

960,364.

C. J. MELLIN.
FEED WATER HEATING APPLIANCE.
APPLICATION FILED DEC. 3, 1909.

Patented June 7, 1910.

2 SHEETS—SHEET 1.

FIG. 1.

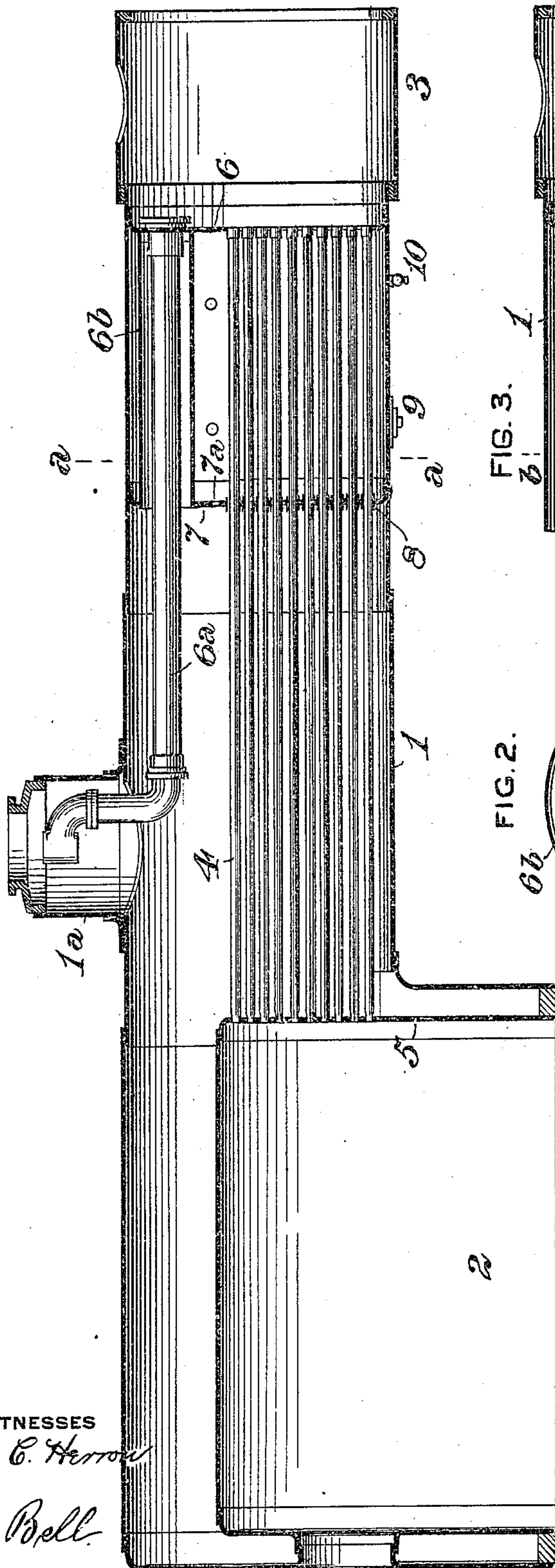


FIG. 3.

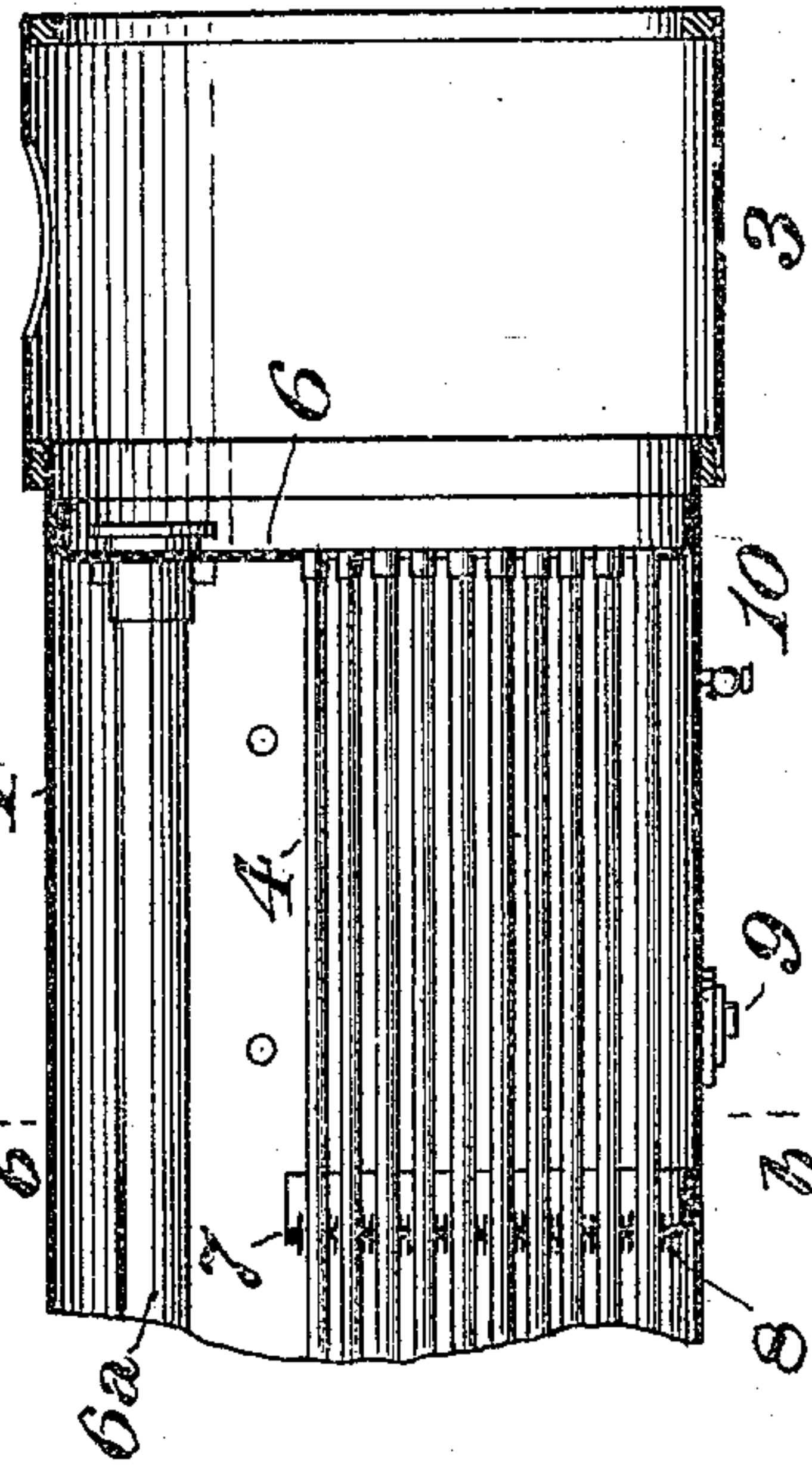
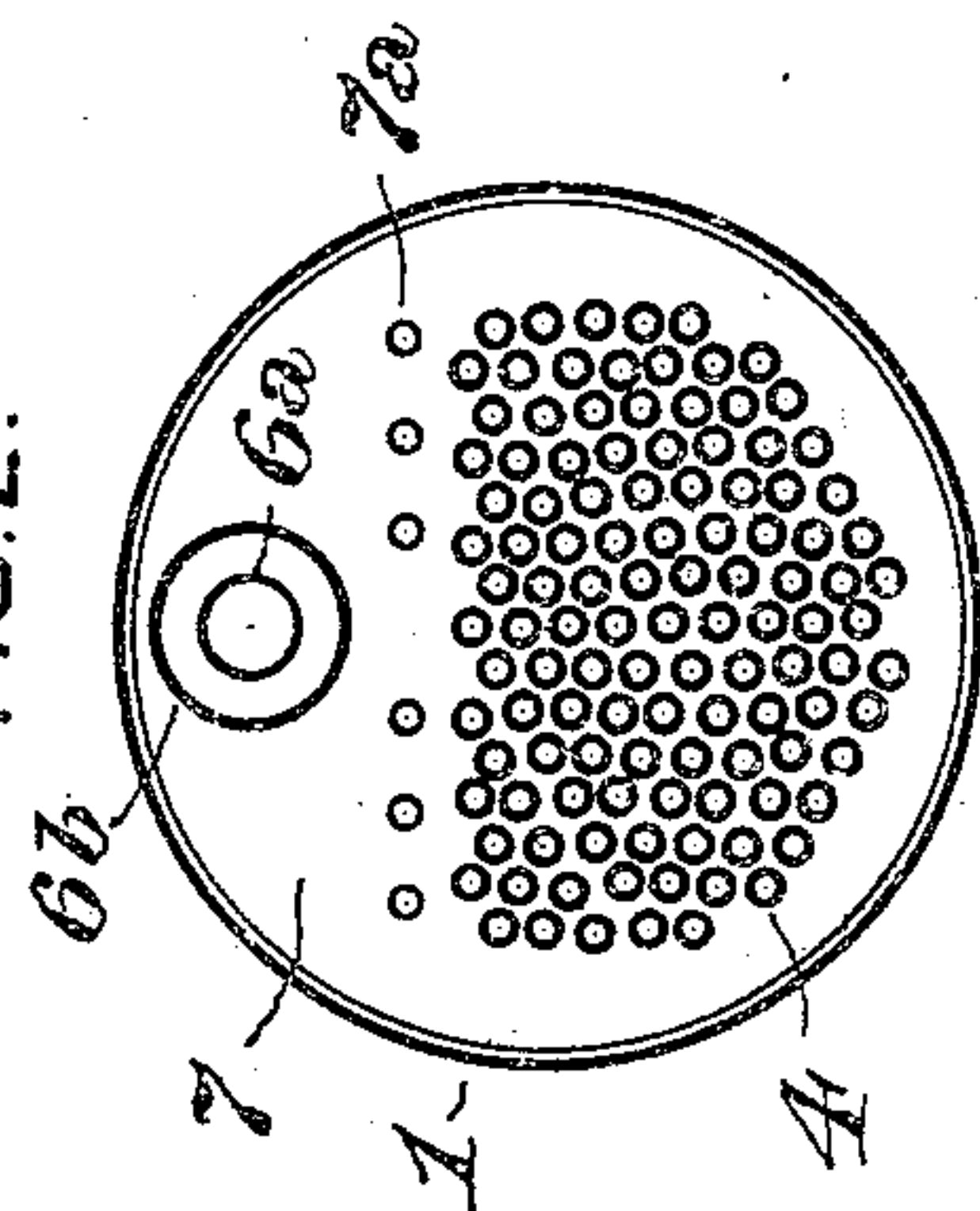


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 5.

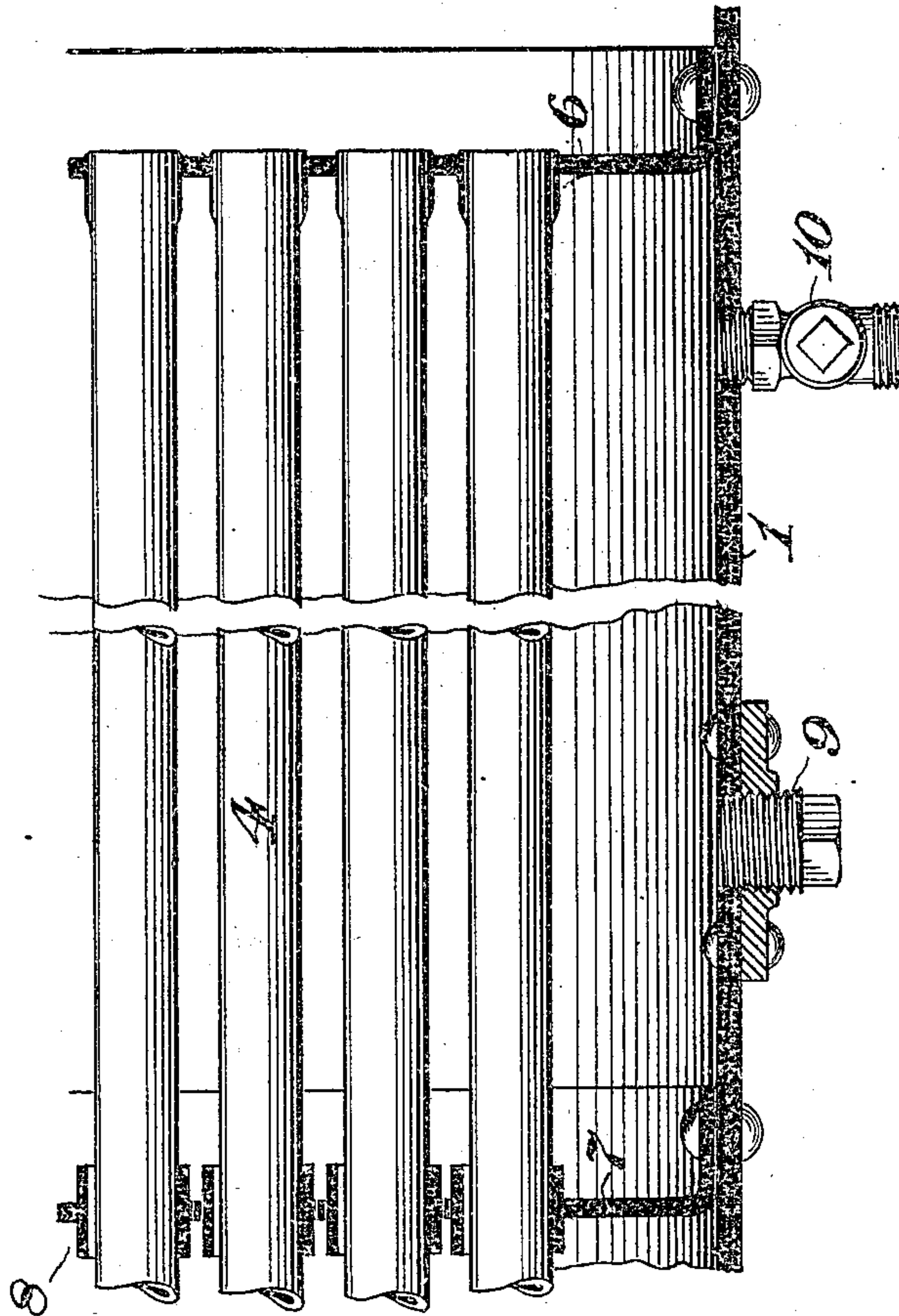
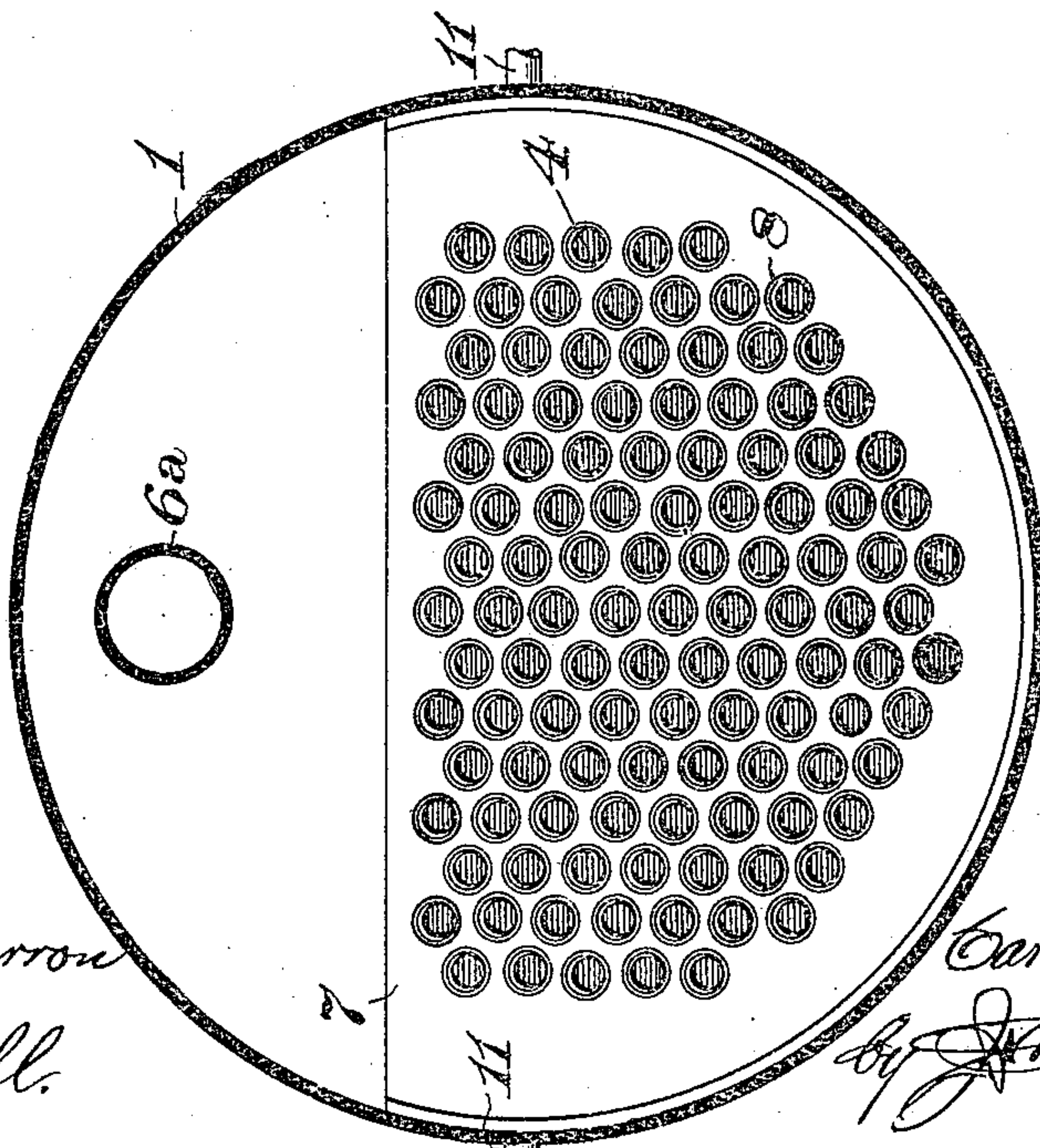


FIG. 4.



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UNITED STATES PATENT OFFICE.

CARL J. MELLIN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO AMERICAN LOCOMOTIVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

FEED-WATER-HEATING APPLIANCE.

960,364.

Specification of Letters Patent.

Patented June 7, 1910.

Application filed December 3, 1909. Serial No. 531,152.

To all whom it may concern:

Be it known that I, CARL J. MELLIN, of Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Feed-Water-Heating Appliances, of which improvement the following is a specification.

The object of my invention is to provide an appliance of simple and inexpensive construction, and ready applicability to tubular steam boilers, either of the locomotive or return tubular type, whereby the feed water, upon entering the boiler, will be retarded in a portion thereof adjacent to the discharge ends of the tubes, and be preliminarily heated by the gases of combustion passing through the portions of the tubes extending through said portion of the boiler, before mingling with the more highly heated water in the other portion of the boiler, thereby utilizing a percentage of the heat of the gases of combustion, prior to their escape from the tubes, which would, under ordinary conditions, be wasted.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical, longitudinal, central section through a locomotive boiler, illustrating an application of my invention; Fig. 2, a transverse section through the same, on the line *a a* of Fig. 1; Fig. 3, a vertical longitudinal, central section through the forward portion of a locomotive boiler, showing a structural modification of my invention; Fig. 4, a transverse section, on an enlarged scale, through the same, on the line *b b* of Fig. 3; and, Fig. 5, a partial vertical, longitudinal, central section, on a further enlarged scale.

My invention is herein exemplified as applied in connection with a tubular steam boiler of the locomotive type, having a cylindrical shell or waist, 1, which is connected, at its rear end, to a firebox, 2, and, at its front end, to a smoke box, 3, which is provided with a suitable exit flue or stack. A plurality of fire tubes, 4, extend through the waist of the boiler, from the firebox flue sheet, 5, to the front flue sheet or flue head, 6, in the ordinary manner, and the steam generated in the boiler is carried to the engine or engines by a supply steam pipe or dry pipe, 6^a, leading from a dome, 1^a, on the

waist of the boiler, through the front flue sheet, 6.

In the practice of my invention, a vertical water retarding partition or diaphragm, 7, which is perforated for the passage through it of the fire tubes, 4, by a plurality of holes of slightly greater diameter than said tubes, is secured to the inside of the shell, 1, of the boiler, between the flue sheets 5 and 6, and is so located that the portion of the shell between its forward side and the front flue sheet, 6, which portion, for purposes of description, I shall term the feed water heating space, shall be of substantially less length than that between its rear side and the rear end of the firebox, which I shall term the steam generating space. The relative lengths of these two spaces may be varied in the discretion of the constructor. The partition, 7, is secured to the boiler shell by rivets passing through a flange on its periphery, and may either be of circular form, extending entirely across the transverse plane of the shell, as shown in Figs. 1 and 2, or of segmental form, extending from a plane slightly below the normal water level of the boiler to the bottom thereof, as shown in Figs. 3 and 4. In the former case, a horizontal row of heated water supply perforations, 7^a is formed in the partition, slightly above the top row of tubes.

In order to provide long bearing surfaces for the tubes in the partition, 7, and thereby obviate any tendency to cutting action of the thin partition on the tubes, the holes in the partition through which the latter pass are made of sufficient diameter to receive short pipes or ferrules, 8, the inside diameter of which is slightly greater, as, say, 1/16 to 1/4 of an inch, than the outside diameter of the tubes. The lune shaped spaces between the upper portions of the tubes and the ferrules are thus made so narrow as to substantially retard the passage of water from the forward to the rear side of the partition, and such restriction of the spaces as will prevent the free passage of water, is the leading and characteristic feature of my invention. The alinement of the holes in the partition in which these ferrules are fitted may with advantage be slightly above that of the holes in the front and rear tube sheets, so as to provide a steady bearing for the tubes on the ferrules, and enable any desired length of tubes to be

used which will admit of the feed water heating space being made as long as may be found advantageous. The bottom of the feed water heating space is fitted with a cleaning plug, 9, and wash out plug, 10, and feed water is supplied to the feed water heating space through supply connections, 11, which are to be fitted with suitable check valves as in ordinary practice.

10 To prevent any tendency of the entering feed water to condense steam passing through the dry pipe, 6, the latter may be inclosed in a protecting casing, 6^b, extending from the partition, 7, to the front flue sheet, 6.

15 In operation, the water supplied to the feed water heating space is retarded therein by the partition, 7, and heated therein by the gases of combustion passing through the portion of the length of the tubes within said space, the feed water, at its lowest temperature, absorbing a considerable amount of heat from the forward portions of the tubes, the temperature of which is not sufficiently high for the generation of steam or for imparting any material accession of heat to a body of water of the boiler temperature. A substantial amount of otherwise practically waste heat may thus be utilized. After being preliminarily heated in the feed water heating space, the feed water flows slowly, and in thin films, into the steam generating space at the rear of the partition, through the restricted spaces between the tubes and the ferrules, and comes in contact with the tubes when it has been brought to its maximum temperature in the feed water heating space. In cases where a segmental or partially separating partition is used, as in Figs. 3 and 4, there will also be a slight flow of the hottest water over the top of the partition, and with the circular or completely separating partition there will also be a flow of the hottest water through the row of perforations, 7^a.

I claim as my invention and desire to secure by Letters Patent.

1. The combination, with a tubular steam boiler, of a transverse water retarding partition or diaphragm secured to the inside of the boiler shell and interposed between a feed water heating space adjoining the discharge ends of the tubes and a steam generating space in rear thereof, a plurality of fire tubes passing through perforations of slightly larger diameter in the partition the spaces intervening between the tubes and said perforations being restricted so as to permit only a retarded traverse of water in

thin films, and a feed water supply connection opening into the feed water heating space.

2. The combination, with a tubular steam boiler, of a transverse water retarding partition or diaphragm secured to the inside of the boiler shell and interposed between a feed water heating space adjoining the discharge ends of the tubes and a steam generating space in rear thereof, a plurality of fire tubes passing through perforations of slightly larger diameter in the partition, the spaces intervening between the tubes and said perforations being restricted so as to permit only a retarded traverse of water in thin films, heated water supply perforations formed in the partition above the top row of fire tubes, and a feed water supply connection opening into the feed water heating space.

3. The combination, with a tubular steam boiler, of a transverse water retarding partition or diaphragm secured to the inside of the boiler shell and interposed between a feed water heating space adjoining the discharge ends of the tubes and a steam generating space in rear thereof, a plurality of fire tubes passing through perforations of slightly larger diameter in the partition, the spaces intervening between the tubes and said perforations being restricted so as to permit only a retarded traverse of water in thin films, a steam supply pipe passing through the feed water heating water space, a protecting casing inclosing said pipe within said space, and a feed water supply connection opening into the feed water heating space.

4. The combination, with a tubular steam boiler, of a transverse water retarding partition or diaphragm secured to the inside of the boiler shell and interposed between a feed water heating space adjoining the discharge ends of the tubes and a steam generating space in rear thereof, a plurality of fire tubes passing through perforations of slightly larger diameter in the partition, the spaces intervening between the tubes and said perforations being restricted so as to permit only a retarded traverse of water in thin films, short tubes or ferrules fitted in said perforations and supporting said fire tubes, and a feed water supply connection opening into the feed water heating space.

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Witnesses:

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CHAS. J. ROGERS.