

No. 880,399.

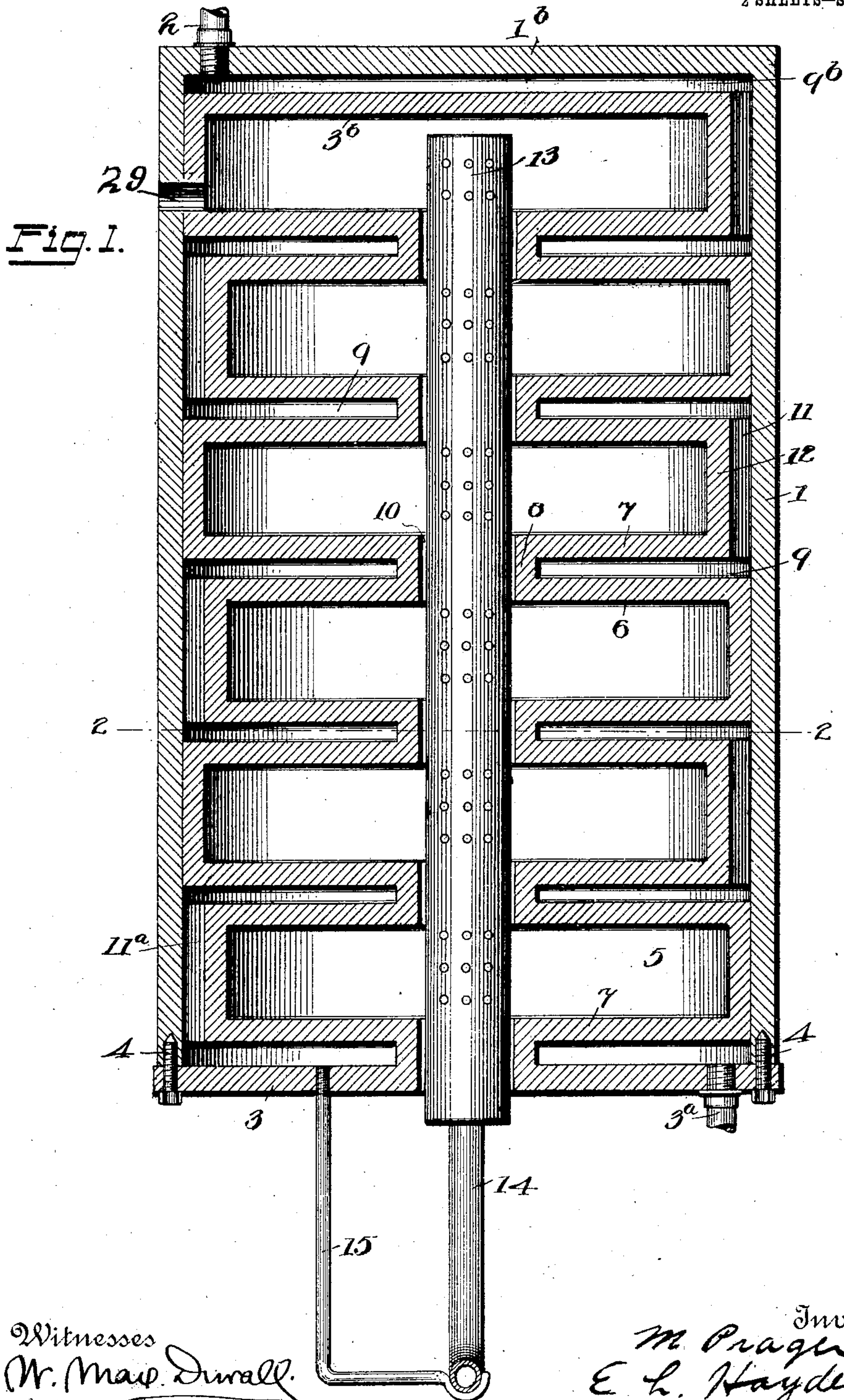
PATENTED FEB. 25, 1908.

M. PRAGER & E. L. HAYDEN.

STEAM SUPERHEATER.

APPLICATION FILED APR. 10, 1907.

2 SHEETS—SHEET 1.



Witnesses  
Mr. Max D. Wall.  
Stephen Kinsler

Inventors  
M. Prager  
E. L. Hayden  
By Willhisen & Jones  
Attorneys

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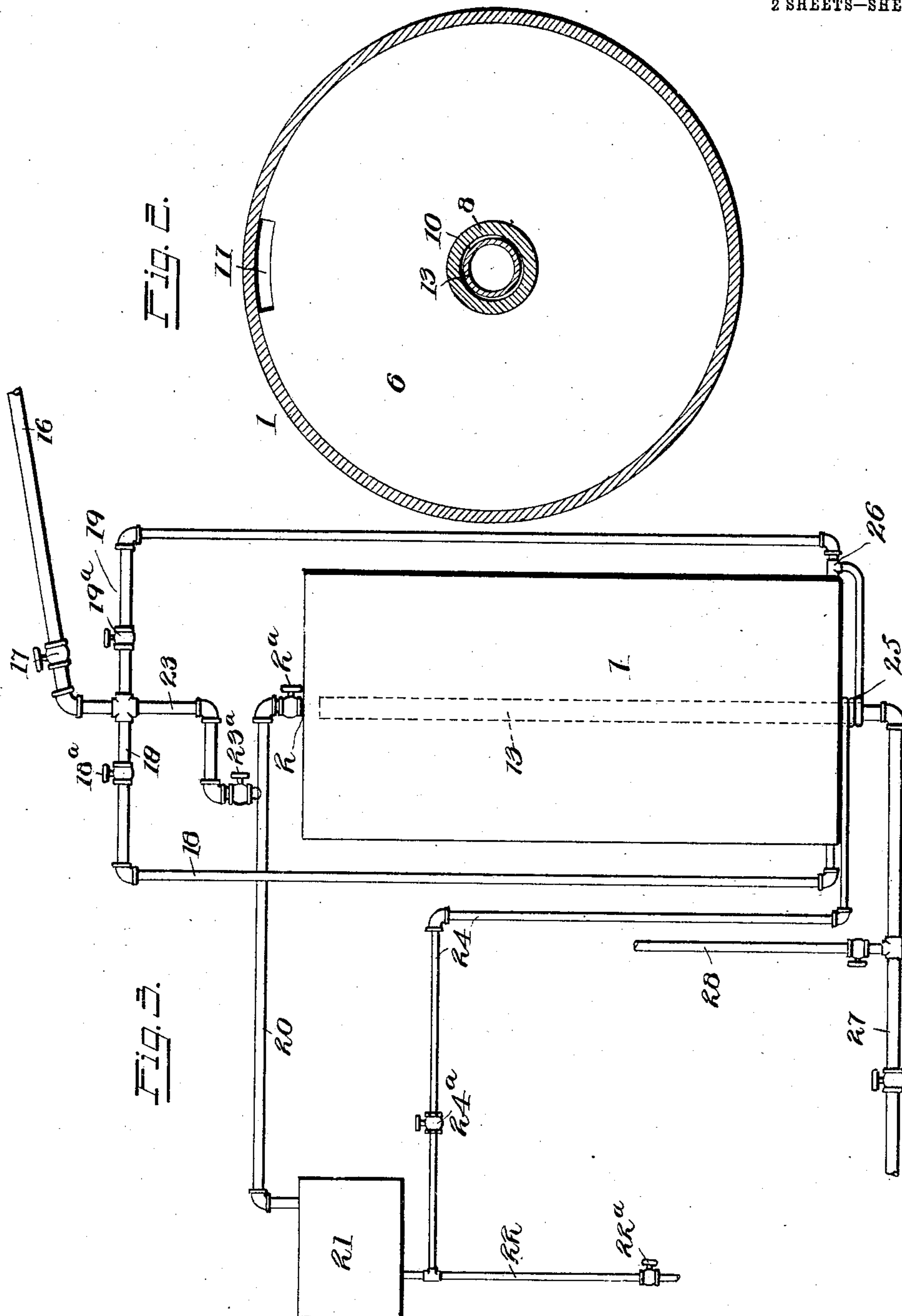
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2 SHEETS—SHEET 2.



Witnesses  
W. Map. Dwell.  
Stephen Kinsta.

Inventors  
M. Prager and  
E. L. Hayden  
by Williamson & Finner  
his Attorneys



# UNITED STATES PATENT OFFICE.

MOSES PRAGER AND ELMER L. HAYDEN, OF SAVANNAH, GEORGIA.

## STEAM-SUPERHEATER.

No. 880,399.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed April 10, 1907. Serial No. 367,434.

*To all whom it may concern:*

Be it known that we, MOSES PRAGER and ELMER L. HAYDEN, citizens of the United States, both residing at Savannah, in the county of Chatham and State of Georgia, have invented certain new and useful Improvements in Steam-Superheaters; and we 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 appertains to make and use the same.

This invention relates to improvements in superheaters for steam, and is primarily designed to increase the efficiency of such apparatus by the employment of a device both cheap and of a simple construction.

It is well understood that steam superheaters may be employed in a number of relations, and while this particular device is designed primarily for use with laundry apparatus, such as small machines for shirt ironing, collars and cuffs, and mangles, still it is not restricted to this limited use.

While we do not limit ourselves to the details shown and described, for the purpose of disclosure reference is had to the accompanying drawings, illustrating a practical embodiment of the invention, in which like letters designate the same parts in the several views, and in which:—

Figure 1 is a central vertical section through the superheater, the burner therefor being shown in elevation. Fig. 2 is a transverse section on the line 2—2 of Fig. 1, and Fig. 3 is a diagrammatic view, showing a system of steam piping with our invention coupled thereto.

Broadly, the invention consists of an inner and outer casing, detachably secured together and provided internally with heating chambers and passages for causing the live steam to pass in a zig-zag path through the superheater in contactual relation with the heated walls of the heating chambers and thence passing out of the apparatus in a superheated state and conducted to any suitable machine for which a high heat is necessary and where the steam pressure is low.

1 designates the outer casing, preferably of cylindrical form and open at its lower end, said casing at its closed end being provided with an outlet opening represented by the outlet pipe 2. The inner casing is of a diameter to snugly fit within the outer casing and consists of a plurality of heating cham-

bers formed by spacing plates integrally cast with the walls of the cylinder and provided with passage-ways therein, a central opening being also provided in said spacing plates to allow of means for heating the interior of said chambers. As shown in the drawings, this internal casing consists of a base plate 3 of a diameter equal to or slightly greater than the exterior diameter of the casing 1 and forming a support and closure for the open end thereof. The outer casing may be securely fastened to the base plate 3 in any suitable manner, but in the drawings this is simply illustrated by lags 4 passing through the base 3 and into the walls of the outer cylinder. Superposed on said base plate 3 are a plurality of hollow castings forming heating chambers 5 separated by spaced plates 6 and 7 solid centrally as at 8, and forming passageways 9 therebetween, the central or solid portions 8 being provided with an opening 10 for a purpose hereinafter referred to.

It will be seen from the drawings that vertical passage-ways 11 are formed between the horizontal passage-ways 9, by the peculiar construction of the inner cylinder, a portion of the wall of which at different positions opposite each heating chamber being inset as at 12, forming the passage ways 11<sup>a</sup> with the outer cylinder 1.

The openings 10 in the spacing plates are to allow the interior of the heating chambers to be highly heated, and this may be done in any suitable way. In the drawings this is illustrated by a central burner 13 extending therethrough, which burner may be fed by gas or hydrocarbon oils led through the supply pipe 14, which may be supported by a suitable bracket 15 threaded into the base plate 3.

In Fig. 3 we have illustrated an application of our superheater with a system of steam pipes, wherein 16 designates the main supply provided with a cock 17 and communicating with the branch pipes 18, 19 passing at their lower ends through the outer cylinder 1 and discharging into the passageway 9 formed between the base plate 3 and the spaced plate 7 at the lower end of the inner cylinder. These branch pipes are provided with cocks 18<sup>a</sup>—19<sup>a</sup>. The outlet pipe 2 of the superheater extends by means of a branch pipe 20 to what may be termed a steam chest 21 communicating by a pipe 22, provided with a cock 22<sup>a</sup>, leading to the



machine that is to utilize the superheated steam. 23 is a connecting-pipe between the pipe 20 and the main supply, and this pipe is provided with a cock 23<sup>a</sup>. The branch  
 5 pipe 20 or the outlet pipe 2 is also provided with a cock between the superheater and the pipe 23, designated on the drawings at 2<sup>a</sup>. 24 is a condenser pipe provided with a cock 24<sup>a</sup> and connected up with the steam chest  
 10 21 and thence led to the burner and coiled therearound as at 25, and then connected to one of the branch supply pipes as at 26. 27 designates a valve controlled pipe for the air, and 28 a similar pipe for the gas fed to  
 15 said burner 13.

From the foregoing and referring particularly to Fig. 1, it will be seen that the live steam being conducted into the passage-way 9 formed between the base plate 3 and the  
 20 spaced plate 7, through the inlet pipe 3<sup>a</sup>, passes across the superheater and up through the passage-way 11<sup>a</sup>, thence transversely in the opposite direction through one of the passage-ways 9 to a passage-way 11 on the  
 25 entrance side of the cylinder and so on to the top where it passes through the passage-way 9<sup>b</sup> formed by the unbroken head plates 1<sup>b</sup> and 3<sup>b</sup> of the outer and inner cylinders.

The chambers 5 being highly heated by  
 30 the burner and the walls thereof consequently very hot, during the passage of the steam through the passage-ways as described the same being in contactual relation with the heated walls is highly superheated and  
 35 finally passes through the passage-way 9<sup>b</sup> in contact with the plate 3<sup>b</sup> and out of the pipe 2, and it will be observed that at the exit end of the superheater, the steam has the largest and hottest heating surface to pass over, that  
 40 is to say the hot plate 3<sup>b</sup>.

The products of combustion may descend downwardly through the central space along-  
 45 side of the burner and discharge through the lower central opening, but any other suitable means may be provided for carrying off the exhaust products, and for the purpose of illustration in the drawings a further means is shown as simply comprising a pair of alin-  
 50 ing ports cut in the inner and outer cylinder at the bottom of the top heating chamber, as indicated at 29.

The operation of Fig. 3 is apparent, but it may be referred to briefly: If it is not de-  
 55 sired to use the superheater, the cocks 18<sup>a</sup>, 19<sup>a</sup>, 2<sup>a</sup> and 24<sup>a</sup> being closed and the cocks 17 and 23<sup>a</sup> being open, the passage of steam will be direct from the supply pipe 16 through the branch pipes 23 and 20 to the steam chest 21,  
 60 and with the cock 23<sup>a</sup> closed and the cocks 18<sup>a</sup>, 19<sup>a</sup> and 2<sup>a</sup> open, the fresh steam will pass from the supply pipe 16 through the branch pipes 18 and 19 to the superheater and thence out through the outlet pipe 2 and through the connecting pipe 20 to the steam  
 65 chest 21. The connecting pipe 24 may be

employed for conducting any condensed steam back to one of the branch supply pipes, it being re-converted into live steam by passing around the coils 25 on the burner.

From the foregoing description and partic-  
 70 ularly referring to Fig. 1, it will be seen that we construct a very efficient superheater embodying simplicity, strength and cheapness and which may be readily detached for cleaning, and  
 75

Having thus described the invention what we claim is:—

1. In a superheater, the combination of an outer casing, an inner cylinder comprising a  
 80 plurality of intercommunicating closed heating chambers, means for introducing a heating medium internally thereof, a recess being formed between said heating chambers and between said inner and outer cylinders form-  
 85 ing a tortuous steam passageway through said superheater exteriorly of said heating chambers, means for introducing live steam to said passageway, and means for conduct-  
 90 ing off the superheated steam, substantially as described.

2. In a superheater, the combination of an outer casing, an inner cylinder therefor com-  
 95 prising a plurality of intercommunicating closed heating chambers separated from each other by spaced plates, each heating cham-  
 100 ber being provided on the periphery of its vertical wall with a recess located at a position different from the corresponding recess of the next adjacent heating chamber, said  
 105 recesses forming with the space between said spaced plates a tortuous passageway through said superheater, means for introducing live steam into said passageway, means for con-  
 110 ducting off the superheated steam, and means for introducing a heating medium directly into each of said heating chambers, substan-  
 115 tially as described.

3. In a superheater, the combination of an outer casing, an inner cylinder provided with  
 120 a plurality of heating chambers, and means for heating said chambers, the construction of said inner cylinder being such that passage-  
 125 ways are formed between said heating chambers and between the walls of said inner cylinder and outer casing for conducting the passage of steam through said superheater in intimate contact with the heated walls of  
 130 said chambers, substantially as described.

4. In a superheater, the combination of a cylinder comprising a plurality of superposed  
 120 heating chambers formed from spaced separating plates and the wall of said cylinder opposite each heating chambers being inset at a different position than its next adjacent  
 125 chamber and forming a communicating passage between the spaces of two adjacent separating plates, an outer casing for snugly inclosing said inner cylinder, means for in-  
 130 troducing steam between said outer and inner cylinders at one end thereof, and means



for conveying off the steam from between the outer and inner cylinder at the other end thereof, substantially as described.

5. In a superheater, the combination of a cylinder comprising a plurality of heating chambers formed by inwardly extending horizontal channeled separating plates, said cylinder being closed at its upper end and the periphery of said cylinder opposite each heating chamber being inset at a position different to the inset portion of its adjacent heating chamber, an outer cylinder open at one end and snugly inclosing said inner cylinder and so associated therewith as to form a space between the closed ends of said cylinder, communicating with the space formed by one of said inset portions, means for introducing steam between said cylinder at one end thereof, and means for conducting off the steam from the passage-way between said heads, substantially as described.

6. In a superheater, the combination of an inner cylinder, comprising a plurality of heating chambers, formed from inwardly extending lateral channeled separating plates, inset recesses being formed on the periphery of said heating chambers at different positions relatively to its next adjacent heating chamber, and said inset recesses communicating with the channels formed in said separating plates, said inner cylinder being closed at its top and provided at its bottom with a spaced base plate having a diameter greater than the diameter of the cylinder proper, an outer cylinder closed at one end and snugly fitting over said inner cylinder and resting at its open end on the base plate of said inner cylinder, a space being formed between the closed ends of said respective cylinders and communicating with one of said inset recesses, means for conducting steam at one end between said cylinders, and an outlet pipe communicating with the space formed between the closed heads of said

cylinders at the opposite end, substantially as described. 45

7. In a superheater, an inner cylinder comprising a base superposing a plurality of heating chambers formed by inwardly disposed channeled separating plates vertically connected by the periphery of said cylinder and said periphery opposite each heating chamber having an inset recess at a position different to the next adjacent heating chamber, and said separating plates being formed solid centrally and provided with openings therethrough, an outer cylinder closed at one end and at its open end resting on and secured to said base plate, a space being formed between the solid heads of said cylinders, an inlet pipe, an outlet pipe, and a burner projecting through said openings in said separating plates for heating said heating chambers, substantially as described. 50 55 60

8. The combination with a superheater, of a supply pipe and a branch pipe connecting said supply pipe to said superheater, a branch outlet pipe for said superheater leading to the machine utilizing the superheated steam, an intermediate pipe between said supply pipe and said outlet branch, and cocks controlling said respective pipes for either leading the fresh steam directly to said branch outlet pipe or through said superheater to said branch outlet, a burner for said superheater, and a condenser pipe forming communication between said branch outlet and said branch supply pipe, said condenser pipe being coiled around said burner, substantially as described. 65 70 75 80

In testimony whereof, we affix our signatures in presence of two witnesses.

MOSES PRAGER.  
ELMER L. HAYDEN.

Witnesses:

B. F. PHILLIP,  
HAROLD M. PRAGER.