(No Model.)

2 Sheets—Sheet 1.

M. L. SEVERY.

STEAM BOILER.

No. 503,005. Patented Aug. 8, 1893.

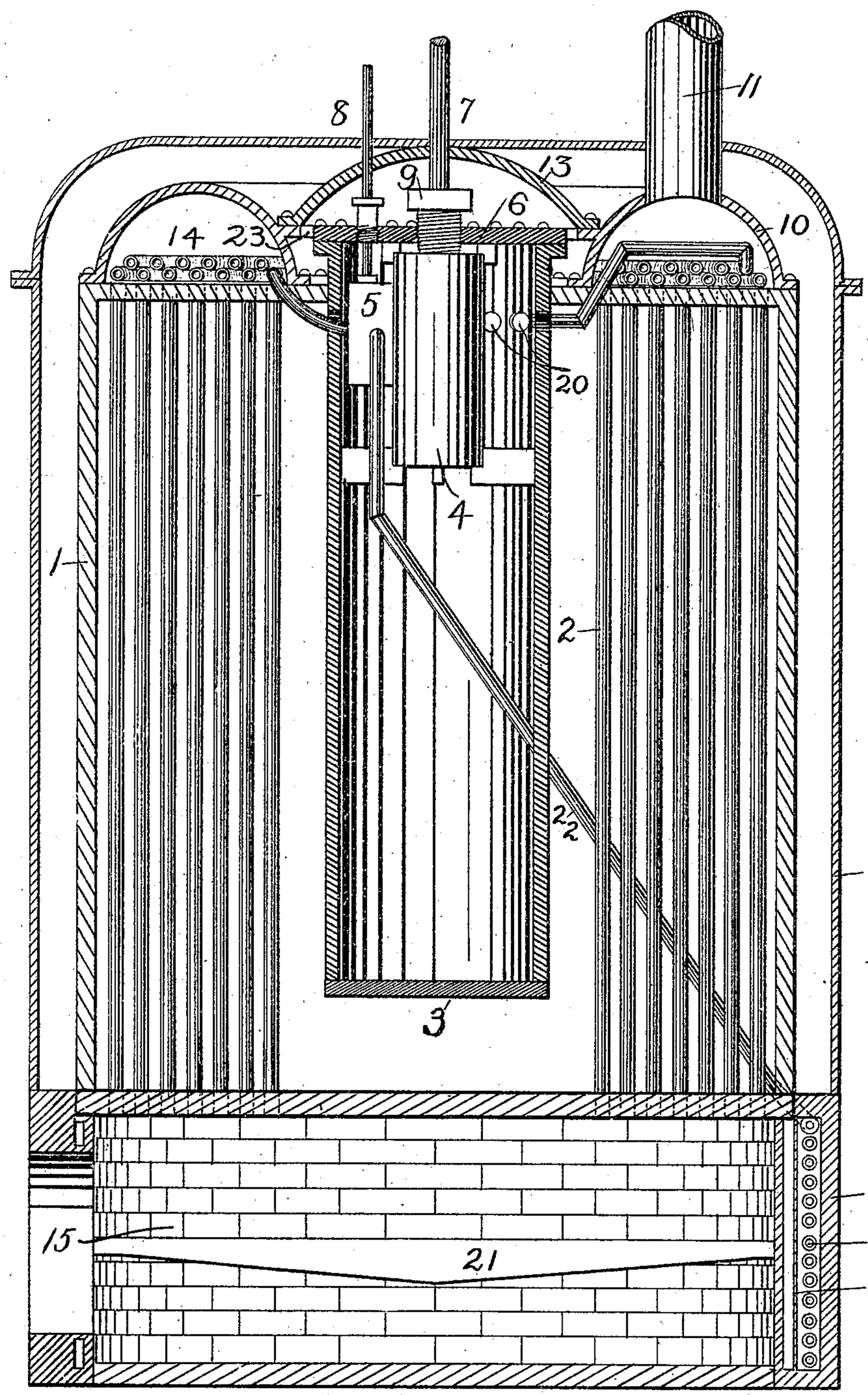

Fig. 1.

Witnesses.
Josephine D. McKenzie
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(No Model.) 2 Sheets—Sheet 2.

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No. 503,005. Patented Aug. 8, 1893.

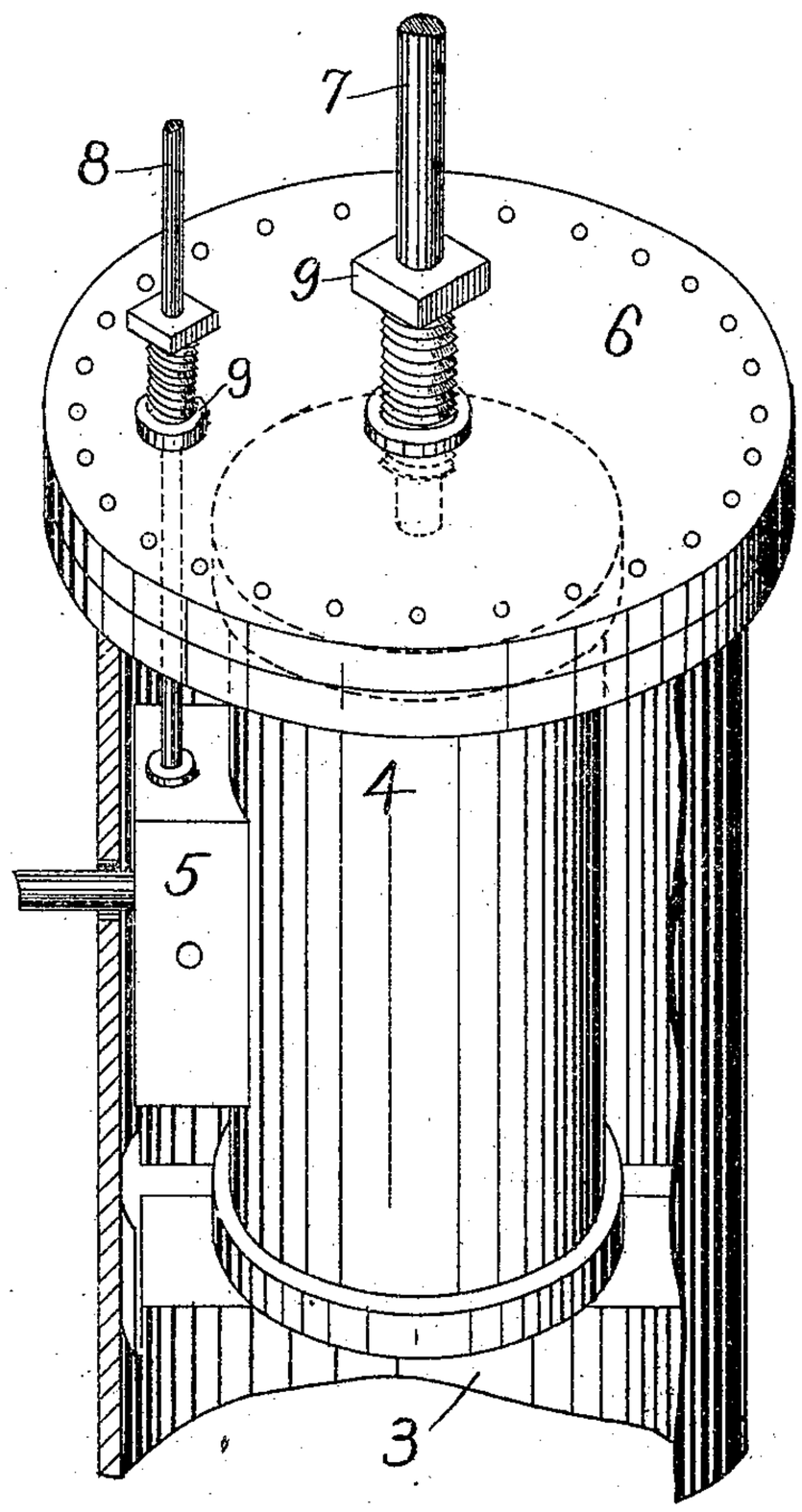

Fig. 2.

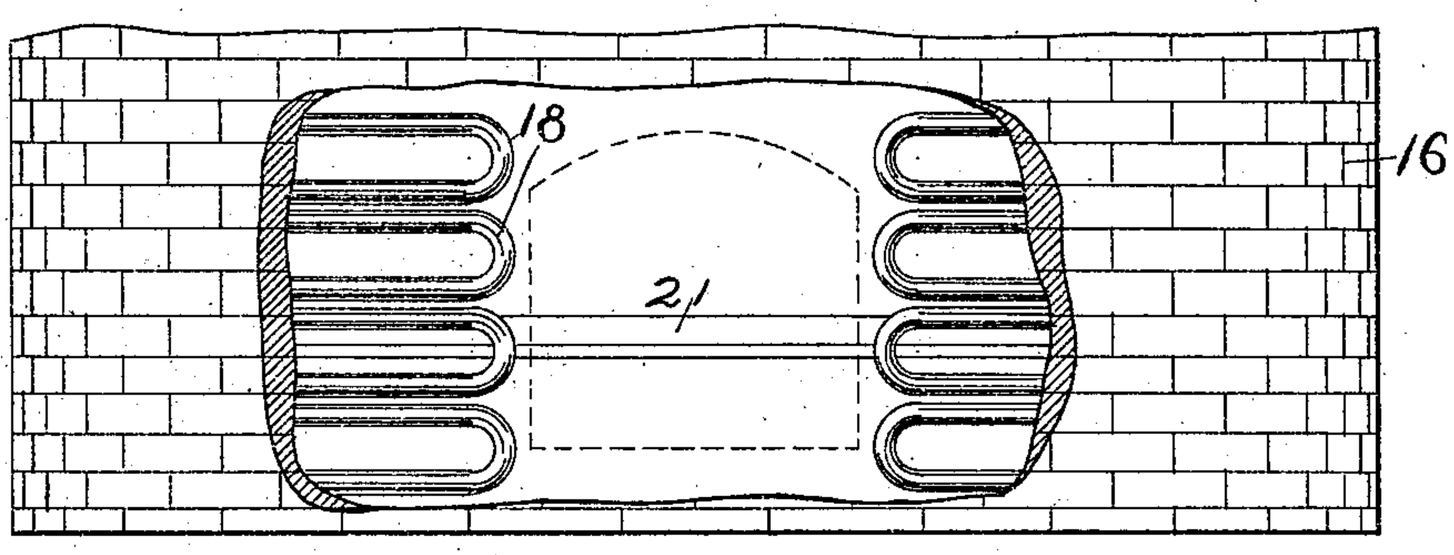

Fig 3.

Witnesses.
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UNITED STATES PATENT OFFICE.

MELVIN L. SEVERY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO FRANCIS DOANE, CHARLES F. CROWELL, AND MELVIN L. SEVERY, TRUSTEES, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 503,005, dated August 8, 1893.

Application filed February 8, 1893. Serial No. 461,533. (No model.)

To all whom it may concern:

Be it known that I, MELVIN L. SEVERY, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Steam-Boilers, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to a combined boiler, steam superheater, steam engine, and feed-water heater.

The object of the invention is to utilize to the greatest degree possible in such combined apparatus the heat employed.

It consists in the construction and arrangement of parts herein described and particularly pointed out in the claims.

In the drawings, Figure 1, is a view in vertical section of the apparatus. Fig. 2, is a view of the steam chest, a part of the outer wall of the same being shown as partly broken away. Fig. 3, is a view in elevation of the fire box, a portion of the casing for the same, the front part including the door being shown as broken away, and the door being shown in dotted lines.

In the figures the same numerals refer to the same parts.

Referring to the drawings, 1 is a cylindrical boiler having in it a series of vertical flues, arranged in concentric circles within the same, with the exception of a space in the center of the boiler. In this space is a cylinder 3 of iron or other suitable material, which extends nearly to the bottom of the boiler and through the top plate of the same, and forms the steam chest, and acts more or less as a separator. Steam enters from the boiler by means of the perforations 20. Properly supported in the upper part of this steam chest is the steam cylinder 4, having the usual valve box 5, on one side of the same. Through the top plate passes the piston rod 7, and valve rod 8, and each of these rods is surrounded by a suitable packing-box 9, which extends above the top plate. The detachability of the plate 6, makes the steam cylinder accessible for removal, if desired.

Bolted to the top of the boiler is an arched annular plate of iron 10, whose total diameter is equal to that of the top plate of the boiler, and whose internal diameter is a little greater than that of the cylinder 3. Owing to the arched form of this plate 10, a chamber is formed above the ends of the flues and with this chamber and also the smoke stack 11, the flues communicate. On the inside surface of this plate is a ring or ledge 23, and to this ledge is bolted an arched plate 13, which curves over the plate 6, and by means of this plate 13, a chamber is formed above said plate. The object of the plate is to protect the top of the steam chest and packing boxes.

In the annular chamber, and over the ends of the flues is a series of horizontal coils of pipe 14, which coils are in communication with the steam chest in the boiler and to the coils on one side steam passes from the steam chest 3, and from the other end of the coils steam passes to the valve-box 5. By means of these coils the steam which is supplied to the steam cylinder is super-heated and its potential energy is thus increased.

15 is the fire box which is of the usual construction but is surrounded by a closed casing 16 of iron, separated from the outer surface of the fire box by a space. In this space is a vertical partition 17 and between this partition and the case is a coil of pipes 18, arranged around the fire box except where the door is situated as shown in Fig. 3. And between the fire box and this partition 17 is an air space to prevent the feed water from abstracting the heat from the fire box by conduction or convection and thus lowering the efficiency of the combustion. The space between the walls 16 and 17, contains the feed water. The exhaust steam from the steam chest passes through the pipe 2 leading down through the interior of the boiler and into the coils 18 and thus the feed water is heated. By thus heating the feed water, a further economy of heat is obtained.

I have shown the feed water and the exhaust pipes of equal height with the fire box, but it is obvious that they may, where desired, be extended upwardly around the boiler in the space between it and the casing 19.

The boiler is surrounded with a casing of

iron or other suitable material 19, made separable so that by removing the upper part it will be possible to get at the flues and steam chest.

It will be readily seen that no part of my apparatus containing the steam is directly exposed to the cooling effect of the outside air; and that the intervening air space between the feed-water chamber and the fire-box prevents the loss of heat therefrom by conduction or convection, while the heat that radiates from the fire-box is employed to assist in heating the feed water.

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

1. In the herein-described apparatus, the combination, to wit, the boiler 1, the steam chest or chamber 3 located in the boiler, the steam cylinder 4 within said steam chest, the air jacket 19 inclosing the boiler, the fire-box, a feed-water chamber surrounding the fire-box, an air chamber intermediate the fire-box and the feed-water chamber, the heating pipe or coil 18 in the feed-water chamber, and the pipe 22 extending from the exhaust port of steam cylinder 4 through the interior of the boiler and connected with the coil 18, substantially as shown and described.

2. The herein-described apparatus comprising, to wit, the tubular boiler 1, the steam chest or chamber 3 located in the boiler, the steam cylinder 4 within said steam chest, the steam superheater 14 arranged in the path of the flues of the boiler, the air jacket 19 inclosing all of the foregoing parts, the fire-box, a feed-water chamber surrounding the fire-box, an air chamber intermediate the fire-box and the feed-water chamber, the heating pipe or coil 18 in the feed-water chamber, and the pipe 22 extending from the exhaust port of steam cylinder 4 through the interior of the boiler and connected with the pipe or coil 18, in combination, substantially as shown and described.

In testimony whereof I have hereunto subscribed my name this 6th day of February, A. D. 1893.

MELVIN L. SEVERY.

Witnesses:
CHAS. A. KELLOGG,
JOSEPHINE D. MCKENZIE.