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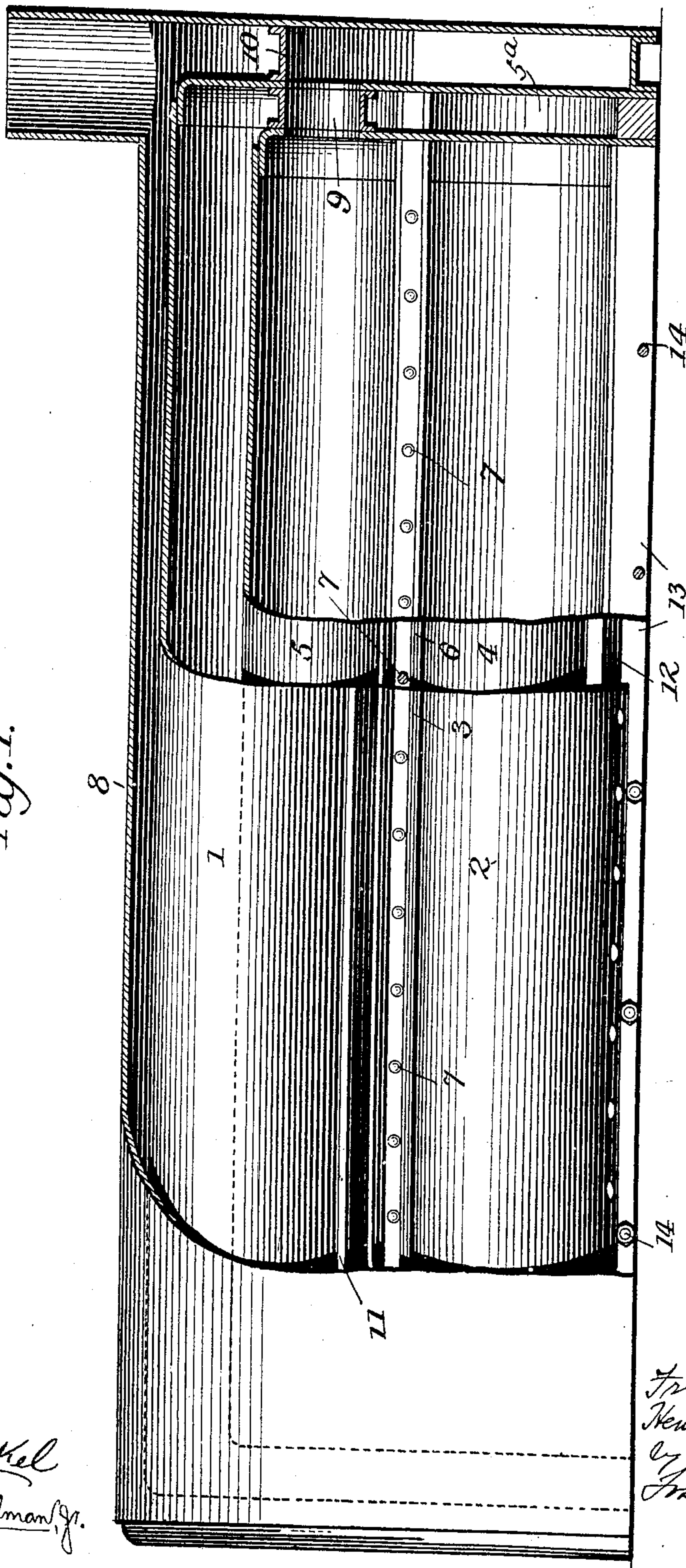
PATENTED JAN. 2, 1906.

F. BURGER & H. M. WILLIAMS.
FIRE BOX.

APPLICATION FILED MAR. 14, 1902.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 2

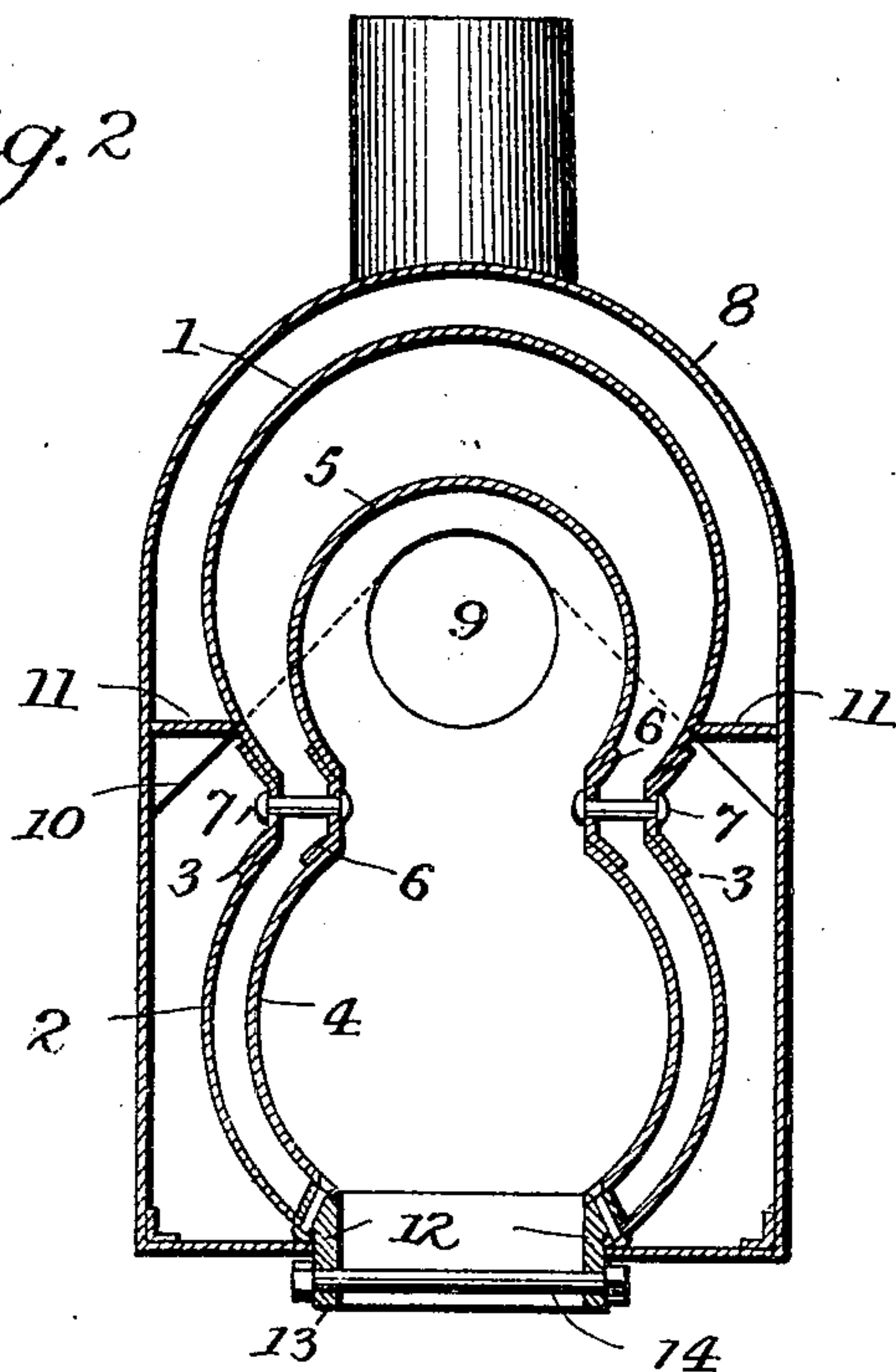
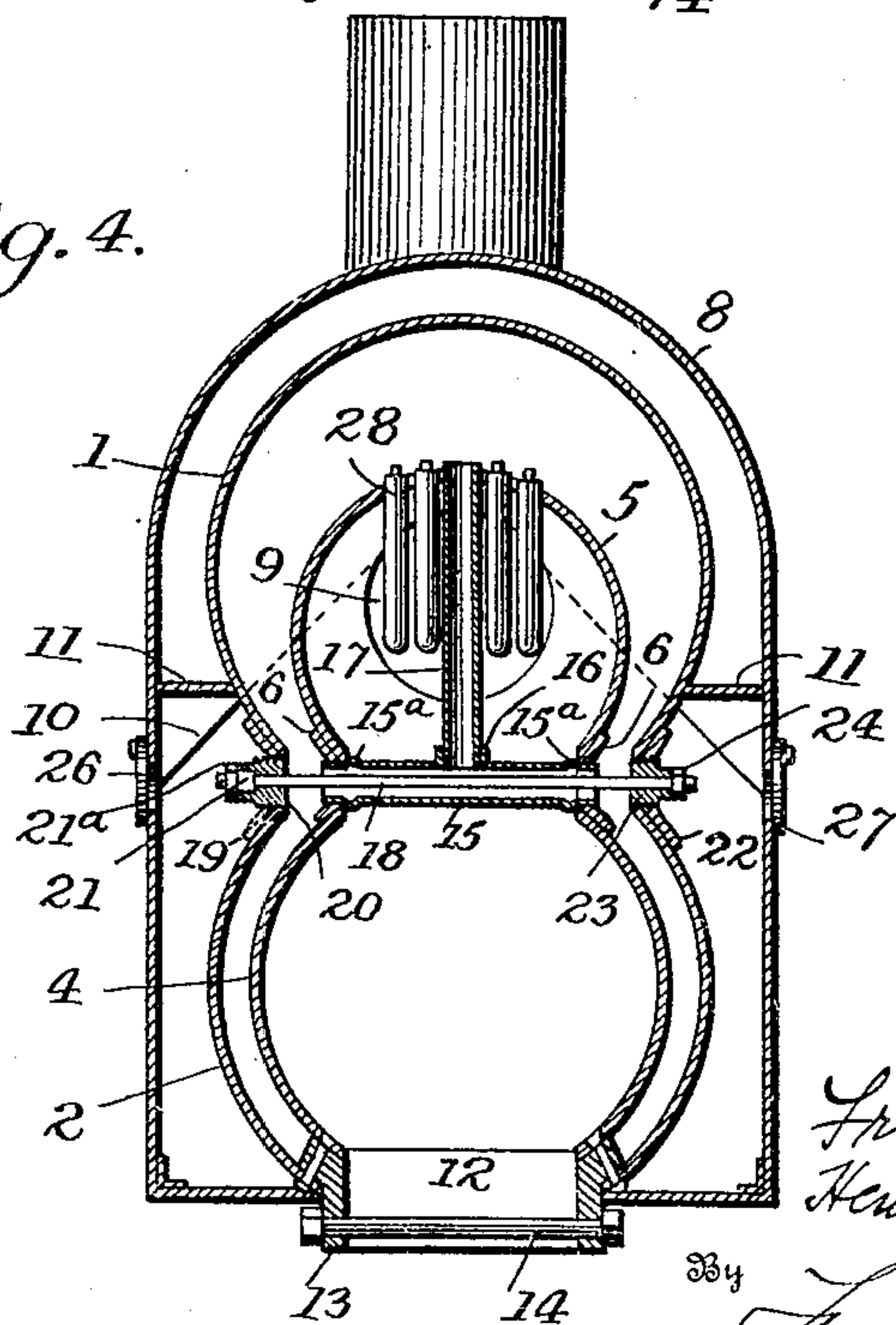


Fig. 4.



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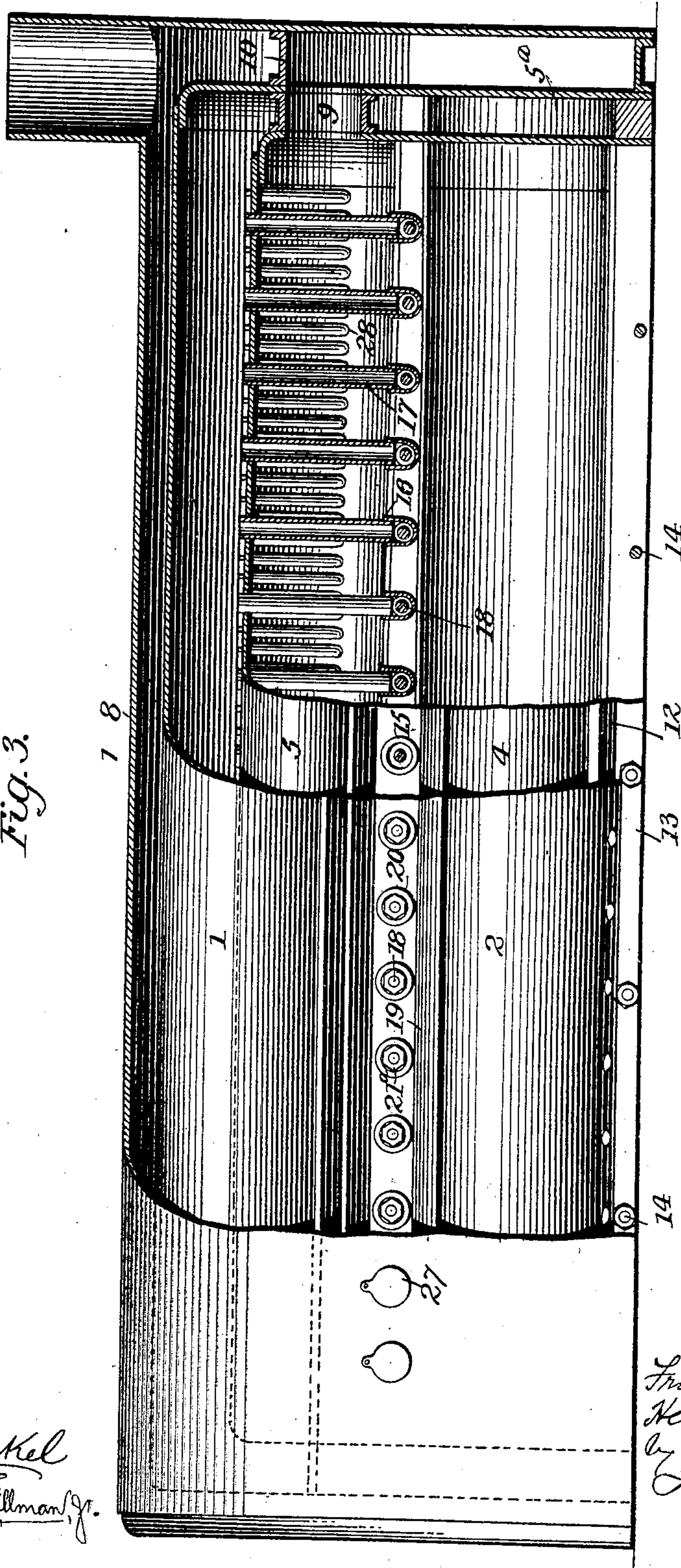
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

FRANZ BURGER AND HENRY M. WILLIAMS, OF FORT WAYNE, INDIANA;
SAID BURGER ASSIGNOR OF ONE-HALF OF HIS RIGHT TO SAID WILLIAMS.

FIRE-BOX.

No. 809,247.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Application filed March 14, 1902. Serial No. 98,221.

To all whom it may concern:

Be it known that we, FRANZ BURGER and HENRY M. WILLIAMS, citizens of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented a certain new and useful Improvement in a Combined Boiler and Fire-Box, of which the following is a specification.

This invention relates to steam-boilers, the object being to improve the general structure with a view to increasing the heating-surface and the steaming capacity of the boiler and to dispensing with the use of many of the stays usually employed in the construction of a boiler, and thereby largely reducing the work and consequently the expense of construction.

A boiler constructed in accordance with this invention has a fire-box extending the whole length of the boiler, minus the water-legs at each end of the same, and the fire-box is formed of two longitudinally-extending shells superposed one on the other, and the water and steam spaces are formed by inclosing these two shells within two similar but larger shells, which are also superposed. These shells are inclosed within a casing with a space between them, and provision is made to cause the hot gases and products of combustion to circulate through this space on their way from the fire-box to the smoke-stack.

The invention will be fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section and partly broken away, of a boiler made in accordance with the present invention. Fig. 2 is a vertical transverse section. Fig. 3 is a view similar to Fig. 1, showing a modification. Fig. 4 is a vertical transverse section of Fig. 3.

The outer shells of the boiler are indicated by 1 and 2, the upper shell 1 being semicylindrical and supported upon the lower shell 2, to which it is connected by channel-irons 3. The inner shells are indicated by 4 and 5, the upper shell 5 being semicylindrical and supported upon the shell 4, to which it is connected by the channel-irons 6, and the inner and outer shells are tied together by stay-bolts 7, passing through the channel-irons 3 and 6. The space between the inner and outer shells forms the steam and water space

of the boiler and the space inclosed by the inner shells forms the fire-box. The inner shells are somewhat shorter than the outer shells, and water-legs 5^a are formed at each end of the boiler.

The whole boiler is inclosed by a jacket to leave a space between the jacket and the outer shells of the boiler, and through this space the hot gases from the furnace circulate on their way to the smoke-stack. An opening 9 is formed in the rear end of the fire-box, and a partition 10 extends across the space at the rear end of the boiler between the boiler-shell and the jacket, said partition extending from side to side of the casing and serving to deflect the hot gases from the furnace downwardly as they pass through the opening 9. Two horizontal partitions 11 are also provided, one on each side of the boiler and extending longitudinally thereof and across the space between the side of the casing and the outer shell of the boiler. These partitions terminate a short distance from the front end of the casing, and it will be seen that by this arrangement the hot gases will be deflected downwardly by the partition 10 and caused to travel through the spaces at the sides of the boiler below the partition 11 to the front of the casing, when they will pass up the front space between the boiler and the casing and thence along the side spaces above the partitions 11 to the smoke-stack. The course of travel of the hot gases is indicated by the arrows in Fig. 1.

The lower inside and outside shells of the boiler are partly cut away at the bottom to afford room for the fire-grates. In order to unite the inner and outer shells at this point, the usual mud-ring 12 is employed, such ring having a downward extension 13, into which are fitted stay-bolts 14, which give stiffness to the lower part of the boiler.

The leading principle involved in this invention is to have a very large fire-box to create a large direct-heating surface, and by using a forced draft below the grate and a very weak induced draft by the smoke-stack the fire-box will become filled with a large body of hot gases and flame which, because a very light draft is used, will remain for a considerable time in contact with the metal, and the water will be enabled to absorb more of the heat.

In some cases it may be desirable to in-

crease the direct-heating surface of the fire-box, and in such case we may provide a series of water-tubes to be exposed to heat in the fire-box—such, for example, as is illustrated in Figs. 3 and 4.

At the juncture of the two inside shells and in the channel-irons 6 are expanded a series of horizontal tubes 15, and there may be as many as desired of these tubes at intervals throughout the length of the boiler. Preferably these tubes are expanded or bulged out to form collars 15^a on the inside of the fire-box, against which collars the channel-irons 6 will press and prevent a collapse of the two shells at their junction. Each tube 15 is also provided, substantially midway its length, with an extension or T 16, into which is screwed or expanded a vertical tube 17, the upper end of which is expanded into the crown-sheet of the fire-box and communicates with the water-space of the boiler. This insures proper circulation through the tubes 15 and 17.

When the tubes 15 are employed, the stay-bolts 7 or some of them may be omitted and stay-rods 18 be employed in lieu thereof. In such case the channel-iron 19 will be provided with a screw-plug 20, provided with a central hole through which the rod 18 passes. The hole in the screw-plug is countersunk to receive a collar 21 on the rod 18, and the latter is threaded at its end outside the collar to receive a nut 21^a, adapted to screw up against the plug 20 to make a tight joint therewith.

The opposite channel-iron 22 is also provided with a screw-plug 23, which is provided with a threaded opening to receive the threaded end of the rod 18. To assemble the parts, the rod 18 is pushed through the plug 20 and the tube 15 and screwed into the plug 23 until the collar 21 seats in the recess in the plug 20. The nuts 21^a and 24 are then screwed onto the ends of the rod 18, thereby making a steam-tight joint.

As it is necessary to have access to the tubes 15 and rods 18 for the purpose of repair and cleaning, openings 26 are made in the jacket 8 opposite the tubes, which openings are provided with movable covers 27.

In addition to the tubes 15 and 17 a series of Field tubes 28, may also be secured in the upper inner shell and project into the fire-box, as shown in Fig. 3.

Without limiting ourselves to the precise details of construction illustrated and described, we claim—

1. A boiler consisting of two pairs of super-

posed shells, one pair inclosing the other with a space between them to form the water and steam space of the boiler, and the inner pair forming the fire-box, combined with a casing inclosing said shells with a space between them with which the fire-box is in communication, and a partition dividing said space into upper and lower chambers, substantially as set forth.

2. A boiler consisting of two pairs of superposed shells, one pair inclosing the other with a space between them to form the water and steam space of the boiler, and the inner pair forming the fire-box extending from end to end of the boiler, horizontal water-tubes extending across the fire-box and communicating with the interior of the boiler at each side thereof, and vertical tubes leading from the horizontal tubes through the crown-sheet of the fire-box, substantially as set forth.

3. In a boiler, the combination with two pairs of superposed shells, one pair inclosing the other with a space between them, channel-irons secured to the shells of the respective pairs at their junctions, horizontal tubes secured in the channel-irons of the inner shells and forming stays therefor, and rods extending through said tubes and secured at their ends in the channel-bars of the outer shells, substantially as set forth.

4. In a boiler, the combination with superposed shells and channel-irons secured together at their junctions, of screw-plugs secured in said channel-irons at opposing points, and a rod passing loosely through one plug and having a threaded connection with the other, and nuts on the ends of the rod engaging the plugs substantially as set forth.

5. In a boiler, the combination with superposed shells and channel-irons secured together at their junctions, of screw-plugs secured in said channel-irons at opposing points, and a rod passing loosely through one plug and having a threaded connection with the other, nuts on the ends of the rod engaging the plugs, a casing inclosing said shells and having openings to afford access to said nuts and rods, and covers for said openings, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANZ BURGER.
HENRY M. WILLIAMS.

Witnesses:

GEO. K. TORRENCE,
C. B. WATERS.