

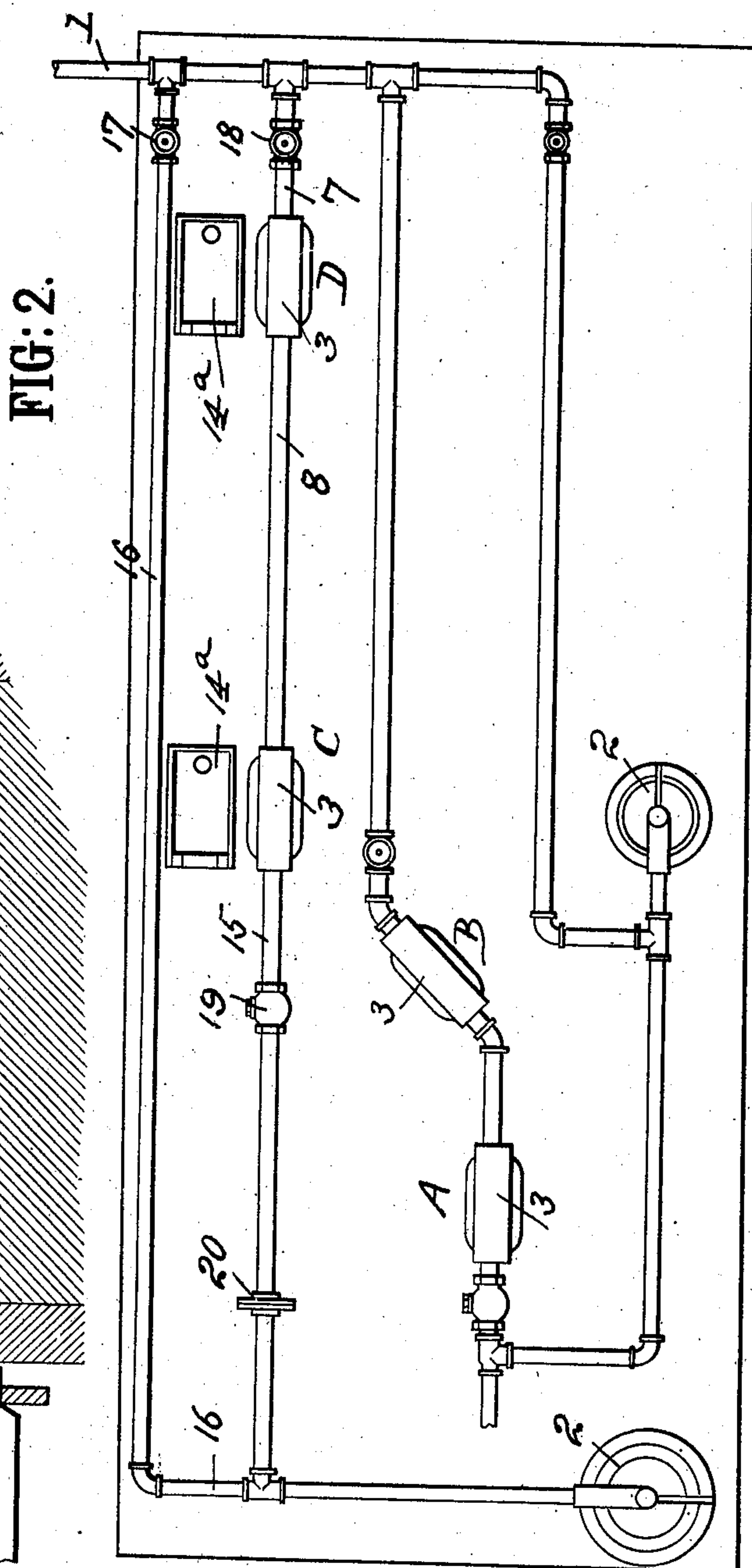
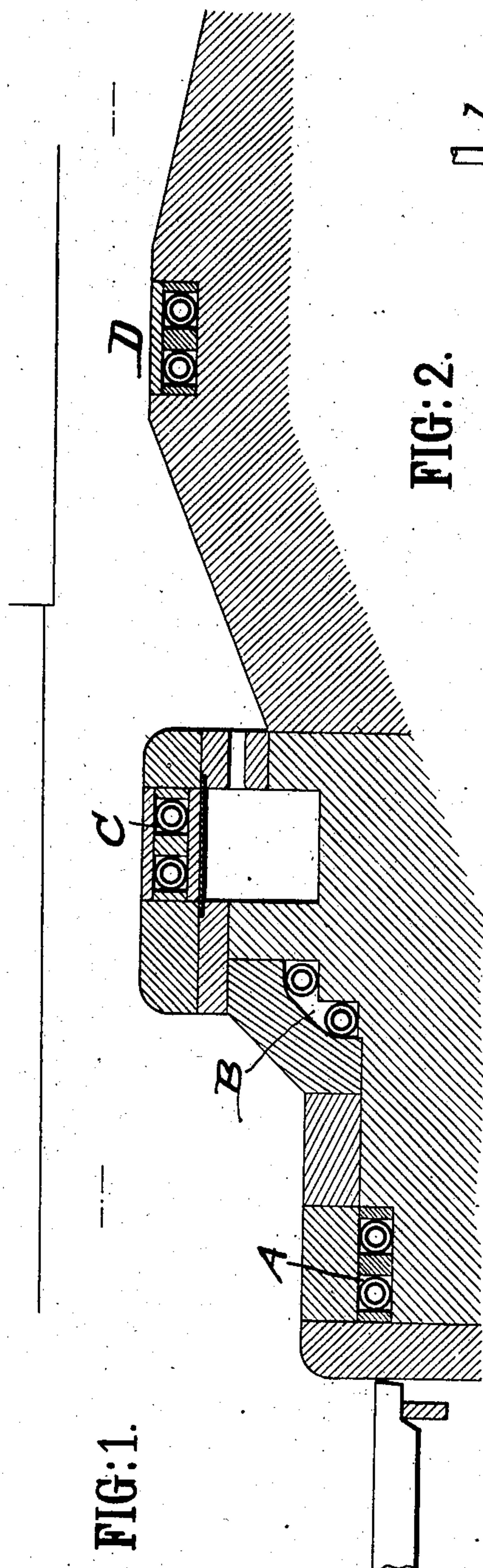
No. 827,145.

PATENTED JULY 31, 1906.

A. COTTON.  
SUPERHEATER.

APPLICATION FILED APR. 27, 1906.

2 SHEETS--SHEET 1.



No. 827,145.

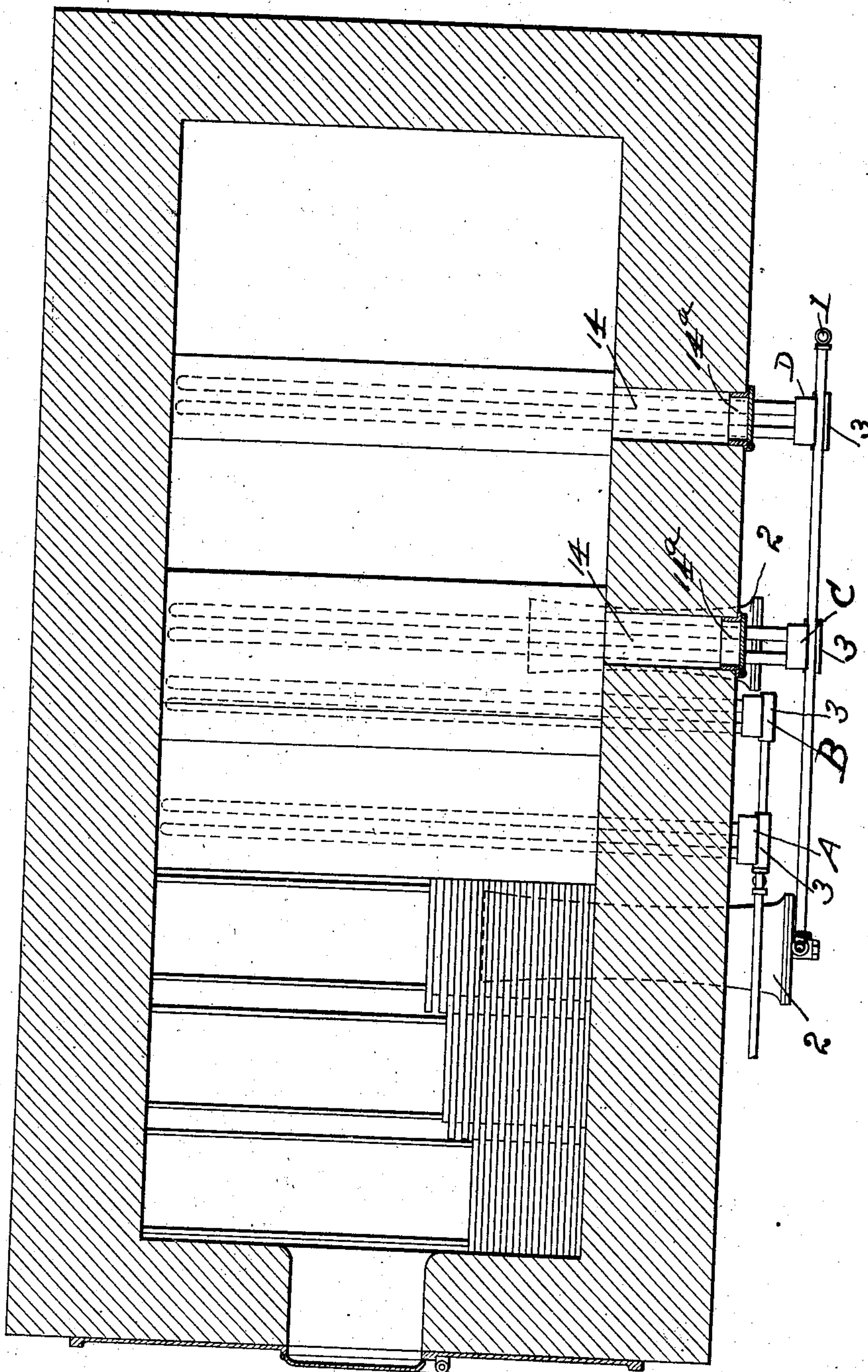
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3 SHEETS—SHEET 2.

FIG. 3.



WITNESSES

*Max B. A. Doring*  
*E. Neumann*

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BY  
*Darius Davis*  
his ATTORNEYS



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3 SHEETS—SHEET 3.

FIG:4.

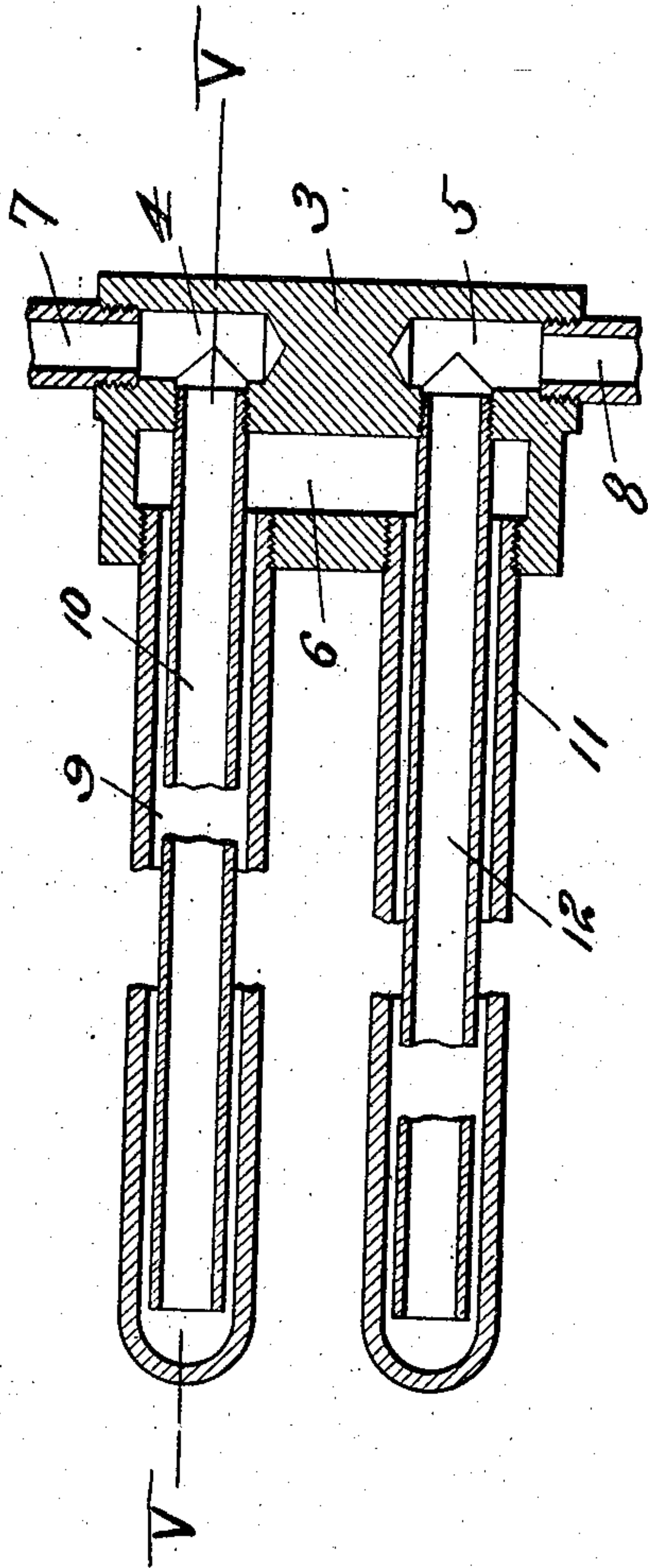


FIG:6.

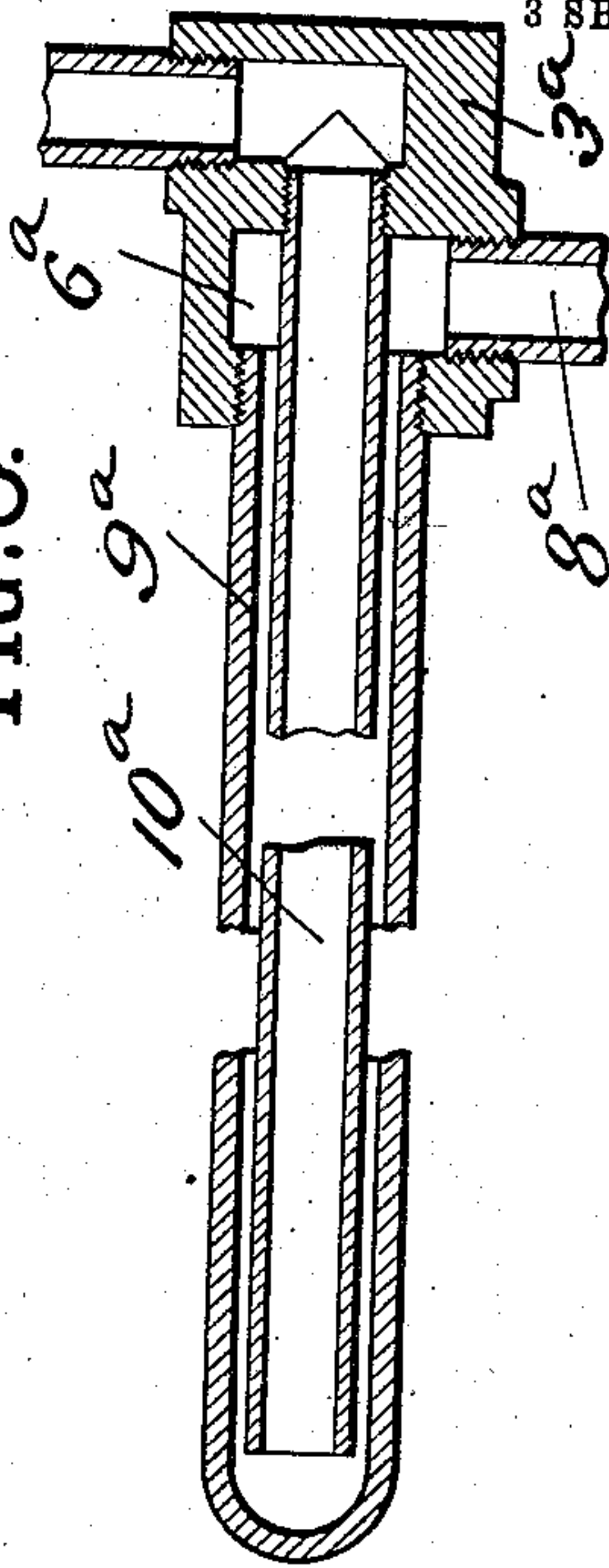
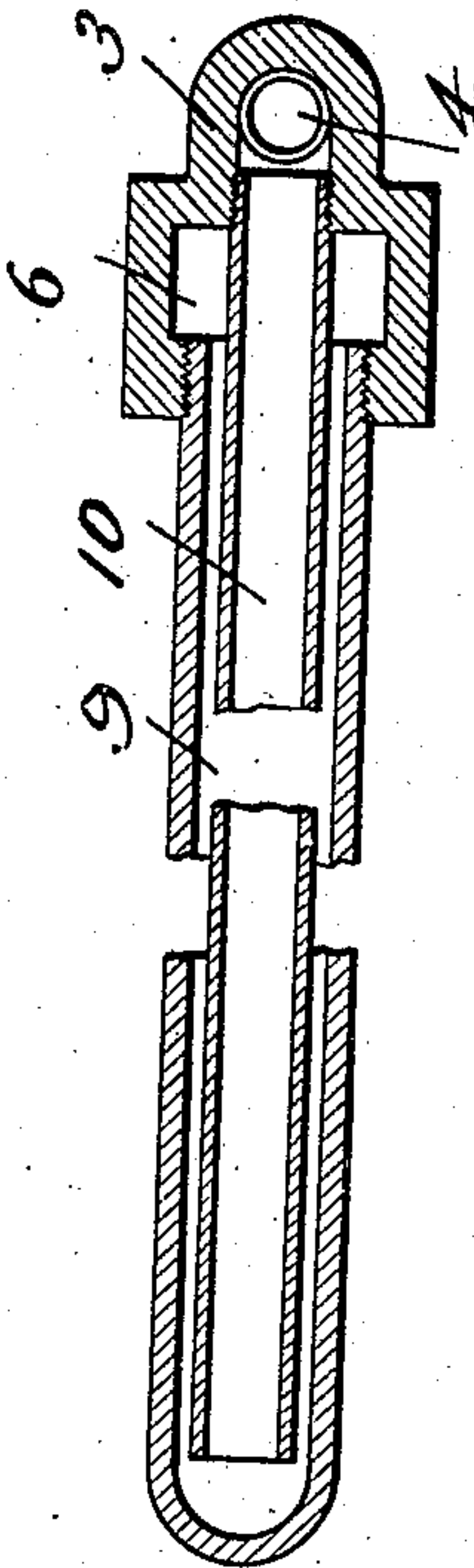


FIG:5.



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# UNITED STATES PATENT OFFICE.

ALFRED COTTON, OF NEWARK, NEW JERSEY.

## SUPERHEATER.

No. 827,145.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed April 27, 1906. Serial No. 313,970.

*To all whom it may concern:*

Be it known that I, ALFRED COTTON, a subject of the King of Great Britain, residing at Newark, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Steam-Superheaters, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a partial longitudinal sectional view of a boiler-furnace with the superheater in place; Fig. 2, a diagrammatic side elevation thereof; Fig. 3, a horizontal sectional view; Fig. 4, a horizontal sectional view of one of the superheaters; Fig. 5, a vertical sectional view thereof on the line V V of Fig. 4, and Fig. 6 a horizontal sectional view of a slightly-different form of the device.

The invention has for one of its many objects the provision of a simple and effective apparatus by which steam may be superheated before it is discharged into a jet-blowing apparatus either for creating a forced draft or an induced draft for a steam-generator.

A further object of the invention is to so construct the apparatus that the superheater proper may be readily removed from the boiler-furnace whenever desired, and, further, that should the superheater become inoperative steam may be supplied directly to the blowers without passing into the superheater.

The invention consists in the novel combination and arrangement of parts hereinafter fully described, and particularly pointed out in the claims appended.

Referring to the various parts by numerals and letters, 1 designates a steam-supply pipe which is connected to a boiler or other source of steam-supply, and 2 designates steam-jet blowers by which the draft is assisted. The superheaters are arranged transversely of the furnace in the bed of the combustion-chamber and are connected to the steam-supply pipe in such a manner that steam will pass through them on its way to the blowers. Each superheater, as shown in Figs. 1, 2, and 3, consists of a connecting-box 3, formed with a small inlet-chamber 4 and outlet-chamber 5 near its ends and with the large circulation-chamber 6 on its inner side. Connected to the chamber 4 is a steam-inlet pipe 7, a steam-outlet pipe 8 being connected to the chamber 5. Connected to one end of the circulation-chamber 6 is a large heater-pipe 9, which ex-

tends transversely of the furnace, preferably the entire width thereof, said pipe being closed at its outer end and opening at its inner end into said chamber 6. Lying within this pipe is a small open-ended circulation-pipe 10, which is substantially the same length as the pipe 9, its inner end communicating with the chamber 4. Connected to the other end of the chamber 6 is a heater-pipe 11, which is of the same form as pipe 9, and within this pipe is arranged a circulation-pipe 12, which is similar to pipe 10, said pipe 12 communicating at its inner end with the chamber 5. The course of the steam through the superheater is as follows: It enters through pipe 7 and passes through pipe 10 into pipe 9, thence to chamber 6, through pipe 11 into pipe 12, and then through chamber 5, out through pipe 8. When the superheaters are arranged in series, the outlet-pipe from one is the inlet-pipe for the next one.

The furnace is preferably formed with shallow transverse compartments 13 in the bed of the combustion-chamber, and in these compartments are placed the pipes 9 and 11 of the superheater, the said pipes being of sufficient length to extend entirely across the bed of the furnace, the boxes 3 being arranged on the outside thereof, as shown clearly in Fig. 2. These compartments are formed close to the surface of the bed of the combustion-chamber in order that the pipes of the superheater may become highly heated and are covered by fire-clay tiles, said tiles forming a part of the bed of the said chamber.

I preferably arrange the superheaters at the highest points in the bed of the combustion-chamber—that is to say, heater C at the top of the bridge-wall, heater D at the crown of the bed of the combustion-chamber; A just below the fire-platform in the rear of the grate-bars. I also preferably arrange the superheater device B in an inclined position at the junction of the fire-platform and the forward side of the bridge-wall. In the side of the furnace-wall just above the superheaters C and D, arranged in the bridge-wall and in the bed of the combustion-chamber, I form cleaning-openings 14 to permit of access to the top of the bridge-wall and to the bed of the combustion-chamber. These openings I preferably close by means of substantial iron doors 14<sup>a</sup>. By means of these openings the dust may be cleared from the top of the bridge-wall and from the bed of the combustion-chamber.



tion-chamber over the superheaters, so that it will not interfere with the proper heating of the steam in said superheaters.

The supply-pipe 1 is connected to the superheater D by pipe 7. Pipe 8 connects the outlet from D to the inlet of C, and pipe 15 connects the outlet from C to the pipe 16, which leads to the jet-blower. In pipe 16 is arranged a valve 17, and in the pipe 7 between the supply-pipe and the superheater D is arranged a valve 18, and in said pipe between the superheater C and the pipe 16 is arranged a non-return check-valve 19, by which the return of the steam to the superheater C is prevented. In pipe 15 between the check-valve 19 and the pipe 16 is arranged a coupling 20. By means of these valves the steam may be passed through the superheaters or around them to the blower. In the normal operation of this part of the apparatus the valve 17 is closed, so that the steam will pass through the superheaters C and D. Should the superheaters become broken or burned out, the valve 18 is closed and the valve 17 opened. This will cut off the steam through the superheaters and cause it to pass through the pipe 16 to the blower, the check-valve 19 preventing the steam passing back to the superheaters. This valve while acting to automatically prevent steam passing back to the superheater will also act automatically to allow steam which may be generated in the superheater to flow to the blower. It will further be noted that should water accumulate in the superheater C when it is cold it will pass off in steam through the check-valve when the fire is again started, and there will be no danger of the superheater being destroyed.

The superheaters A and B are also connected to the supply-pipe and to a blower in a manner similar to the superheater C and D.

In Fig. 6 is shown the box 3<sup>a</sup>, to which is connected one pipe 9<sup>a</sup> and one pipe 10<sup>a</sup>, the outlet-pipe 8<sup>a</sup> being connected to the chamber 6<sup>a</sup>. It is obvious that one or more sets of superheating-pipes may be connected to the box. It is further apparent that the superheating-pipes may be arranged in other positions than those shown and that as many of them as may be desired may be employed.

I locate my superheaters in channels in the bed of the passage carrying the hot furnace-gases. By this means I can obtain a very large heating-surface indeed, as a great number of such superheaters as described can be located in this way, and consequently the degree of superheat can be made as high as desired. The apparatus is durable, for while being well placed for absorbing heat from the gases flowing over it it is well protected from the direct heat of the gases. Further, the protection is increased with time by the deposition of dust above the channels, while doors are provided for the easy removal of this dust

without interrupting the operation of the boiler when the coating of dust becomes thick enough to hinder the transmission of enough heat.

From the foregoing it will be readily seen that I provide a very simple and effective superheater which is not only well adapted for superheating steam, but may be used for heating air or other gases for any purpose.

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

1. The combination of a furnace formed with transverse compartments in the bed of the combustion-chamber, superheater-pipes arranged therein and consisting of an inner and outer pipe, a connecting-box connected to a plurality of said pipes and to the steam-supply whereby steam will pass successively through the superheater-pipes, said furnace being provided with cleaning-openings in one of its side walls just above the superheaters, and doors for closing said cleaning-openings.

2. The combination of a furnace formed with a compartment in the bed of the combustion-chamber, a superheater arranged therein and consisting of a series of heater-pipes and circulation-pipes, a connecting-box connecting said pipes whereby steam will pass successively through the heater-pipes and circulation-pipes, a jet-blowing apparatus, a steam-supply pipe connected to the superheater, means for connecting the superheater to the blowing apparatus, a pipe connecting the supply-pipe to the blowing apparatus independently of the superheater, a valve in said pipe, a valve in the supply-pipe to cut off communication with the superheater, and a check-valve between the superheater and the jet-blower.

3. The combination of a furnace formed with transverse compartments in the bed of the combustion-chamber, a superheater arranged in each of said compartments, said superheater comprising a connecting-box formed with an inlet-chamber and an outlet-chamber and a large circulation-chamber, heater-pipes connected to each end of the circulation-chamber and in communication therewith, said pipes being closed at their free ends, circulation-pipes within the heater-pipes and connected to the inlet and outlet chambers, said circulation-pipes extending near to the closed end of the heater-pipes, the connecting-box being arranged outside of the wall of the furnace, cleaning-openings through the wall above the superheater and doors for closing said cleaning-openings.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 14th day of April, 1906.

ALFRED COTTON.

Witnesses:

WM. R. DAVIS,  
E. I. CAUGHLAN.