

No. 614,679.

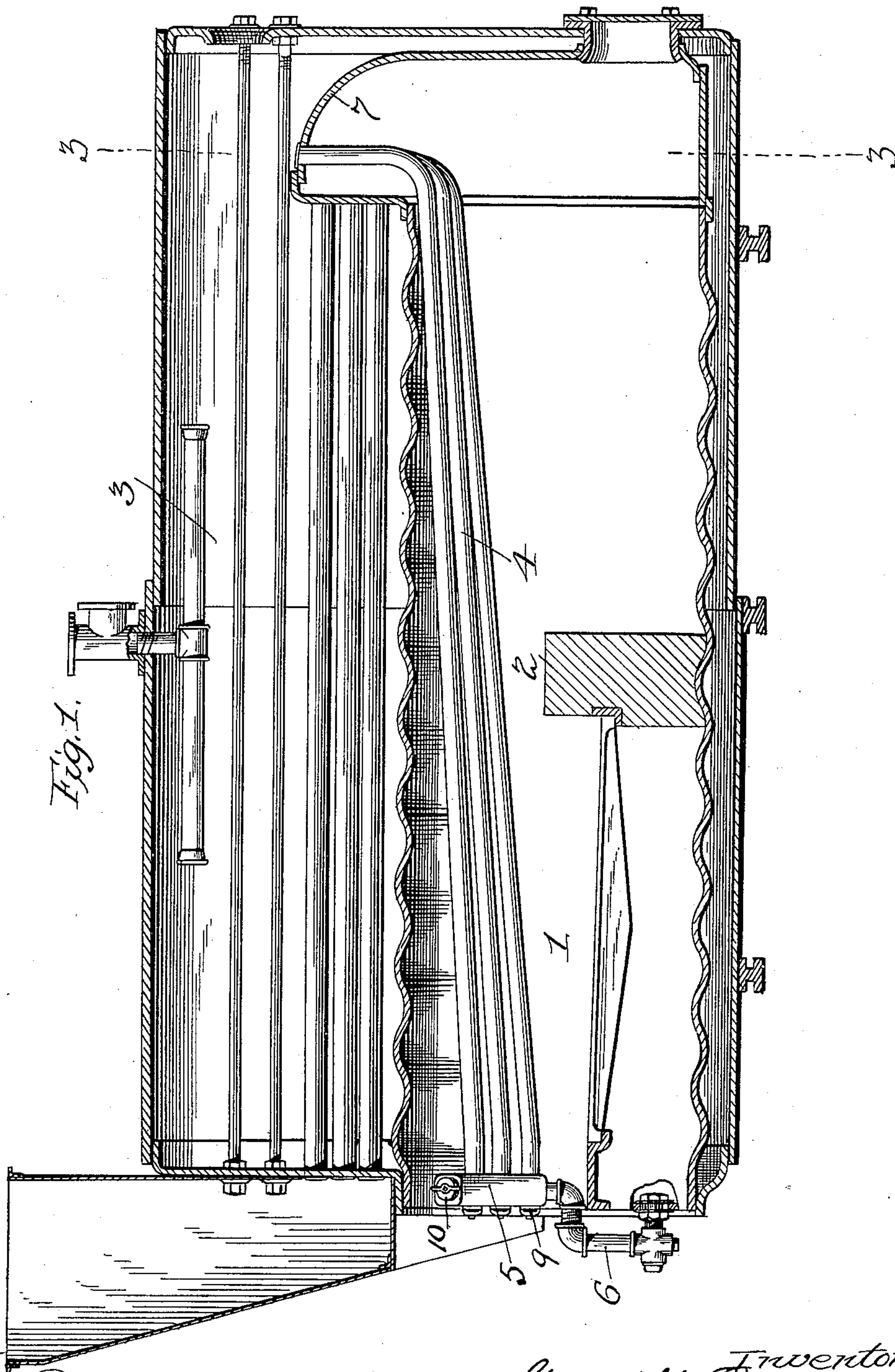
Patented Nov. 22, 1898.

G. H. WATSON.
FURNACE BOILER.

(Application filed Feb. 15, 1898.)

(No Model.)

3 Sheets—Sheet 1.



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Fig. 3.

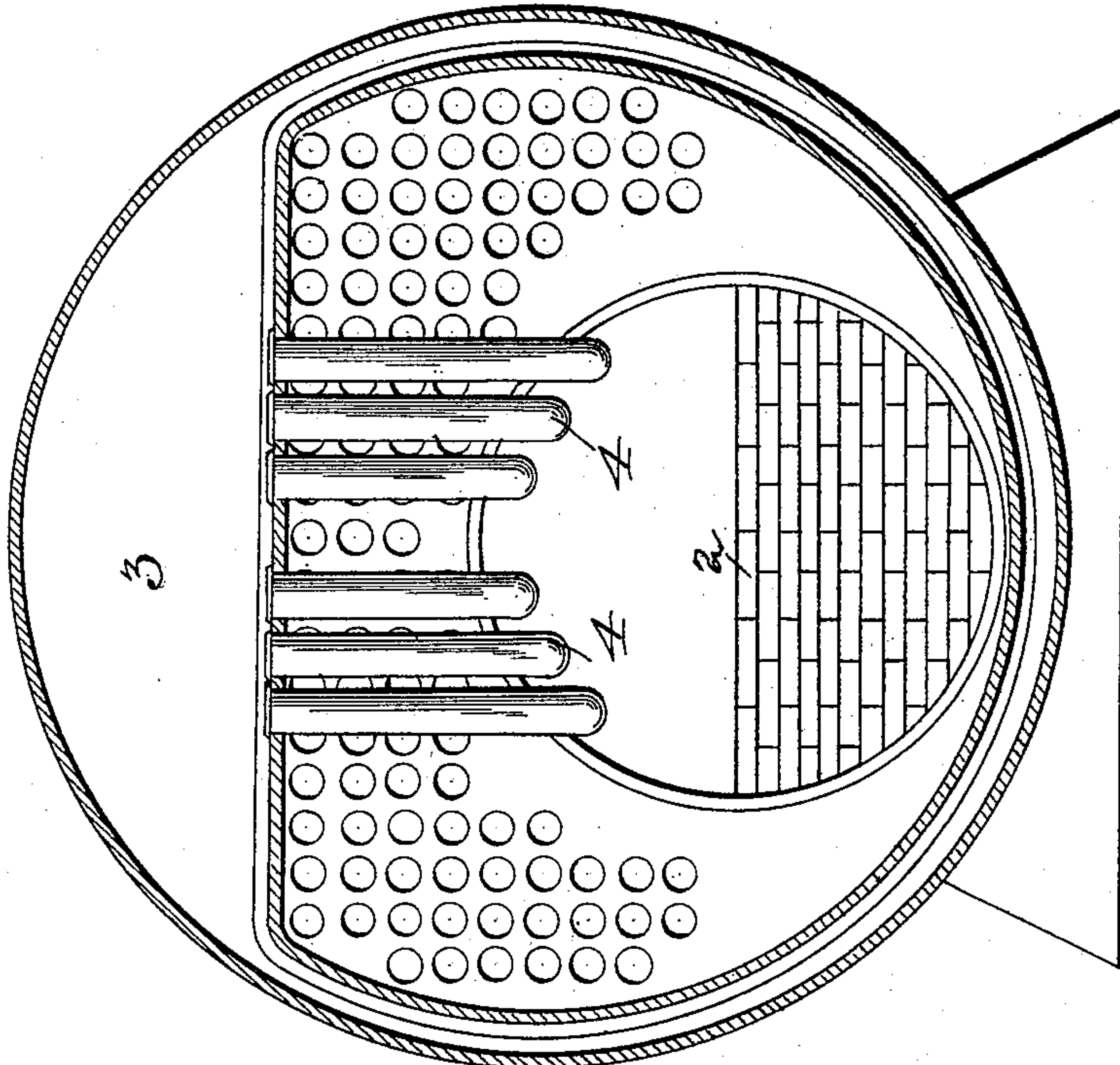
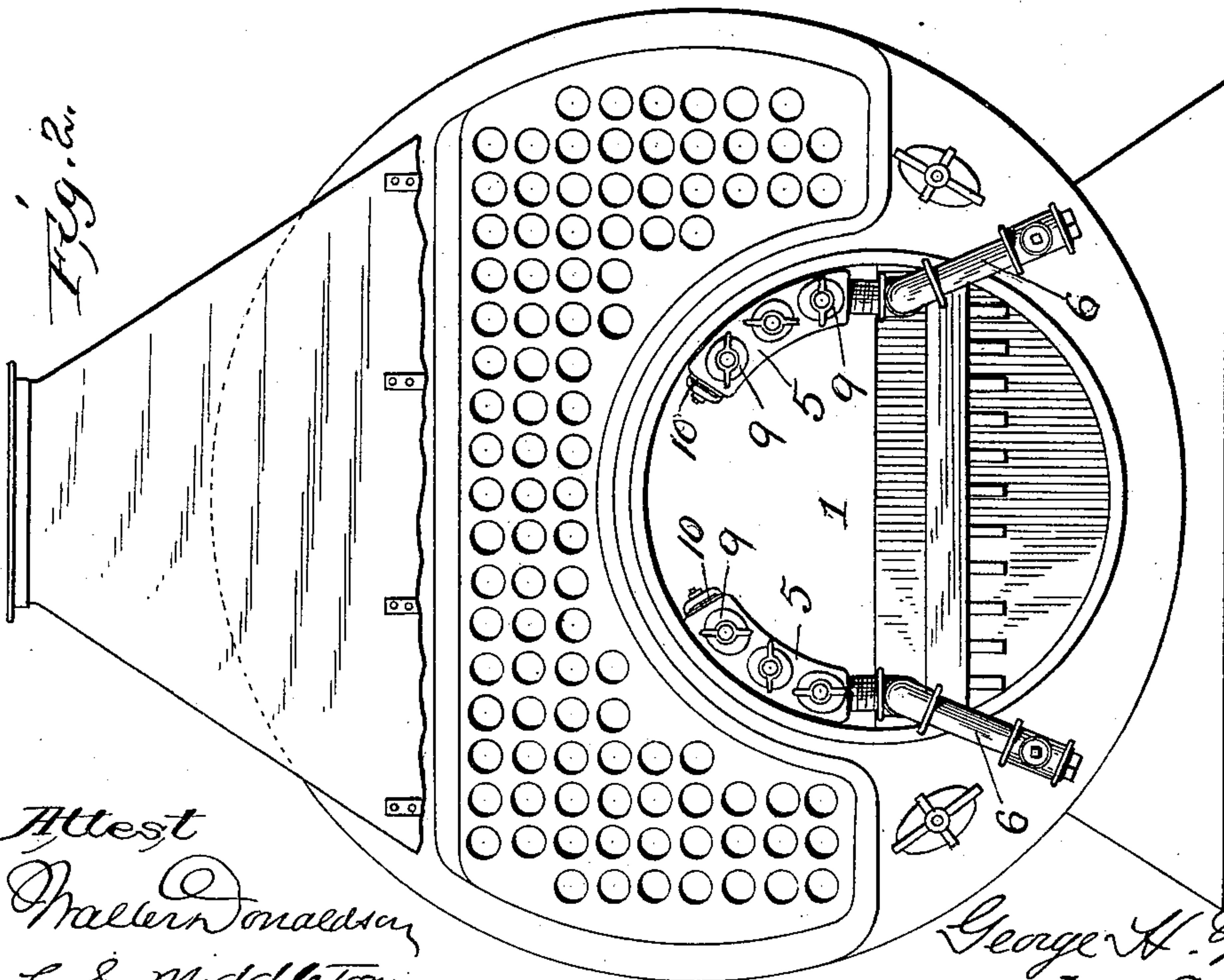


Fig. 2.



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Fig. 5.

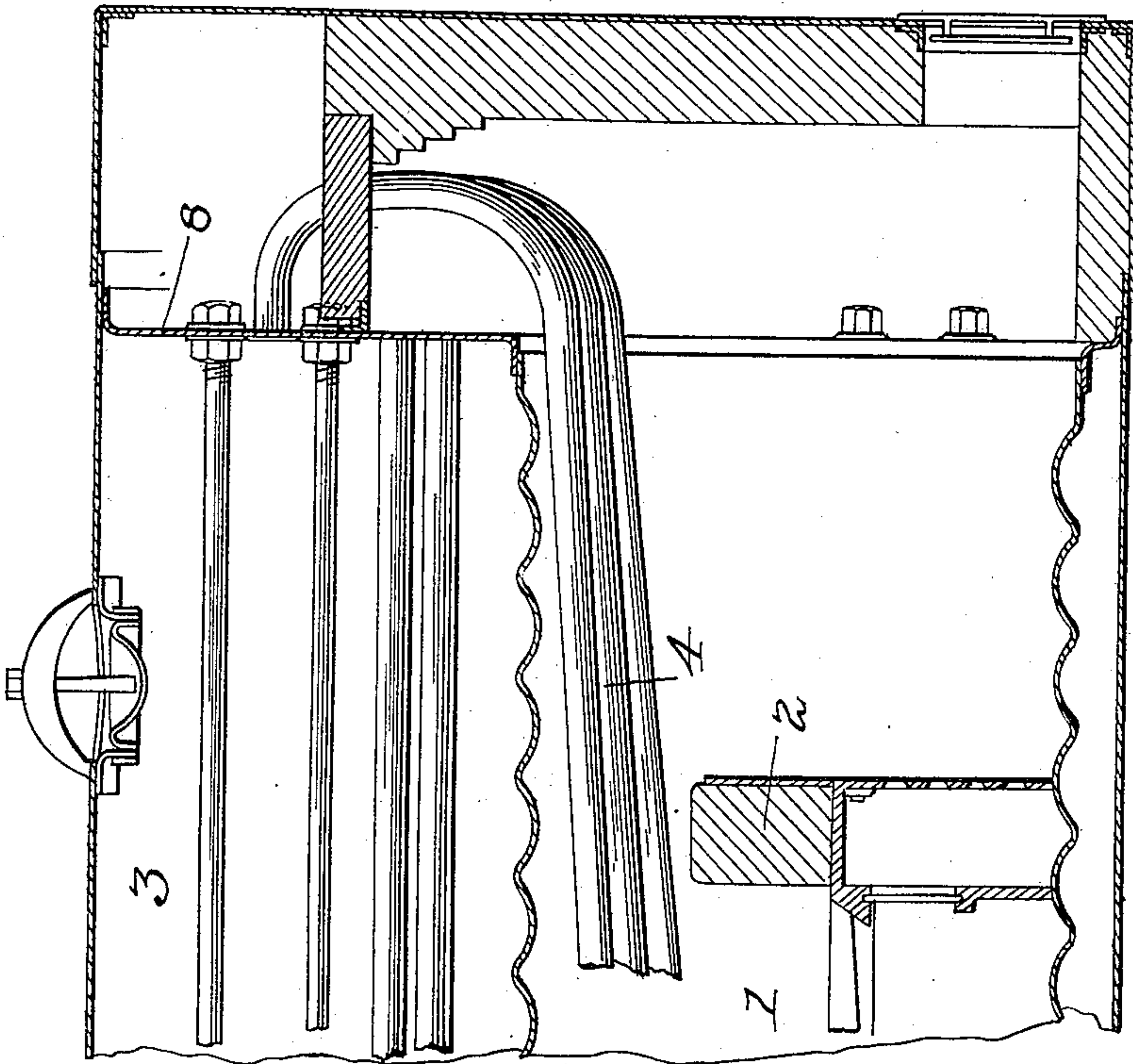
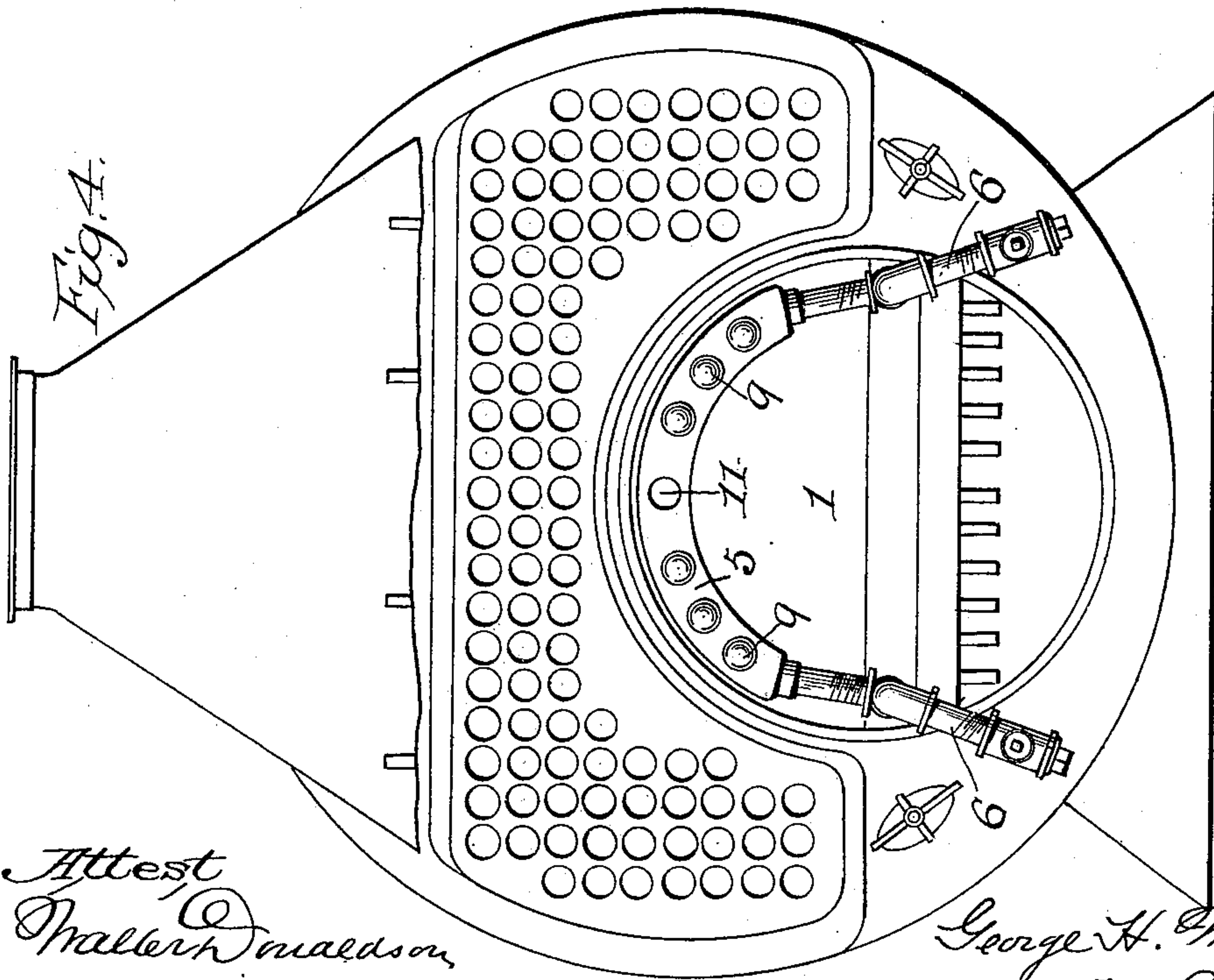


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE H. WATSON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
EDWIN J. NOBLE, OF SAME PLACE.

FURNACE-BOILER.

SPECIFICATION forming part of Letters Patent No. 614,679, dated November 22, 1898.

Application filed February 15, 1898. Serial No. 670,413. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. WATSON, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Furnace-Boilers, of which the following is a specification.

This invention relates to steam-boilers, marine and stationary, of the general character known as "internal-furnace tubular" boilers, sometimes called "Scotch" boilers.

It is a principal object of my invention to provide an internal-furnace tubular boiler with a heating and circulating pipe, one or more, but preferably a plurality, extended continuously and directly through the fire-box or furnace and connected at the fire-front with a header that collects water from the lower part of the water-leg, from which the water is conducted by said heating and circulating pipe or pipes and discharged into either the steam or water space of the boiler proper.

Another object of my invention is to so construct the header or headers that ready and easy access will be afforded to each heating and circulating pipe independently of the others for the purpose of brushing out or cleaning the same from end to end thereof. To this end each heating and circulating pipe has an independent connection with the header, and the latter is provided with series of removable caps opposite the pipe ends, so that access to the interior of each pipe can be readily obtained. Other caps may be provided at the ends of the headers to facilitate their cleansing when necessary.

Among the advantages of my improvement may be mentioned the greater facilities for inspection, cleansing, and repair of the circulating devices, more rapid and effective circulation, a very large economy of fuel, and much better results than usual in the prevention of scale and sedimentary deposits.

Other objects and advantages of the invention will appear from the novel features of construction and combinations of parts in a steam-boiler hereinafter more particularly described and claimed.

In the annexed drawings, illustrating the invention, Figure 1 is a vertical longitudinal

section of an internal-furnace tubular boiler embodying my improved heating and circulating devices. Fig. 2 is a front elevation of the same, partly broken away. Fig. 3 is a vertical transverse section through a rear portion of the boiler on the line 3 3 of Fig. 1. Fig. 4 is a part front elevation of the boiler, showing a single header for all the heating and circulating pipes. Fig. 5 is a part vertical longitudinal section of boiler, showing the rear ends of the heating and circulating pipes as arranged to discharge into the boiler through the rear tube-plate.

As shown in Fig. 1 of the accompanying drawings, the reference-numeral 1 designates the fire-box end of the tubular internal furnace. 2 is the bridge-wall, and 3 the boiler proper.

For the purpose of facilitating a rapid, steady, and uniform circulation I extend through the fire-box or furnace one or more heating and circulating pipes, (designated by the reference-numeral 4,) and at its forward end I connect each pipe independently with a header or headers 5, supported in or upon the fire-front of the boiler. The header or headers 5 must communicate through any suitable pipe connections 6 with a lower front part of the boiler water-leg, so as to take up the cooled water that would otherwise tend to remain under the fire-box without becoming properly heated.

Each heating and circulating pipe 4 is extended continuously through the internal furnace or fire-box 1, as shown, and at its rear end each of these pipes is turned upward and made to discharge into either the steam or water space of the boiler or at or about the water-line, as may be preferred. As shown in Figs. 1 and 3, the upturned rear ends of the heating and circulating pipes 4 may be independently tapped or expanded into openings formed in an arched plate 7, forming part of the rear water-leg. In Fig. 5 I have shown the upturned rear ends of these pipes 4 as being curved forward at their extremities, which are expanded into openings formed in the rear tube-sheet 8 of the boiler. Obviously the connection between the rear upper portion of the boiler and the upturned rear ends

of the heating and circulating pipes 4 may be made in any proper manner that is suited to the peculiarities of the boiler construction and to the object to be attained by use of these heating and circulating pipes. Any number of these pipes 4 may be provided, as preferred.

At their forward ends the heating and circulating pipes 4 are independently expanded into openings formed in the header or headers 5, which may be supported in recessed portions of the fire-front or be suitably attached to either the inner or outer side of said fire-front, as preferred. The front of each header is provided with openings closed by a series of removable caps 9, located directly opposite the ends of the several heating and circulating pipes 4, so that by removing any cap the pipe in line therewith can be easily cleaned or brushed out with a suitable instrument inserted throughout the length of the pipe. The independent connection of the several pipes 4 with their header or headers 5 thus affords a great facility for inspecting and cleaning these pipes, aided by the removable caps 9, that give a ready access to and through the header. As shown in Figs. 1 and 2, each header 5 may be provided also with a removable cap 10, suitably located for convenience in cleaning the header itself. With some boilers it may be preferable to provide two headers 5, as shown in Fig. 2; but if it is desired to raise the heating and circulating pipes 4 away from the grate-bars there may be provided a single elevated header 5, as shown in Fig. 4. If desired, the header may be provided with an opening 11, Fig. 4, for connecting thereto a pipe through which feed-water can be introduced.

When the boiler is in operation, the rapid heating of the water in the pipe or pipes 4 and header or headers 5 will greatly facilitate the circulation throughout the entire steam-generator. The cooler water from below the fire-box will be drawn upward through the pipe connections 6 into the header or headers 5, passing thence to the heating and circulating pipe or pipes 4, and will so be discharged at a greatly-elevated temperature into the steam or water space at the rear upper part of the boiler. Thus the circulation will be made rapid, uniform, and thoroughly effective, the boiler contents will be kept in a state of constant agitation, scale and sedimentary impurities will be thrown down into the space below the furnace, whence they can be readily removed, steam will be generated rapidly and with a large economy of fuel, and the usual tendency to accumulations of scale and sediment will be greatly lessened, while the heating and circulating attachments are so constructed and arranged with relation to the various boiler parts that no difficulty will be

experienced in any necessary cleaning and repairs.

Those parts of the internal-furnace boiler not herein specifically described may be constructed in any usual, convenient, or well-known manner that may be suited to attachment of my improved heating and circulating devices.

What I claim as my invention is—

1. The improved heating and circulating attachment for steam boilers or generators, consisting of a header located at the fire-front in communication with forward lower portions of the water-leg, and a heating and circulating pipe, one or more, extended directly and continuously through the furnace, being in communication with said header at the front and having an upturned rear end discharging into a rear upper portion of the boiler and a removable cap on the header opposite the end of the pipe, substantially as and for the purposes described.

2. The combination with a steam-boiler, of a header located at the fire-front and in communication with forward lower portions of the water-leg, and a plurality of heating and circulating pipes independently connected with said header and extended through the furnace and having upturned independently-discharging rear ends in communication with a rear upper portion of the boiler, substantially as and for the purposes described.

3. The combination with a steam-boiler, of a header located at the fire-front and provided with a series of openings having removable caps, a plurality of heating and circulating pipes independently connected with said header in line with removable caps of the header, the said heating and circulating pipes being extended directly and continuously through the boiler-furnace and having upturned rear ends communicating independently with a rear upper portion of the boiler, substantially as and for the purposes described.

4. The combination with a steam-boiler, of a header located at the fire-front in communication with forward lower portions of the water-leg, means for introducing feed-water into said header, heating and circulating pipes communicating with said header and extended through the boiler-furnace and having upturned rear ends discharging independently into a rear upper portion of the boiler, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE H. WATSON.

Witnesses:

HENRY E. COOPER,
WALTER DONALDSON.