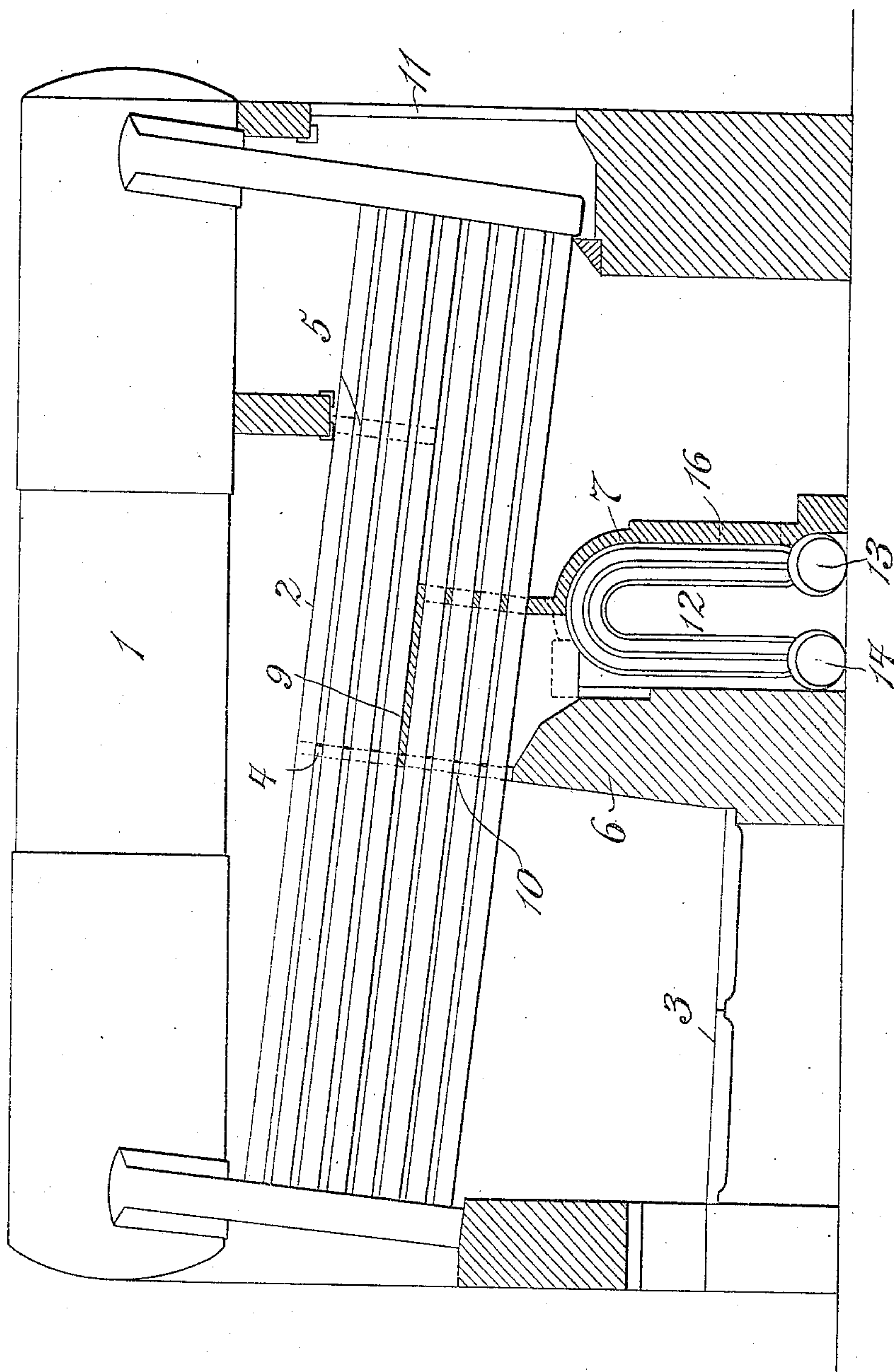


943,606.

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APPLICATION FILED OCT. 26, 1905.

Patented Dec. 14, 1909.  
3 SHEETS—SHEET 1.

Fig. 1.



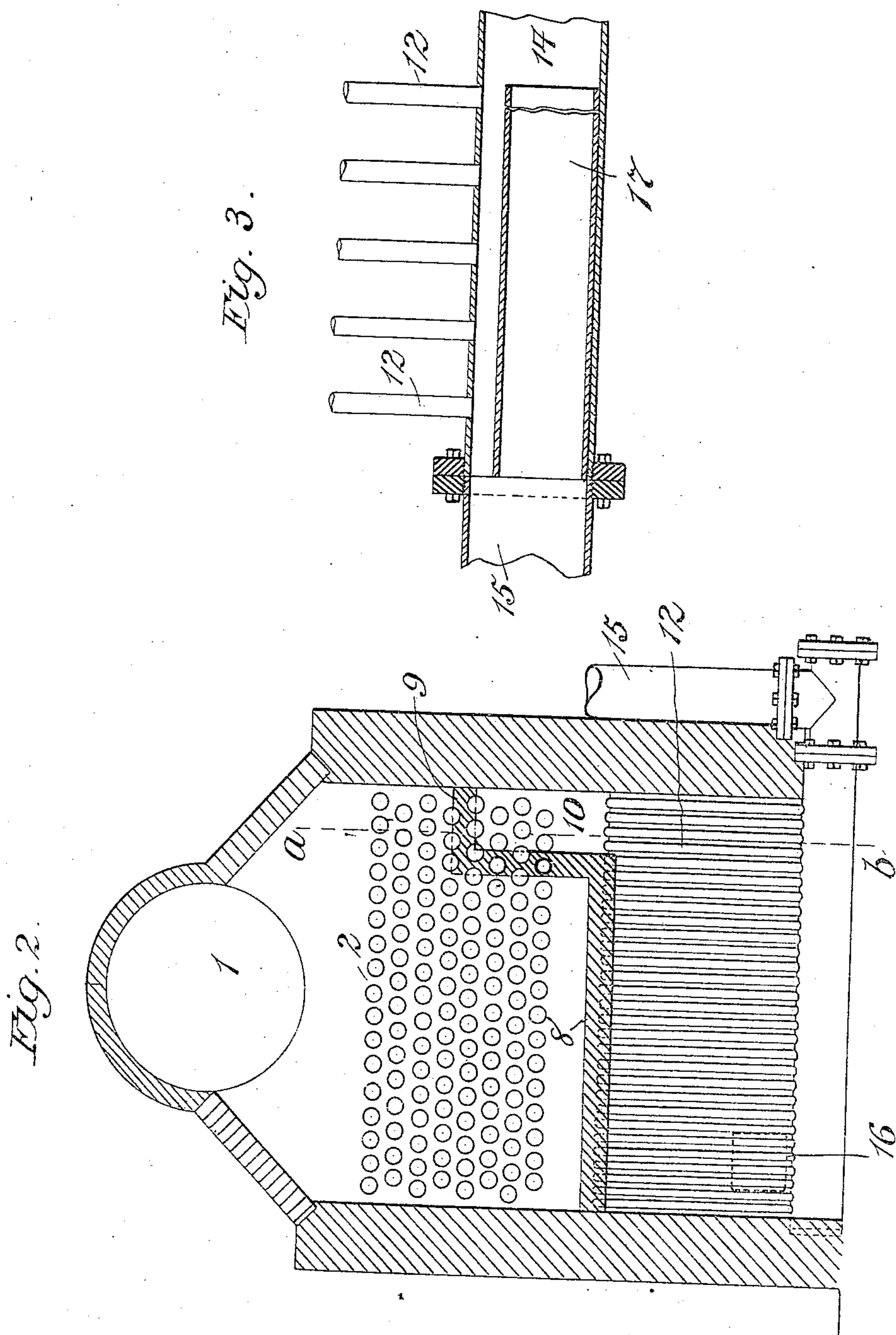
Witnesses  
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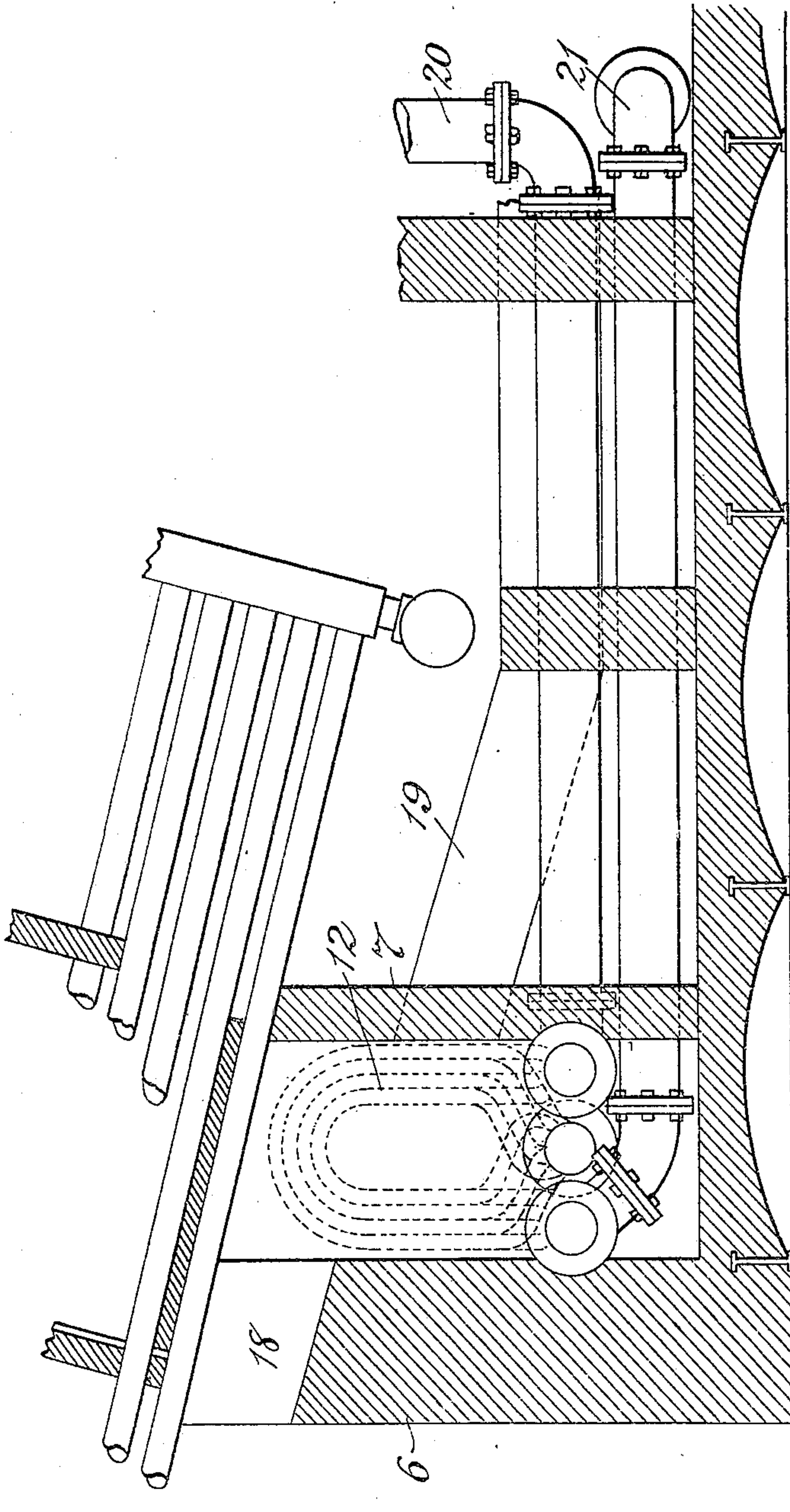
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3 SHEETS—SHEET 3.

Fig. 4.



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# UNITED STATES PATENT OFFICE.

FREDERICK D. POTTER, OF LINDEN, NEW JERSEY.

## SUPERHEATER.

943,606.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed October 26, 1905. Serial No. 284,539.

*To all whom it may concern:*

Be it known that I, FREDERICK D. POTTER, a citizen of the United States, residing in Linden, in county of Union and State of New Jersey, have invented a certain new and useful Improvement in Steam-Superheaters, of which the following is a specification.

This invention has relation to an improved form of superheater to be applied to steam boilers, and the principal object of the invention is to supply an effective superheater construction for utilizing a portion of the hot gases from the furnace with a maximum of economy in such a manner as to preserve the superheater itself from danger of burning.

I have shown two preferred forms of my invention which are illustrated in the accompanying drawings wherein—

Figure 1 is a vertical section of the device on the plane *a—b* in Fig. 2, Fig. 2 is a transverse vertical section of the device shown in Fig. 1, Fig. 3 is a sectional detail of a preferred construction of main feed pipe for the superheater proper and Fig. 4 is a sectional detail of a modified form of combined superheater and boiler.

In the drawings the main boiler drum is shown at 1 and the water tubes at 2. The furnace is shown at 3 and the usual baffle plates for confining the gases to a curved path of travel are shown at 4 and 5.

In the modification of my device shown in Figs. 1 and 2, the superheater is situated below the water tubes and at the rear of the back wall 6 of the furnace. The space for accommodation of the superheater is bounded at the rear by appropriate fire resisting wall 7 and at the top by a roof 8 which is carried up at one side to a point considerably above the top of the superheater as shown at 9 in Figs. 1 and 2. The carrying up of the top of the superheater space as shown at 9 forms an inlet opening 10 whose width from right to left in Fig. 2 will be varied according to the proportion of the gases it is intended to apply to superheating purposes.

The main body of the gases passes first over the water tubes directly over the furnace and then over the baffle plate 4 and under the baffle plate 5, making its exit at 11 in Fig. 1. A certain portion of the gases however will pass through an inlet opening 10 and down through the space between the

walls 6 and 7 so as to come in contact with the superheater pipes 12 which preferably extend in an arch from one of the main pipes 13 to the other main pipe 14.

The live steam from the boiler enters the main feed pipe 15 and is carried to either of the pipes 13 or 14 and thence passes through the superheater pipes and out by the other main pipe 13 or 14, being thoroughly superheated in transit from one of the main pipes to the other. The hot gases which pass over the superheater pipes take their exit through an opening 16 near the bottom of the superheater space and on the opposite end thereof from the inlet opening 10. The gases passing out through the opening 16 rejoin the main body of the gases and pass out at 11 or may be otherwise disposed of.

In order to equalize the distribution of the steam as it enters I prefer to employ the construction indicated in Fig. 3. Here the steam entering through the feed pipe 15 passes partly through an interior transmitting pipe 17 extending part way into the main supply pipe 14 or 13 and of a less diameter than this latter pipe, and partly through the space surrounding said pipe 17. The pipe 17 may occupy any desired transverse position with respect to the pipe 14. The steam which passes through the pipe 17 takes its exit principally through the superheater tubes 12 beyond the inner extremity of said pipe, while the remainder of the steam takes its exit through the superheater tubes forward of the interior extremity of said pipe. By this means the steam to be superheated is more evenly distributed and is prevented from taking its course principally through the superheater pipes which are nearest the entrance to the main pipe 14.

In Fig. 4 I have shown a modification of my device wherein the gases are admitted through an opening 18 near the top of the rear wall 6 in the furnace. The superheater pipes 12 are located between the rear wall 6 and the supplementary wall 7 as hitherto described and the gases after traveling along the length of the superheater space take their exit by means of a flue 19 leading around the boiler to the chimney instead of mixing with the main body of the gases. This disposition of the gases utilized for superheating is an alternative of that shown in connection with Figs. 1 and 2.

In the form shown in Fig. 4 the steam to be superheated is conveyed to, and carried



away from the superheater by means of the steam pipes 20 and 21.

It will be seen from the nature of the construction herein shown and described that 5 by the use thereof the superheater is subjected to the heating gases at the very initial temperature and without any previous cooling, while the degree of heat can nevertheless be controlled in any given apparatus by 10 the size of the entrance and exit openings of the superheater space.

One feature of this invention which insures free circulation of the uncooled gases through the superheater chamber is found 15 in the use of an inclosed chamber for the superheater tubes whose inlet and outlet passages are placed far apart with respect to the total path traversed by the gases between the grate bars and the chimney. It is well 20 known that the difference in pressure which produces circulation of gases through the superheater chamber is greater in proportion as the inlet and outlet passages are respectively near to and removed from the 25 fire grate. Where the superheater is so placed that the gases in order to pass the tubes return to a point close to that from which they depart on their way to the tubes, there will be very little tendency to cause a 30 diversion of the flow of gas from the direct line leading past the boiler tubes to the chimney. In the construction shown, the gases leave the superheater chamber at a point much nearer the chimney than that 35 at which they are diverted to the superheater.

A number of changes can be made in the construction of this device without departing from my invention and I am not to be 40 limited to the details herein shown and described.

What I claim is—

1. A boiler and furnace in combination

with a superheater chamber back of the furnace wall below the boiler, separating means 45 between the furnace and said space extending along the entire length of the furnace wall from side to side under the boiler except for an opening near one side of the furnace, said chamber also having an exit opening 50 near the opposite side and at the back of said chamber, superheater devices within said heater and steam pipes for leading steam to and from said superheater devices, substantially as described. 55

2. In a superheater a group of branch superheater tubes, a common supply pipe with which said tubes communicate at different points along its length, a main steam pipe for leading steam to said common supply pipe and an interior open ended transmitting pipe within said common supply pipe and shorter than the same, communicating with said main steam pipe all arranged so that steam passes from the main 60 steam pipe into said common supply pipe both through and around said interior transmitting pipe, substantially as described. 65

3. A boiler and a furnace under the same in combination with an inclosed superheater 70 chamber, superheater tubes therein connected with the steam space of said boiler, a passage for uncooled gases leading from the fire space below the boiler into the top and at one end of said chamber and a second passage 75 leading from the opposite end of said chamber directly to a point between a part of the boiler and the chimney, whereby the natural draft is made available to carry uncooled gases through the superheater 80 chamber, substantially as described.

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Witnesses:

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