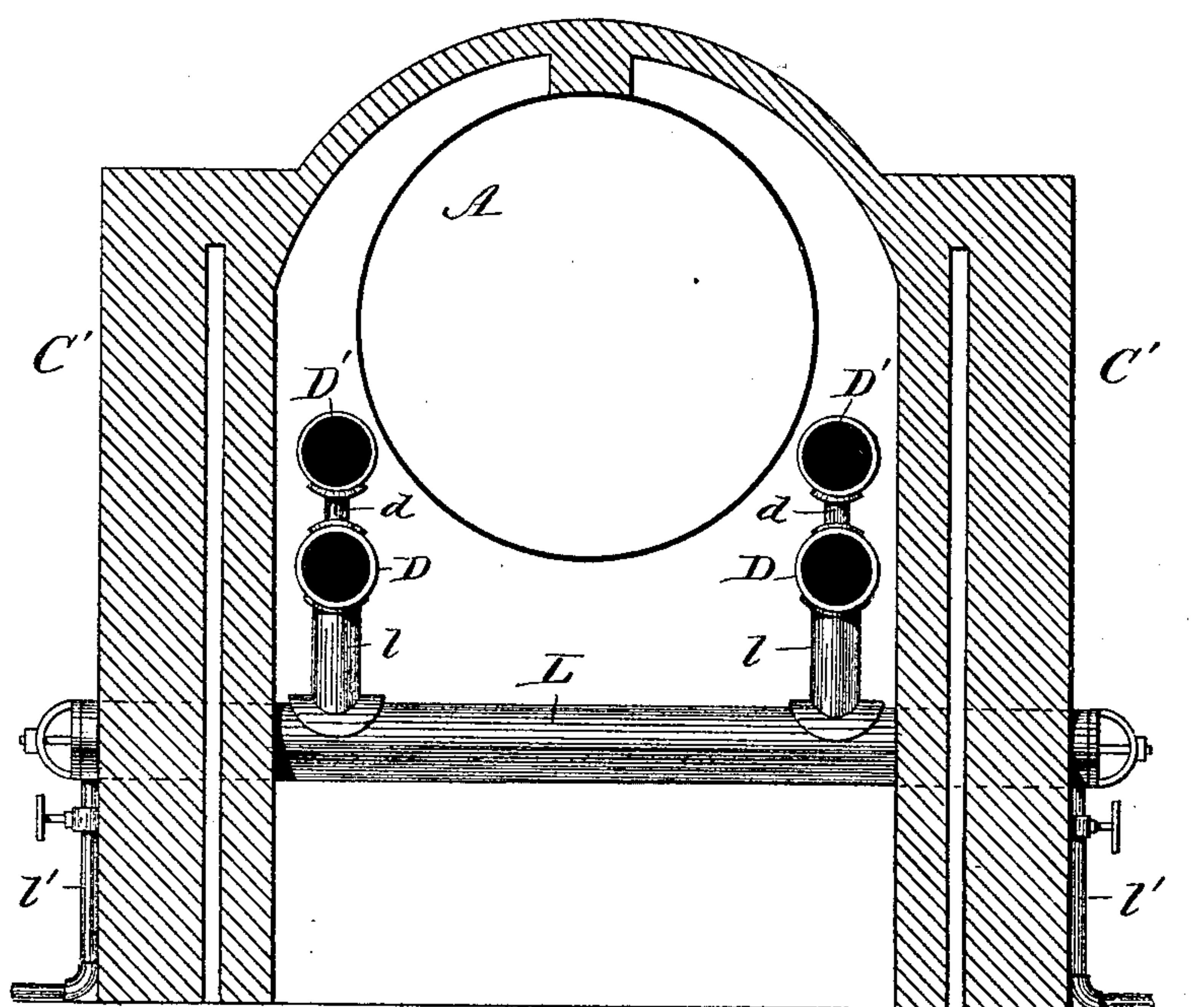
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Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM MONTAGUE FERRY, OF PARK CITY, UTAH TERRITORY.

FEED-WATER HEATER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 350,820, dated October 12, 1886.

Application filed June 2, 1886. Serial No. 203,961. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MONTAGUE FERRY, a citizen of the United States, residing at Park City, in the county of Summit and Territory of Utah, have invented certain new and useful Improvements in Feed-Water Heaters for Steam-Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a steam-boiler and feed-water heater of such construction and arrangement that economy in fuel will result, that the settlement of lime and other impurities will be effected to a great extent before the feed-water enters the boiler, and that the circulating and heating device may be easily cleaned out without interfering with the operation of the boiler. The construction by which I attain the above advantages is, moreover, simple and inexpensive.

My invention can best be understood by reference to the accompanying drawings, in which I have shown a means for carrying it into effect.

In said drawings, Figure 1 is a side elevation, partly broken away, of a steam-boiler embodying my invention. Fig. 2 is a rear elevation of the same. Fig. 3 is a front elevation. Fig. 4 is a sectional view on a larger scale of one of the check-valves, hereinafter described. Fig. 5 is a transverse sectional view of the boiler.

Referring to the drawings, A represents a steam-boiler of any suitable construction; B, the furnace; C, the ash-pit; *c*, the duct for discharging the ashes, and *C'* the walls inclosing the boiler and furnace. The products of combustion pass back under the boiler, impinge against the water-back F, and enter the fire-flues, whence they escape through a flue (not shown) at any convenient point.

D D' represent the feed-water heating and circulating device. In the construction shown the device consists of pipes arranged within the walls *C'* beside the boiler on each side thereof, and one above the other. The number of these pipes may be varied and their

arrangement be different in some respect from that shown without departing from my invention. At one end of the lower pipe, D, the water is received through the medium of supply-pipe *g*, mud-drum G, pipe *g'*, and the chamber of check-valve *e*. From the pipe D the water, now partially heated, passes to pipe D' through ducts *d*, preferably at various points, as shown, and, finally, from the upper of the series of heating-pipes to the boiler through pipes *f f'*, either directly or by way of the water-back F. At the other end of the boiler a communication is maintained with the heater by a pipe, *a*, which leads to the lower, D, of the heater-pipes. It will thus be seen that a slow but constant circulation takes place while the boiler is in operation by way of the parts F, *f'*, A, *a*, D, *d*, D', and *f*, consecutively. In the first passage of the water through the pipes D D' most of the lime and other impurities will be deposited. Provision is made for cleaning these parts by removing the plates *d'*, which close the ends of said pipes and scraping the interior of the latter. The interior of ducts *d* may also be reached by way of holes in the upper or lower pipe, closed by plugs *d''*. To cut off the boiler from these parts during the operation of cleaning, and thus enable steam to be kept up, I place check-valves in the pipe *a* and *f*, as shown, respectively, at *a''* and *f''*. The former, however, is arranged to normally permit egress from the boiler for purposes of circulation and for blowing off the heater-pipes, and to prevent ingress in order that fresh feed-water may not enter the boiler direct. When, therefore, it is desired to blow off the heater, the valves *j* will be opened, the valve *f''* will automatically close, and through the valve *a''* will occur the forcible flow of water necessary for clearing the heater-pipes. The valve *f''* is arranged to automatically prevent egress from the boiler. If it should be desired, this valve may be provided with means for positively holding it open, in which case, the valve *a''* having been positively closed, the heater-pipes could be blown off into the mud-drum G.

H is a mud-drum situated beneath and communicating with the boiler and the water-back.

L indicates a transverse pipe supported in the wall of the furnace, and preferably con-

tained within and covered by the bridge-wall. Near each end the pipe L is connected with the lower of the heater-pipes by vertical pipes 7. This communication between the heater-pipes on each side of the boiler equalizes the circulation, the pipes 7 being large enough to permit a free movement of water through them.

The arrangement furnishes an additional heater at a point when much heat may be thus economized, and also affords a settling-chamber which will relieve the pipes D D' of much solid matter. By clearing the pipes L through the blow-off *i*, the direct clearing of pipes D D' will be rendered less frequently necessary. The pipe L also gives a firm support to the heaters at each side of the boiler at a point intermediate between their ends, and prevents their sagging or losing their proper shape.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a steam-boiler, of a feed-water heater, circulating-pipes between the heater and boiler, and a check valve or valves in said pipes, the heater extending through both end walls of the furnace, and being provided with openings for cleaning the same, and said parts being constructed and arranged substantially as described.

2. The combination, with a steam-boiler, of a feed-water heater communicating at one end with the upper part of the boiler, and at the other end with the lower part, and valves in said communications, the heater extending through both end walls of the furnace, and being provided with openings for cleaning, substantially as set forth.

3. The combination, with a steam-boiler, of a feed-water heater communicating at one end with the upper part of the boiler, and at the other end with the lower part, a check-valve to prevent egress from the boiler in the first communication, a check-valve to prevent ingress to the boiler in the second communication, and means for positively closing the second valve, substantially as set forth.

4. The combination, with a steam-boiler and the furnace-walls, of a feed-water heater consisting of a vertical series of pipes arranged beside the boiler and within said walls, water-ducts *d* from the lower pipe to the one above it, and situated intermediately between the ends of said pipes, a water-connection be-

tween the upper pipe and the upper part of the boiler, and a water-connection between the lower pipe and the lower part of the boiler, substantially as set forth.

5. The combination, with a steam-boiler and the furnace-walls, of a feed-water heater, consisting of a vertical series of pipes arranged beside the boiler and within said walls, water-ducts *d* from the lower pipe to the one above it, a water-connection between the upper pipe and the upper part of the boiler, and a water-connection between the lower pipe and the lower part of the boiler, the said pipes being provided at their ends with the removable plates *d'*, substantially as set forth.

6. The combination, with the steam-boiler and the heating and circulating pipes, of the water back F, in line with the upper part of the boiler, having a steam-space in its upper part above the water-line, and on a level with the steam-space of the boiler, and connections between the water-back, pipes, and boiler, substantially as set forth.

7. The combination, with a steam-boiler, of a feed-water heater in two parts, one on each side of the boiler, and a transverse heating and circulating chamber or pipe, situated immediately back of the furnace and in the path of the products of combustion, communicating with both of said parts, substantially as set forth.

8. The combination, with a steam-boiler, of a feed-water heater in two parts, one on each side of the boiler, a transverse heating and circulating pipe, situated immediately back of the furnace and in the path of the products of combustion, communicating with and below said parts, and a blow-off pipe leading from said transverse pipe, substantially as set forth.

9. The combination, with a steam-boiler, of a feed-water heater, consisting of two parts, one on each side of the boiler, supported at their ends, and a transverse heating and circulating pipe communicating with and supporting said parts between their ends, substantially as set forth.

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

WILLIAM MONTAGUE FERRY.

Witnesses:

SAMUEL J. ARCHHELM,
E. KOYLE.