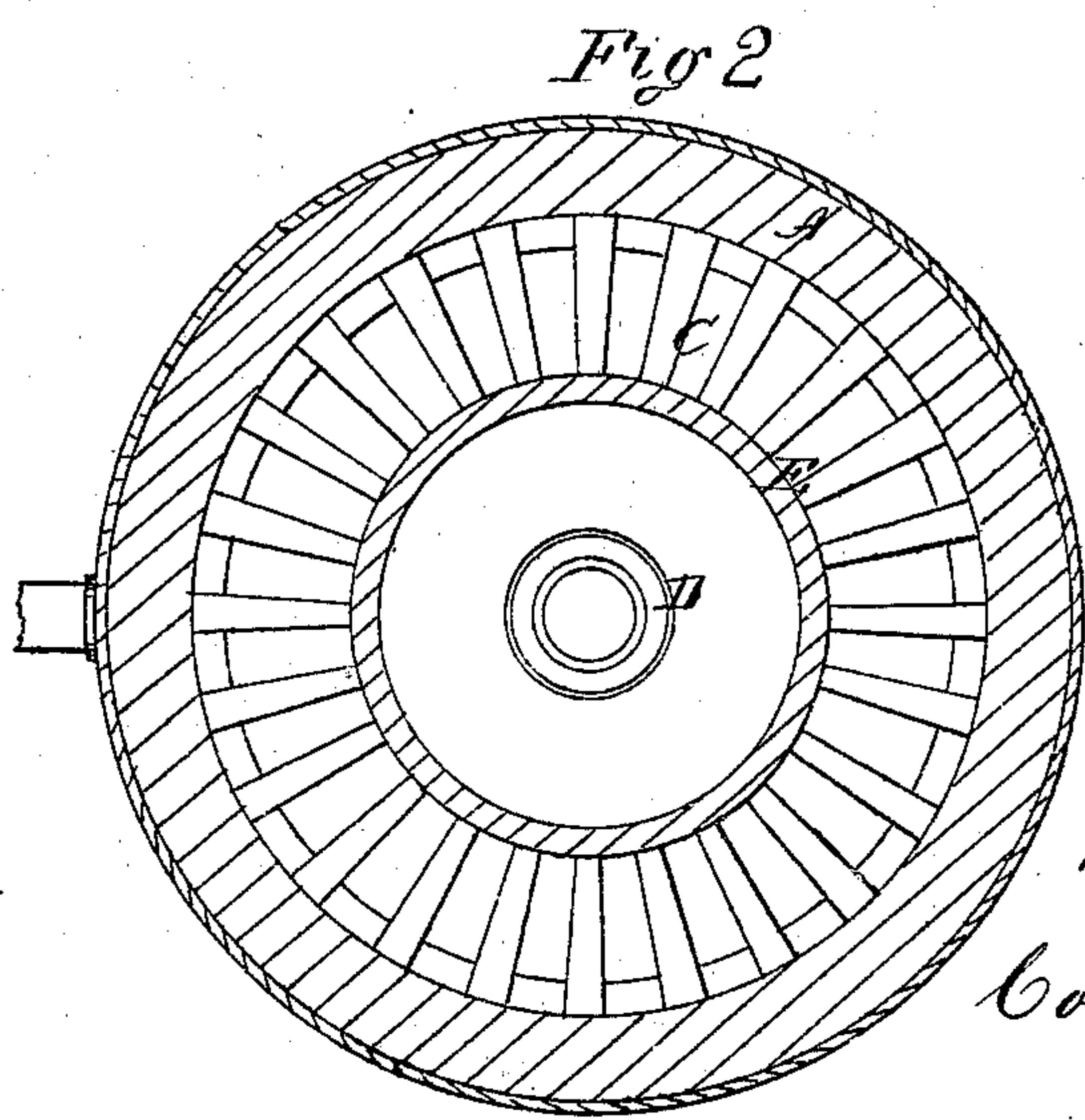
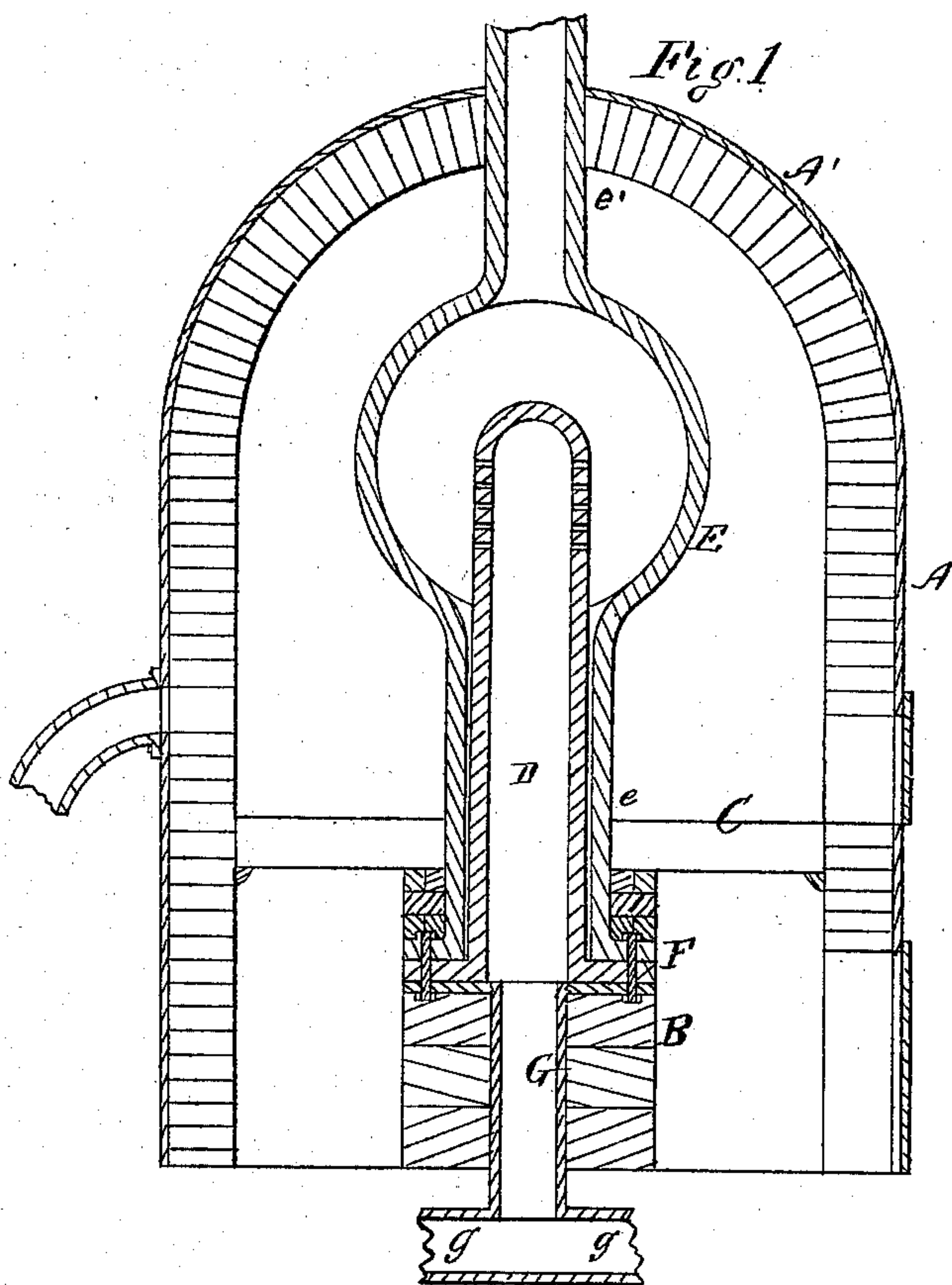


D. RENSHAW.
Superheaters.

No. 143,846.

Patented Oct. 21, 1873.



Witnesses.
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DAVID RENSHAW, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN SUPERHEATERS.

Specification forming part of Letters Patent No. **143,846**, dated October 21, 1873; application filed February 4, 1873.

To all whom it may concern:

Be it known that I, DAVID RENSHAW, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Superheaters; and I do hereby 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

In the drawings, Figure 1 is a vertical central section of my invention, and Fig. 2 is a horizontal section of the same.

The object of my invention is to provide means whereby steam can be rapidly superheated to high temperatures with less danger of fracture of the metal by reason of contraction or expansion than has been heretofore attained. My invention consists in the construction and arrangement of parts, as hereinafter fully described, having reference, first, to introducing steam to be superheated through a pipe so arranged that the temperature thereof is less at the point of ingress than of egress, thereby avoiding the sudden contact of the steam with very hot metal; second, to providing for the expansion of the steam so introduced, so as to break the surfaces of the current thereof by having the diameter of such pipe larger than the diameter of the supply-pipe; and thereby to produce an equalization of temperature; third, to providing for the escape of the steam from the induction-pipe through a number of small orifices, such orifices being of capacity equal to the supply-pipe, whereby the surfaces are further broken and the whole current is thrown out in a series of jets against the hottest part of the superheater, so as to produce a rapid elevation of the temperature; fourth, to the form of the superheater itself, which is designed to combine at once the greatest possible heating-surface, so as to obtain intense temperatures, with great strength, so as to further provide against danger arising from the sudden contraction or expansion of the metal; fifth, to protecting the induction-pipe from fracture by inserting it in the pipe, which is cast on the lower part of the globe which forms the

superheater for that purpose and for a foundation, between which two pipes there is an annular space; sixth, to a general construction which obviates the employment of joints in the fire-chamber, thus combining cheapness and security.

Referring to the drawing, A is a reverberatory furnace of the form shown, being circular in cross-section, and having an arched or rounded top or crown, A'. B is a pedestal, located under the middle of the furnace, and is designed to support the grate and superheating devices. The grate is shown at C located above the point where steam enters. D is the induction-pipe, rising vertically from the pedestal, as shown. The diameter of the core of this pipe is greater than that of its supply-pipe, in order to allow for expansion and to break the surfaces of the current entering it. This pipe D is closed at its upper end, as shown, but is made with a series of small orifices sufficiently numerous to equal the capacity of the supply-pipe. The object of these small orifices is to still further break the surfaces of the steam, which is thus thrown in a series of jets into and against the outer portion of the superheater, which, it is obvious, has the highest temperature. The superheater is constructed in the form of a globe, E, having an inlet-extension, *e*, surrounding the induction-pipe, and an outlet-extension, *e'*, of capacity equal to the supply-pipe. The extension *e* and induction-pipe D are flanged at their lower ends, said flanges being bolted to the cap F, which has an opening, *f*, for the supply-pipe G. This opening *f* may be threaded and the supply-pipe screwed into it, or it may be flanged. The supply-pipe G is of an inverted T-shape, as shown, the extension G being that through which the steam is supplied, while the extension *g'* is for the exhaust. The furnace is built of fire-brick or other suitable material calculated to accept and throw back intense heat, and the globe and pipes are of cast metal.

The advantages of the construction above described are briefly these: The steam is passed from the supply-pipe, which is partly above and partly below the grate, whereby the danger of fracture is lessened, as that part of the pipe with which the steam first comes in

contact is of a lower temperature than its other extremity. The induction-pipe being of greater diameter than the supply-pipe the steam has liberty of expansion, thereby breaking its surfaces and securing equalization of temperature. The orifices in the upper end of the induction-pipe serve still further to break the surfaces of the current, and, as they have a capacity only equal to the supply-pipe, a body of steam, equal in dimensions to the difference between the capacity of the supply-pipe and that of the induction-pipe, is constantly held in the latter, thereby tending to promote still further an equalization of temperature. The globe is a form calculated to receive the greatest amount of heat with the least possible danger from the effects of contraction and expansion of the metal, and the steam, being brought in contact with it in jets, and approaching it from the center or coolest portion, it is still further prepared for the contact before reaching the outer and hottest part of the globe or superheater. Its lower extension serves as a shield or guard to the induction-pipe. The globe being of the proportional dimensions illustrated, the steam may be raised in this one chamber to a temperature as great as the metal of which it is formed will bear, differing essentially in this respect from mere superheating pipes with enlarged portions, in which pipes the steam must be transferred from one chamber to another, in order to obtain a high temperature for any

considerable portion thereof. The superheater-globe is provided with an outlet-extension of less diameter than its supply-extension in order to retard the escape of the steam, and thus cause it to receive the full benefit of the heat from the superheater-globe.

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

1. In a superheater, an induction-pipe, arranged partly above and partly below the grate, substantially as specified.

2. In combination with a supply-pipe of a superheater, an induction-pipe of greater diameter than said supply-pipe, as and for the purpose set forth.

3. In combination with an inner induction-pipe, a superheater, receiving steam from the former, as specified.

4. The induction-pipe, constructed as described, with perforations, in combination with the superheater, within which it is arranged, substantially as and for the purpose set forth.

5. The superheater-globe, provided with an inlet and outlet extension, as described, the latter being of less capacity than the former, for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of January, 1873.

DAVID RENSHAW.

Witnesses:

M. DANL. CONNOLLY,

THOS. A. CONNOLLY.