

(No Model.)

J. A. BERNARD.
CIRCULATING TUBULAR BOILER.

No. 525,940.

Patented Sept. 11, 1894.

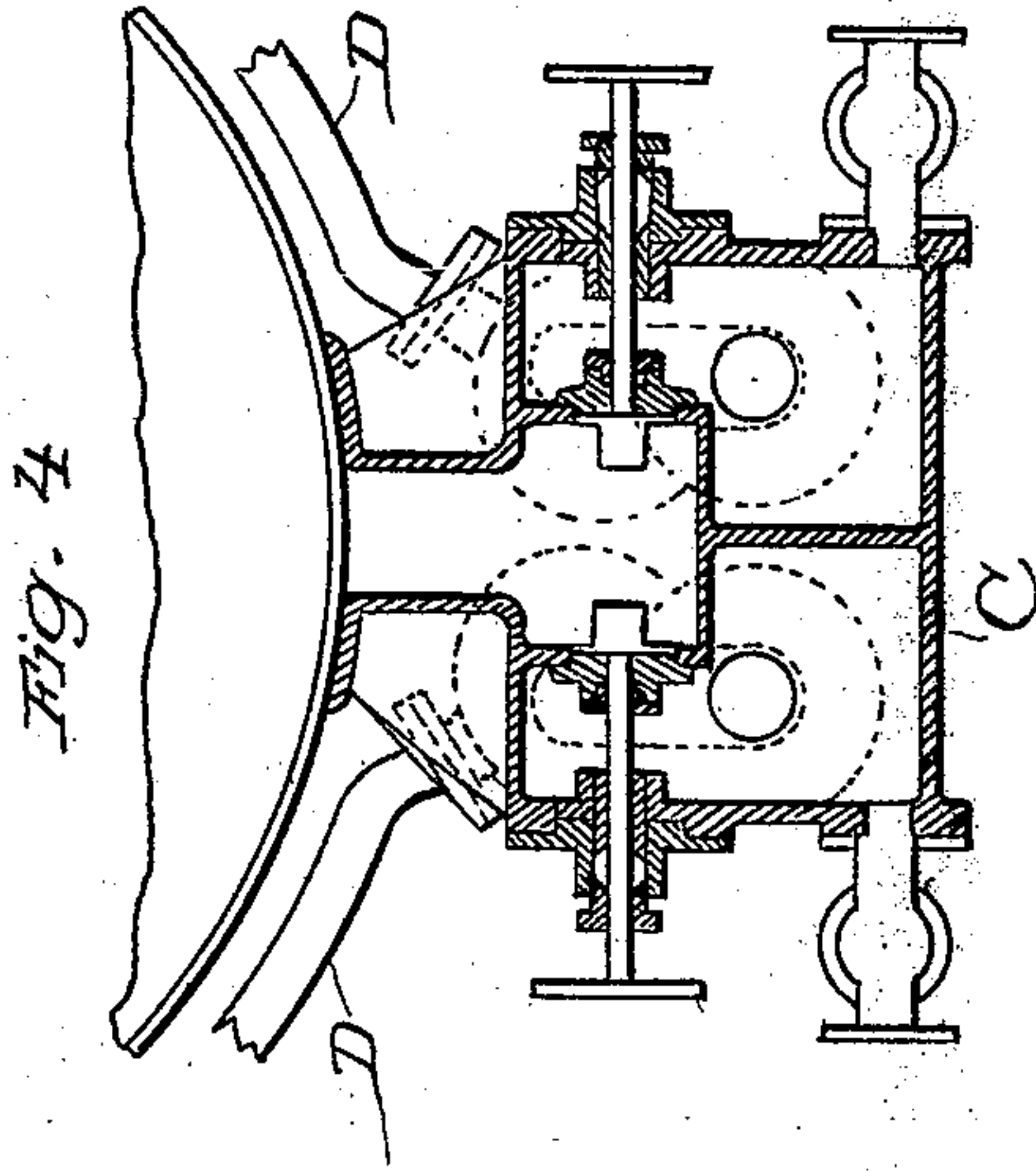
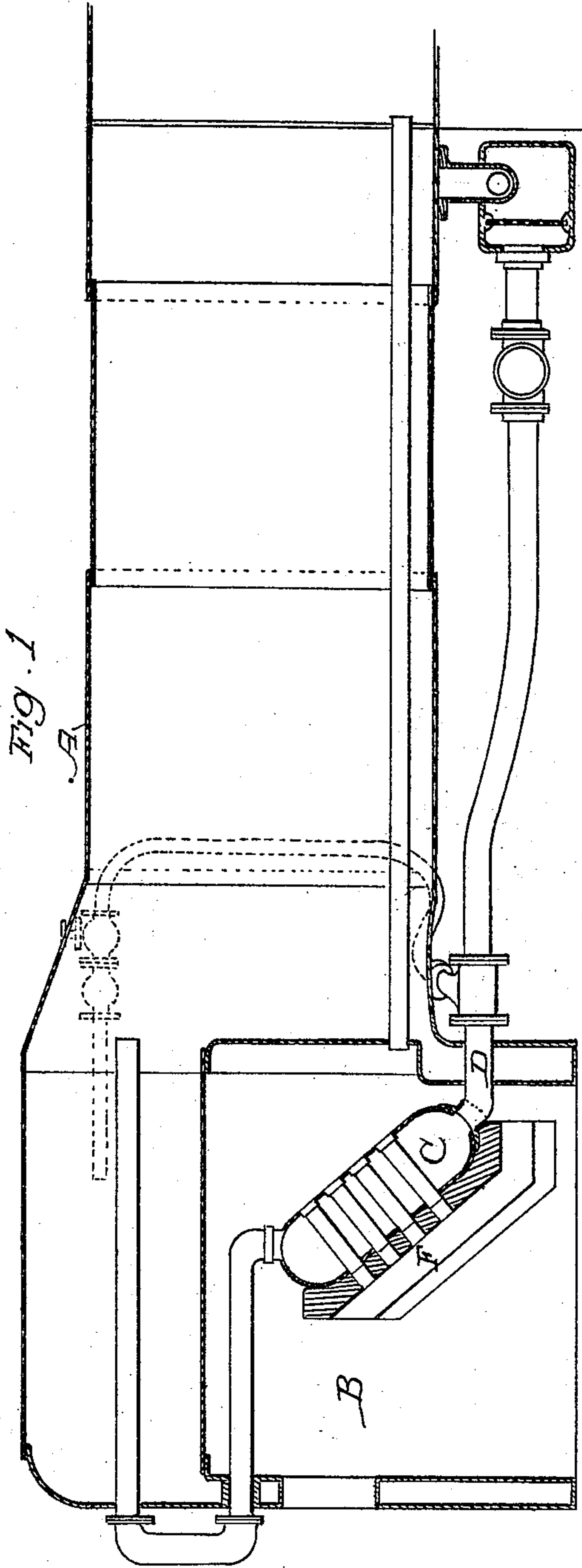


Fig. 2

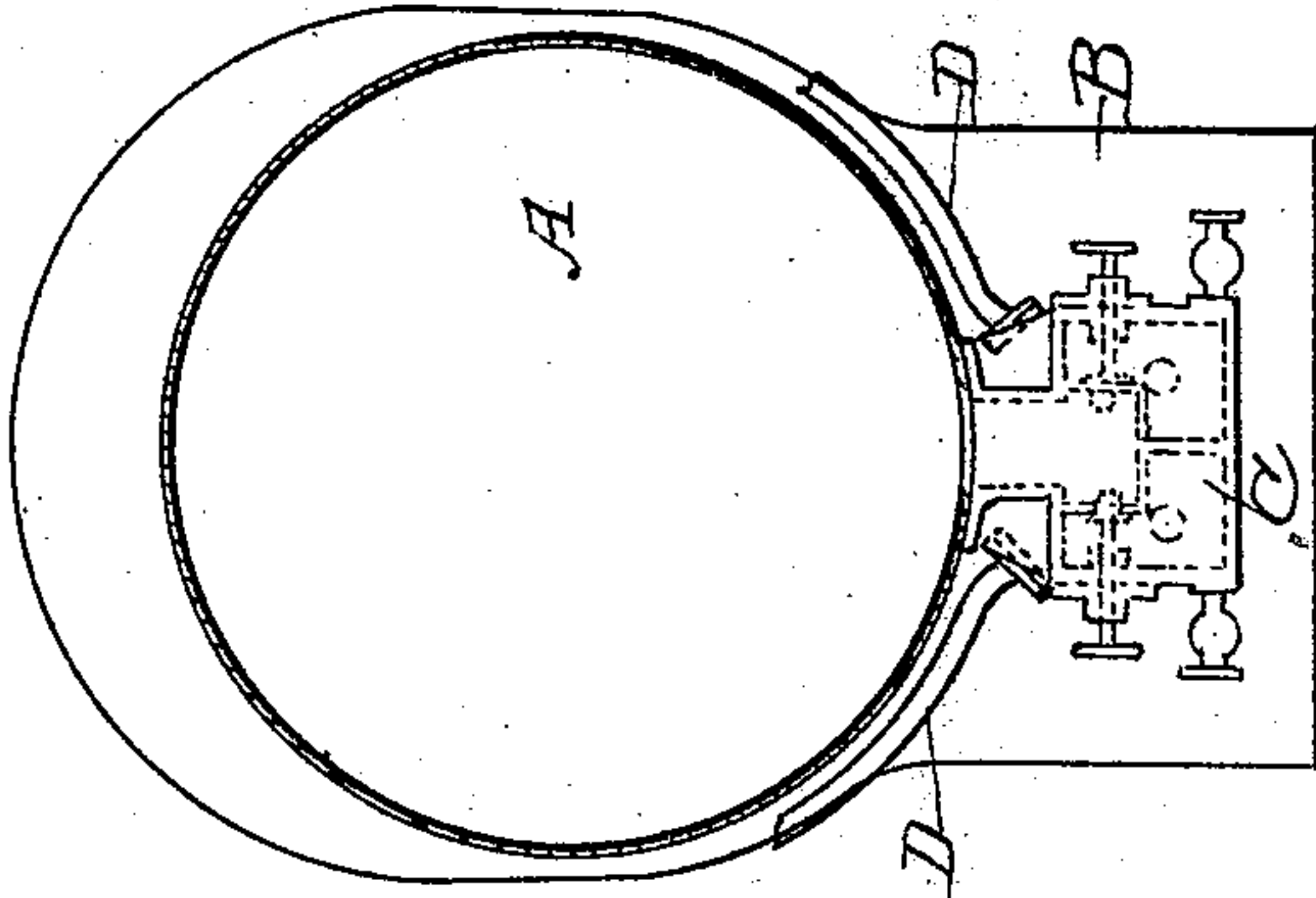
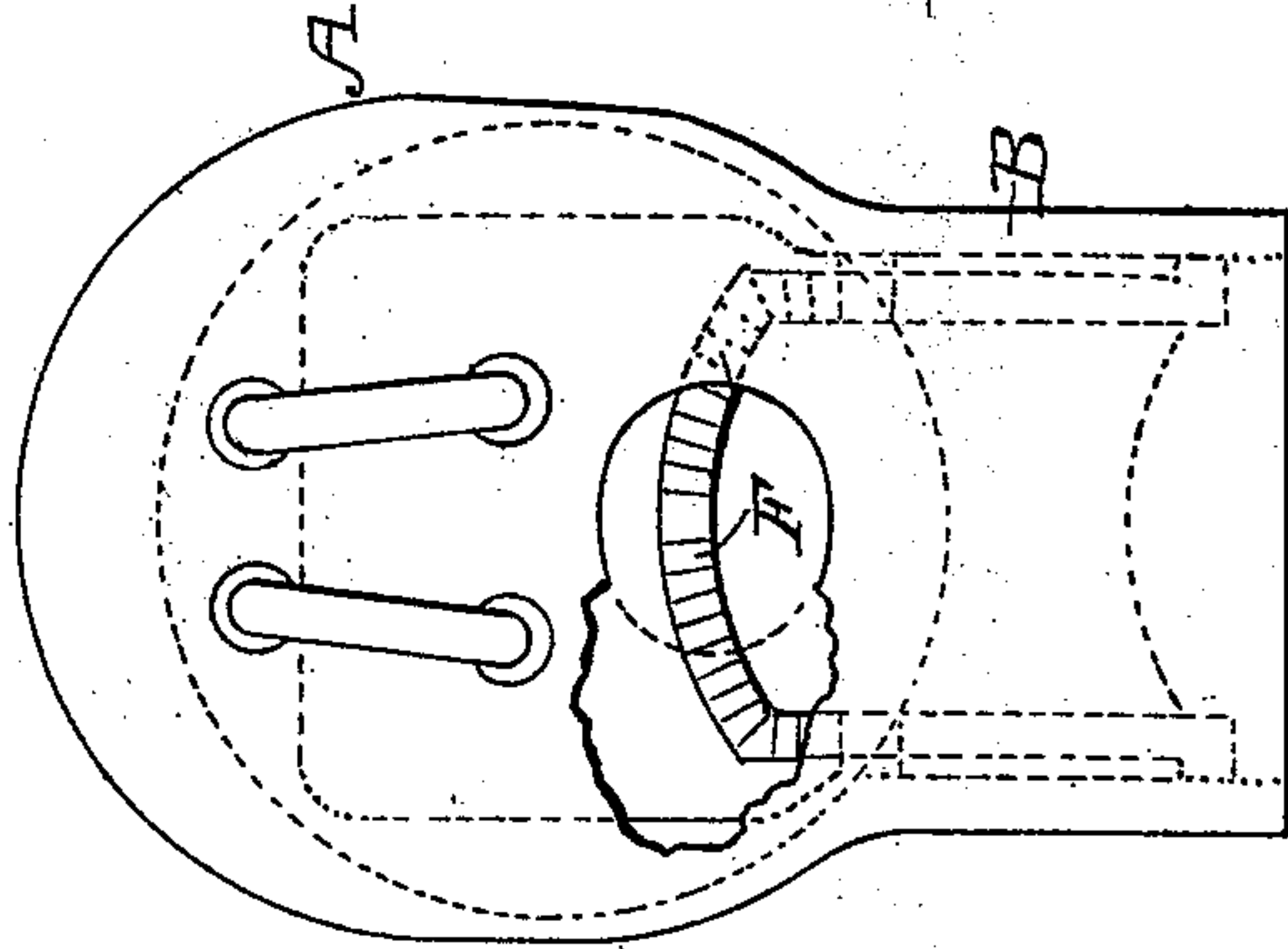


Fig. 3



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UNITED STATES PATENT OFFICE.

JAMES A. BERNARD, OF BAKERSFIELD, CALIFORNIA, ASSIGNOR TO THE
LOCOMOTIVE FEED WATER HEATER COMPANY, OF SAME PLACE.

CIRCULATING TUBULAR BOILER.

SPECIFICATION forming part of Letters Patent No. 525,940, dated September 11, 1894.

Application filed April 2, 1894. Serial No. 506,096. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. BERNARD, a citizen of the United States, residing at Bakersfield, Kern county, State of California, have invented an Improvement in Circulating Tubular Boilers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to locomotive tubular boilers in which a super-heater is located in a fire-box and is connected with the feed water mechanism through an injector and with the boiler by suitable pipes from opposite ends.

My present invention consists in a means for casing and protecting the super-heater from the direct action of the heat of the fire-box, and in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation. Fig. 2 is a transverse section of the same. Fig. 3 is a front view, a portion of the wall being broken away showing the arch. Fig. 4 is an enlarged transverse section of the super-heater.

A is the boiler having the fire-box B within which is fixed the super-heater C. This super-heater is a rectangularly shaped box in transverse section having semi-cylindrical ends with which the supply and delivery pipes connect respectively. This super-heater is shown in the present case supported at the rear portion of the fire-box at an angle upward of forty-five degrees of the horizontal. The supply pipes D open into the lower end of the super-heater, and the pipes through which the water is delivered into the upper part of the boiler connect with the upper end and lead out through the front of the furnace, and thence return into the boiler proper above the furnace crown. In order to protect this super-heater from the direct action of the fire and to make its action more even by reason of a steady and constant heat, I have shown an arch F of asbestos, fire-brick, fire-clay, or other suitable heat resisting material, so constructed as to inclose and cover the lower portion of the super-heater which is directly exposed to the flames and heat of the fire-box. This arch is extended across the fire-box beneath the lower inclined side of the super-heater and is supported from the sides of the

water legs by bolts or plates secured thereon. By this construction the super-heater is protected from the direct action of the flames, and it is also protected from considerable variation of heat which takes place between the new application of fuel in the furnace and the intense combustion thereof when it is all thoroughly ignited.

The fire-brick serves as a medium to receive and retain the highest degree of heat and to give it out gradually to the super-heater as the heat within the furnace is reduced, thus producing at all times an even heat in the super-heater, and insuring the water which passes through it being delivered into the boiler at nearly or quite an equal temperature at all times which is important for the best operation of the apparatus.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a circulating tubular boiler, a super-heater placed at an incline within the fire-box, a means for supplying it with water at one end and a pipe or pipes connecting the opposite end and extending through the front of the furnace and thence returned to the boiler at a point above the water line, in combination with a protecting arch of fire-brick or clay inclined with relation to the superheater and supported from the sides of the water legs, and surrounding the lower surface of the super-heater as described.

2. In a circulating boiler, the combination of a superheater placed at an incline within the fire box, and having semi-cylindrical ends and an approximately rectangular form in cross section, an arch of fire resisting medium similarly inclined and covering the lower portion only of the superheater, a supply pipe opening into the lower end of the superheater, and a pipe leading from the upper end of the superheater out through the front of the furnace and thence returned into the boiler proper at a point above the water level.

In witness whereof I have hereunto set my hand.

JAMES A. BERNARD.

Witnesses:

GEO. H. STRONG,
S. H. NOURSE.