

No. 661,530.

Patented Nov. 13, 1900.

A. G. HOHENSTEIN.

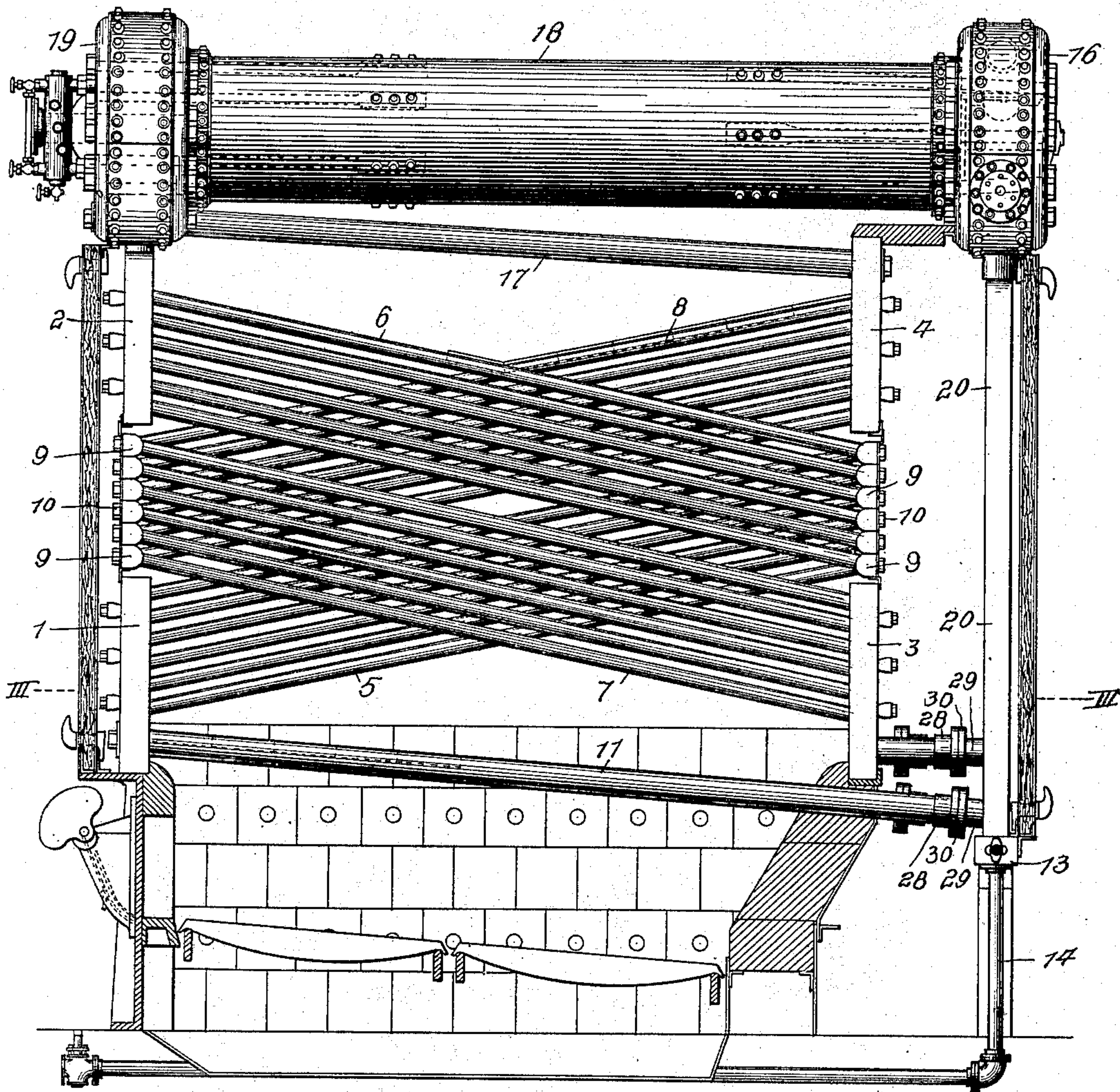
STEAM BOILER.

(Application filed Feb. 16, 1900.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1.



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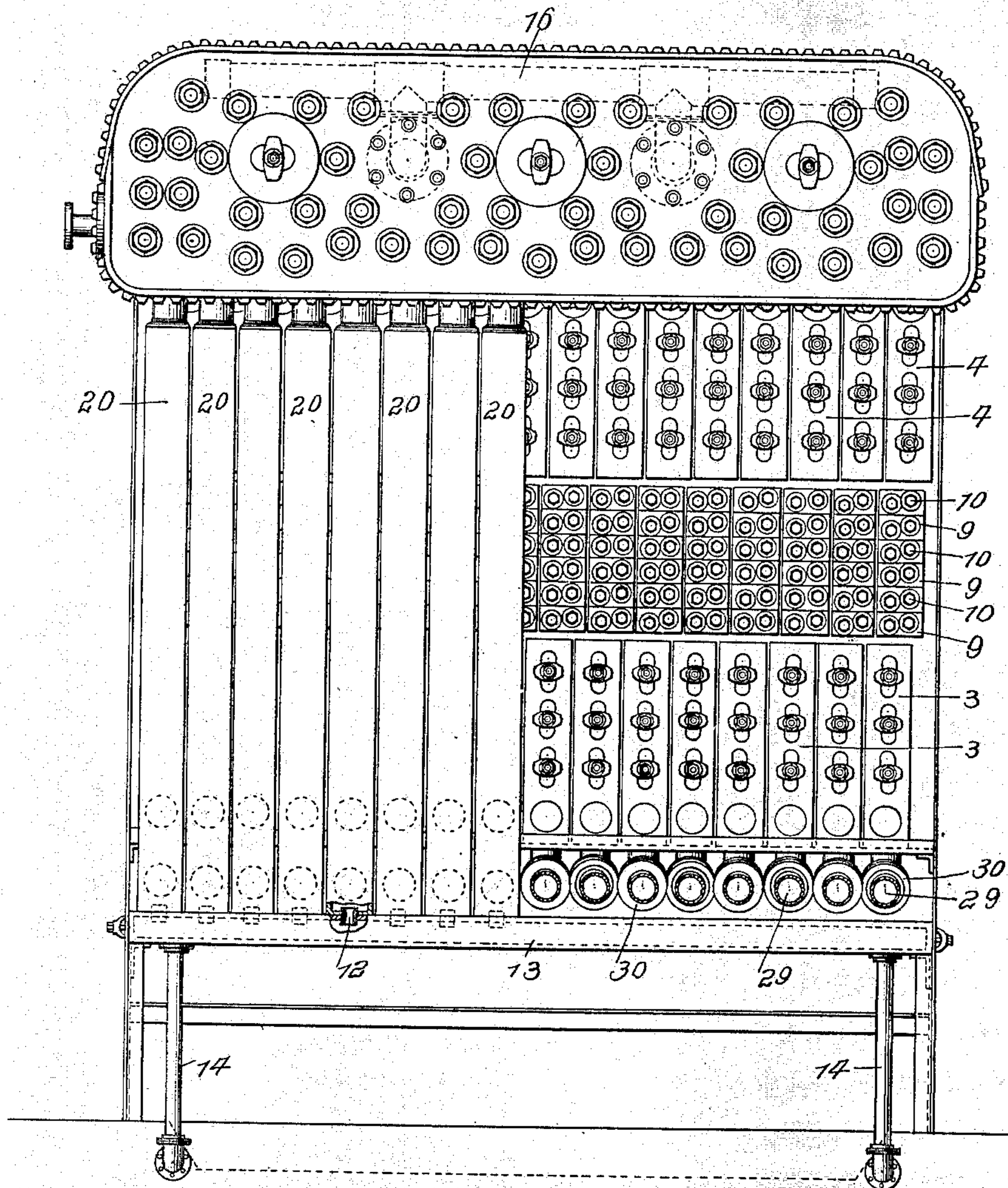
STEAM BOILER.

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3 Sheets—Sheet 2.

FIG. 2.



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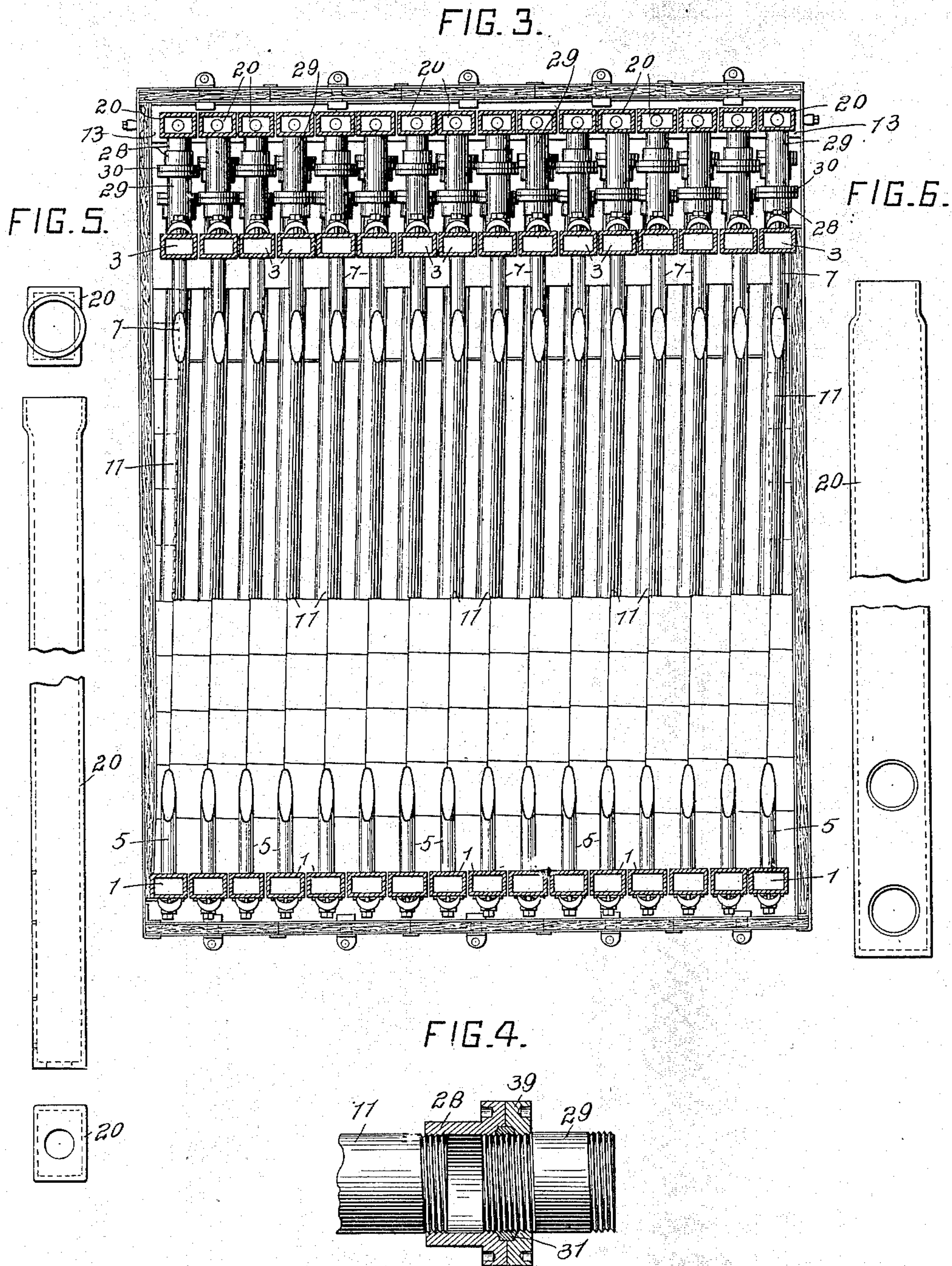
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

ARCHIE G. HOHENSTEIN, OF NEW HAVEN, CONNECTICUT.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 661,530, dated November 13, 1900.

Application filed February 16, 1900. Serial No. 5,438. (No model.)

To all whom it may concern:

Be it known that I, ARCHIE G. HOHENSTEIN, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented or discovered certain new and useful Improvements in Steam-Boilers, of which improvements the following is a specification.

In applications filed, respectively, December 12, 1898, and February 16, 1900, and numbered serially 698,966 and 5,437 (1900) I have described and shown certain improvements in water-tube boilers, said improvements having for their object a construction and arrangement of the parts or elements of this class or kind of boiler whereby a full unrestricted circulation in two independent, but parallel, paths or systems of paths is effected.

The object of the invention described herein is to provide for such an arrangement of elements substantially similar to those set forth in the applications, whereby this class or kind of boiler is the better adapted for steam vessels where the boiler-space is limited.

In the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of my improved boiler. Fig. 2 is a rear elevation of the same, a portion of the downtakes being removed. Fig. 3 is a sectional plan view, the plane of section being indicated by the line III III, Fig. 1. Fig. 4 is a detail view showing a form of separable connection between the downtakes and other parts of the boiler. Figs. 5 and 6 are detail views of the downtake-pipes.

As described in the applications referred to, my improved boiler consists of a series of lower front headers 1, each header being connected by two banks of tubes to a header of a like series of upper front headers 2, and a series of lower back headers 3, similarly connected by two banks or sets of the tubes to a series of upper rear headers 4. Each of the banks or sets forming the connection between pairs of front headers 1 and 2 consists of a series of tubes 5, the number of such tubes being dependent upon the height of the boiler, connected at the rear of the boiler to a like number of tubes 6, forming the upper banks or sets of the connection between the front headers. Each of the banks or sets forming

the connection between pairs of rear headers consists of a series of tubes 7, connected at the front of the boiler to a like number of tubes 8, forming the upper bank or sets of the connection between the rear headers. It will be observed that the upper headers 2 and 4 are arranged directly above the lower headers 1 and 3 and that the tubes forming the several banks or sets extend from their respective headers in converging planes across the boilers to points between the headers on the opposite side, as described in the application referred to. The tubes 5 and 6, forming the banks between the headers 1 and 2, are connected together by boxes or shells 9, constructed as described in application Serial No. 5,437, and the tubes 7 and 8 of the banks connecting the rear headers are similarly connected.

In order to protect the comparatively light tubes forming the banks or sets connecting the headers from direct impact with the hot flame from the fire-box, the series of heavier tubes 11, each having a capacity at least equal to the combined capacities of any set or bank connected to one header extend across the furnace intermediate of the cross-tubes of the banks or sets and the fire-box from the lower front headers 1. At the rear of the furnace each of the series of tubes 11 is connected to the lower end of a downtake-pipe 20, which is also connected to a water-box 13. The water-box is continuous along the back of the furnace and is connected to each of the downtake-pipes 20 by means of thimbles 12, expanded into openings in the upper side of the box and the lower ends of the downtake-pipes. The connection between the tubes 11 and the downtake-pipes is made detachable, so as to permit of the removal of the tubes 11. A desirable form of such connection is shown in Fig. 2. This connection consists of an internally-threaded sleeve 28, screwed onto the end of the tube 11, and a thimble 29, screwing into the opposite end of the sleeve 28 and also into a threaded opening in the lower end of the downtake-pipe. In order to render the joint tight, a threaded collar 30 is screwed down along the thimble against the sleeve 28, so as to compress a packing 31 tightly against the pipe, as shown.

The upper ends of the downtake-pipes are

expanded into openings in the under side of the drum 16, which is connected by a series of tubes 18 to the front drum 19, which is also connected to the upper front headers 2 and to the upper rear headers 4 by a series of tubes 17.

In order to complete the circulating system, the lower rear headers 3 are connected by means substantially similar to the couplings shown in Fig. 4 to the lower ends of the downtake-pipes 20.

In the construction set forth in application Serial No. 5,437 the downtakes at one end of the boiler and two parts or elements of the circulation system at the rear end of the boiler are connected to large drums, which should be of sufficient size—*i. e.*, from eighteen to twenty-four inches in diameter—to permit of a workman entering the drums for the purpose of expanding the tubes, &c., into the openings of the drums and to afford ample steam-breaking space. As the points of connections of the downtakes and the tubes and headers with these drums should be as near as possible to the lowest part of the drums, it follows that portions of the drums will project a considerable distance beyond the front and rear ends of the boilers. While such projection of the drums is not generally objectionable in land-boilers, it is highly objectionable in marine boilers, where the horizontal space for the boilers is limited. In order to avoid the overhang or projection of the drums in marine boilers, the drums are made with flat sides, as shown in Fig. 1; and, further, as space must be allowed between the adjacent bulkhead and the rear end of the boiler to permit access to the rear ends of the tubes this space is utilized for the downtake-pipes, which are placed against the casing or bulkhead, and the rear drum is placed immediately above the downtakes. By such an arrangement ample space is afforded in the rear of the boiler without advancing its front end farther into the fire-room, and any of the cross-tubes can be renewed without disturbing other portions of the boiler.

In order to provide for access to the interior of the rear drum, the tubes 18 are made of sufficient size to permit a man to crawl through them to the rear drum, access to these tubes being had through manholes in the outer wall of the front drum. The drums need not be made of a capacity materially greater than the combined carrying capacities of the head-

ers 2 and the tubes 17, as the tubes 18 will be of sufficient dimensions to afford ample steam-breaking space.

In this construction of boiler the initial point of circulation would be at the lower ends of the downtake-pipes 20 and will proceed in parallel streams, one current through the tubes 11 and the other through the header 3 and banks 7 to the front of the boiler. From the front of the boiler the currents will proceed by the banks 5 and 8 to the rear of the boiler, and thence by the banks 6 and tubes 17 to the front drum 19, in which both currents unite. From the front drum 19 the circulation will proceed through the tubes 18 to the rear drum 16 and from thence down through the downtake-pipes to the starting-point.

I claim herein as my invention—

1. A boiler having in combination front headers, rear headers, tubes extending from the headers across the combustion-chamber, a front drum connected to said headers, a rear drum connected to the front drum and a series of downtake-pipes having independent connections to the rear drum and having independent connections to the front and rear headers, substantially as set forth.

2. A boiler having in combination upper and lower front and rear headers, tubes extending from the headers across the combustion-chamber, a front drum connected to the upper front and rear headers, a rear drum connected to the front drum and a series of downtake-pipes connected to the rear drum and the lower headers, substantially as set forth.

3. A boiler having in combination front headers, rear headers, tubes extending from the headers across the combustion-chamber, a drum connected to the front and rear headers, a rear drum connected to the front drum and a series of downtake-pipes arranged such a distance in the rear of the rear headers as to afford access to said headers and the cross-tubes, and connected to the rear drum and the front and rear headers, substantially as set forth.

In testimony whereof I have hereunto set my hand.

ARCHIE G. HOHENSTEIN.

Witnesses:

DARWIN S. WOLCOTT,
F. E. GAITHER.