

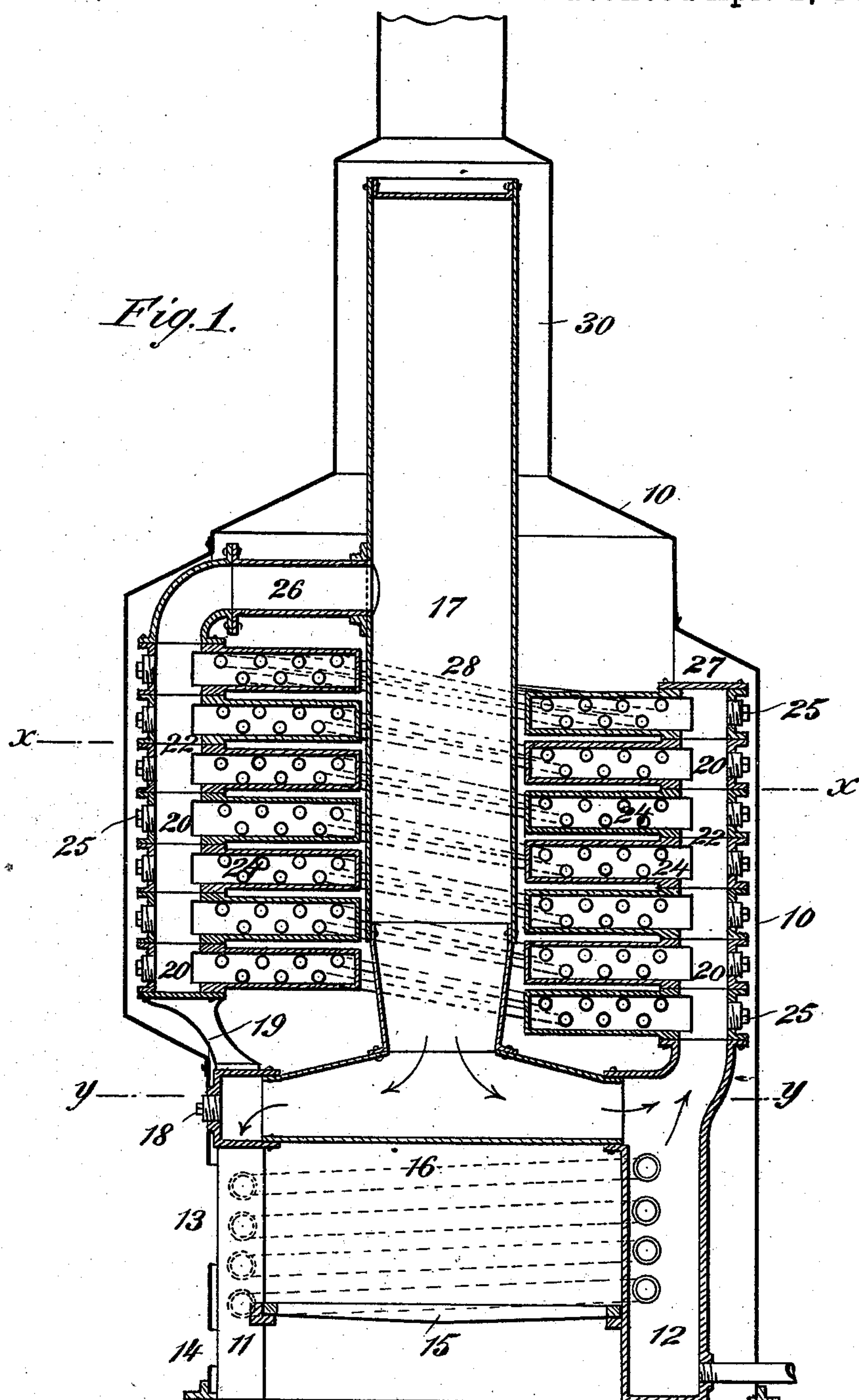
(No Model.)

2 Sheets—Sheet 1.

S. P. HEDGES.
STEAM BOILER.

No. 400,568.

Patented Apr. 2, 1889.



WITNESSES:

Donn Twitchell
& Sedgwick

INVENTOR:

S. P. Hedges
BY *Munn & Co.*

ATTORNEYS.

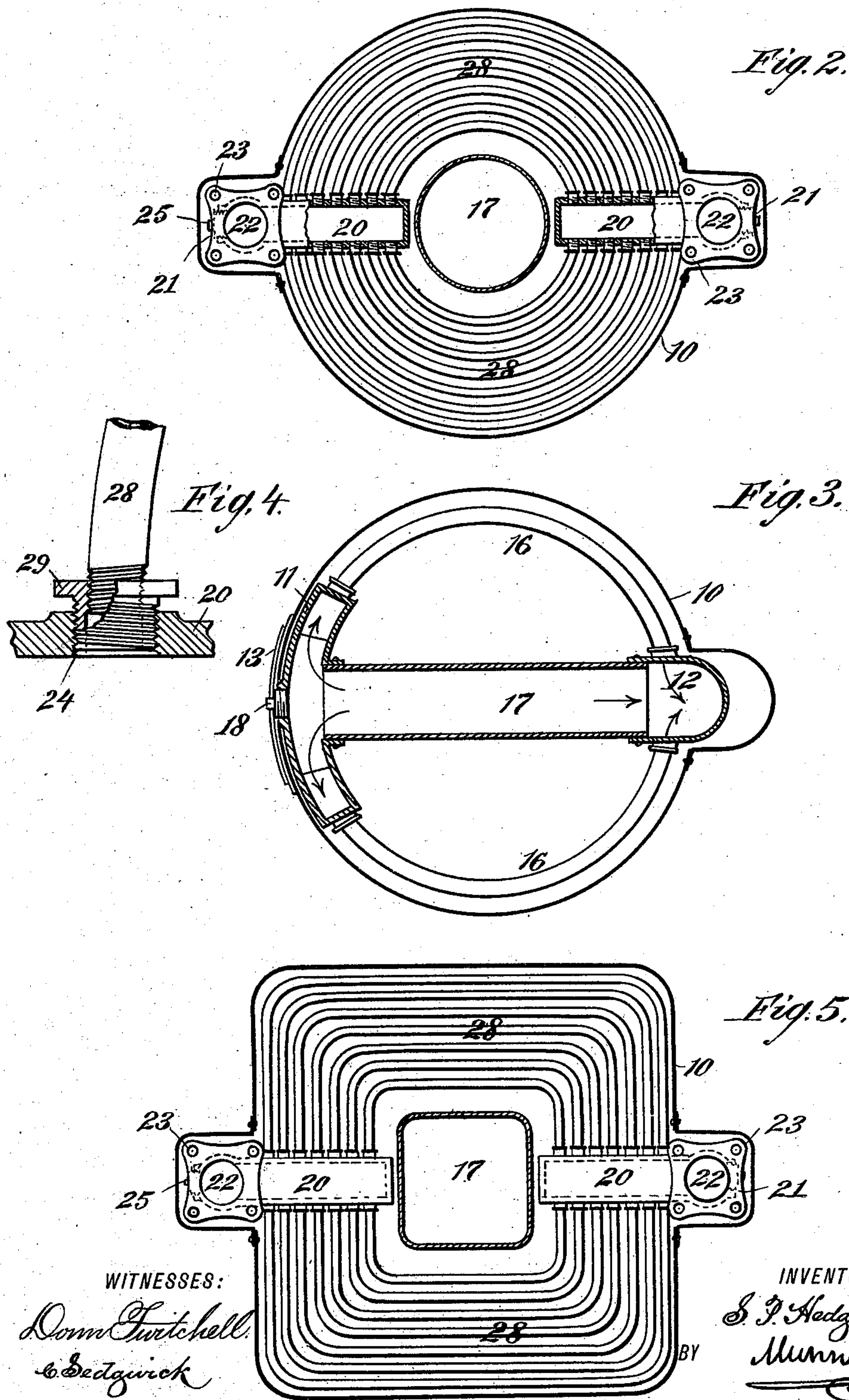
(No Model.)

2 Sheets—Sheet 2.

S. P. HEDGES.
STEAM BOILER.

No. 400,568.

Patented Apr. 2, 1889.



WITNESSES:
Norm Twitchell
E. Sedgwick

INVENTOR:
S. P. Hedges
Munn & Co
BY
ATTORNEYS.

UNITED STATES PATENT OFFICE.

SAMUEL P. HEDGES, OF GREENPORT, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 400,568, dated April 2, 1889.

Application filed November 24, 1888. Serial No. 291,763. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. HEDGES, of Greenport, in the county of Suffolk and State of New York, have invented a new and useful Improvement in Steam-Boilers, of which the following is a full, clear, and exact description.

My invention relates to an improvement in steam-boilers, and has for its object to provide a means whereby a perfect circulation will be obtained, and wherein a single tube or a section of tubes may, if damaged, be expeditiously and readily removed and replaced, and wherein, also, the tubes may be conveniently cleaned.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a central vertical section through the boiler. Fig. 2 is a horizontal section on line *x x* of Fig. 1. Fig. 3 is similar section on line *y y* of Fig. 1. Fig. 4 is a detail view illustrating the attachment of the tubes to the headers or manifolds; and Fig. 5 is a horizontal section through a slightly-modified form of boiler, the section being taken upon a line corresponding to *x x* of Fig. 1.

In carrying out the invention I prefer to construct the boiler in cylindrical form, but desire it to be understood that I do not confine myself to this shape.

Within the cylindrical casing 10 at the base two perpendicular water-legs are located, one leg, 11, at the front, which is U-shaped, the bow section being uppermost, and a straight leg 12 at the rear.

The casing 10 is provided with the usual fire-door, 13, an ash-pit door, 14, the said doors being located between the members of the front water-leg.

The grate 15, which may be of any approved construction, is horizontally supported by the front and rear water-legs, and the contour of the fire-pot is defined by a series of circularly-bent tubes, 16, connecting the two water-legs at each side, as best shown in Figs.

1 and 3, which tubes are arranged in parallel series one above the other, and are inclined upward from the front to the rear, as best shown in dotted lines, Fig. 1. The interior of the fire-box or the inner face of the water-legs and tubes is preferably provided with a proper lining to prevent them from burning.

Above the fire-box an inverted-T-shaped stand-pipe, 17, is supported by inserting the ends of the horizontal section into the bow portion of the front water-leg at the center and in the rear water-leg at or near the top of the same, as best shown in Figs. 1 and 3. A water-inlet aperture is produced in the outer face of the front water-leg, preferably in alignment with the axis of the horizontal section of the stand-pipe. The said aperture is illustrated as closed by a plug, 18.

Upon the upper surface of the front water-leg an upwardly and outwardly extending bracket, 19, is attached, upon which a manifold or header, 20, is supported and secured.

The manifolds consist of a box-like forging, the outer end whereof is enlarged, as illustrated at 21 in Fig. 2, and provided with a top and bottom aligning aperture, 22, and top and bottom flanges 23, projecting horizontally outward from each corner.

The body of the manifold or header extends horizontally within the fire-space, and the inner end is made to closely approach the vertical section of the stand-pipe, as best shown in Figs. 1 and 2. The said body portion of the manifold or header is provided at each side with two or more longitudinally-arranged series of threaded apertures, 24, and the said apertures are preferably so grouped that the apertures in one line will alternate with the apertures in the line above. The outer end of the manifold or header is provided with a hand-hole normally closed by a suitable plug, 25. Any desired number of such headers or manifolds are placed one upon the other and secured by passing bolts through the contacting flanges or in any other approved manner whereby a steam-tight joint may be secured. The upper header or manifold is connected with the vertical section of the stand-pipe by a tube, 26, attached to the surface of the manifold surrounding the aperture 22, as best shown in Fig. 1. A similar

series of manifolds or headers are attached to and supported by the rear water-leg, 12, which leg is provided at the top with an opening registering with the lower aperture 22 in the lower manifold, and the upper aperture 22 of the upper manifold in this rear series is sealed by a plate, 27, a plug, or equivalent device.

It will thus be observed that a continuous passage is provided through the combined rear headers or manifolds, permitting a free circulation from the water-legs up to the cap-plate 27, and consequently through the several series of tubes 28 to the forward manifolds, through which a continuous passage is also provided from the lower manifold to the stand-pipe. The rear series of manifolds are opposite the front series, and both series contain an equal number; but the bottom manifold of the front series is located a greater distance above the fire-pot than the corresponding manifold of the rear series, therefore each manifold of the rear series is lower than the corresponding manifold of the front series, as best illustrated in Fig. 1. A series of concentric semicircular tubes, 28, connect the corresponding front and rear manifolds at each side, the ends of the tubes being secured in the corresponding side apertures, 24. This connection is preferably effected by inserting a bushing, 29, having a left-hand exterior thread, into the manifold apertures 24, and providing the extremities of the tubes with a right-hand thread for insertion into the bushing, as best shown in Fig. 4; but other well known or improved means may be employed without departing from the spirit of the invention.

It will be observed that by reason of the arrangement of the front and rear manifolds that the tubes are made to incline upward from the rear to the front, and that should any tube become clogged by removing the plug from the hand-hole of the manifold to which such tube is secured a suitable cleaner may be readily inserted into such tube.

By reason of the manifolds being arranged in independent series, should any particular set or sets become damaged they may be removed and replaced, and the boiler thereby repaired at comparatively little expense. I desire it, however, to be understood that if in practice it is found desirable each series of manifolds may constitute a single casting or forging.

In Fig. 5 I have illustrated a section of a square or rectangular boiler in which the construction is substantially the same as above described, the only difference being the formation of the body-tubes. Instead of being bent to a semicircular form, they are essentially U-shaped, and may consist of a single tube so bent or several sections united by elbows.

In operation the water entering and passing down the front leg, 11, is forced upward by the heat through the fire-box tubes 16 into

the rear leg, 12, and thence up into the rear manifolds, through the tubes 28, into the front manifolds, and with the steam generated passes through the tube 26 into the stand-pipe 17, and the water passing up with the steam drops down into the horizontal section of the stand-pipe, and again makes the circuit of the manifolds, as indicated by the arrows.

The upper tubes, 28, the manifolds, and the stand-pipe are kept constantly heated by the products of combustion passing upward around and in contact with them, which products find an escape through the off-take flue 30.

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

1. In a steam-boiler, the combination, with opposing series of horizontally non-aligning manifolds or headers, of inclined concentric tubes connecting the corresponding manifolds of each series, substantially as shown and described.

2. In a steam-boiler, the combination, with opposing series of horizontally non-aligning manifolds or headers provided with a series of alternating apertures in the sides, of inclined semicircular tubes having their ends inserted in the equivalent apertures of the corresponding manifolds of each series, substantially as shown and described.

3. In a steam-boiler, the combination, with an essential U-shaped water-leg at the front of the fire-box and an essentially perpendicular water-leg at the rear of the said fire-box, of a series of inclined semicircular tubes connecting the members of the front water-leg with the rear leg, substantially as shown and described.

4. In a steam-boiler, the combination, with a front and rear water-leg and inclined semicircular tubes connecting the said legs, of opposing series of horizontally non-aligning manifolds or headers, inclined tubes uniting the corresponding manifolds, and a connection between one series of manifolds and the rear water-leg, substantially as shown and described.

5. In a steam-boiler, the combination, with a front and rear water-leg, an inverted-T-shaped stand-pipe connecting the water-legs at the top, and a series of semicircular inclined tubes uniting the said legs below the stand-pipe, of a series of front and rear horizontally non-aligning manifolds or headers, a series of inclined tubes connecting the corresponding manifolds of each series, and a connection between the rear manifolds and the rear water-leg and between the front manifolds and the stand-pipe, substantially as shown and described.

SAMUEL P. HEDGES.

Witnesses:

J. F. ACKER, Jr.,
C. SEDGWICK.