J. SCHOETTL.

STERILIZING APPARATUS.

APPLICATION FILED JAN. 16, 1907.

916,611.

Patented Mar. 30, 1909.

4 SHEETS—SHEET 1.

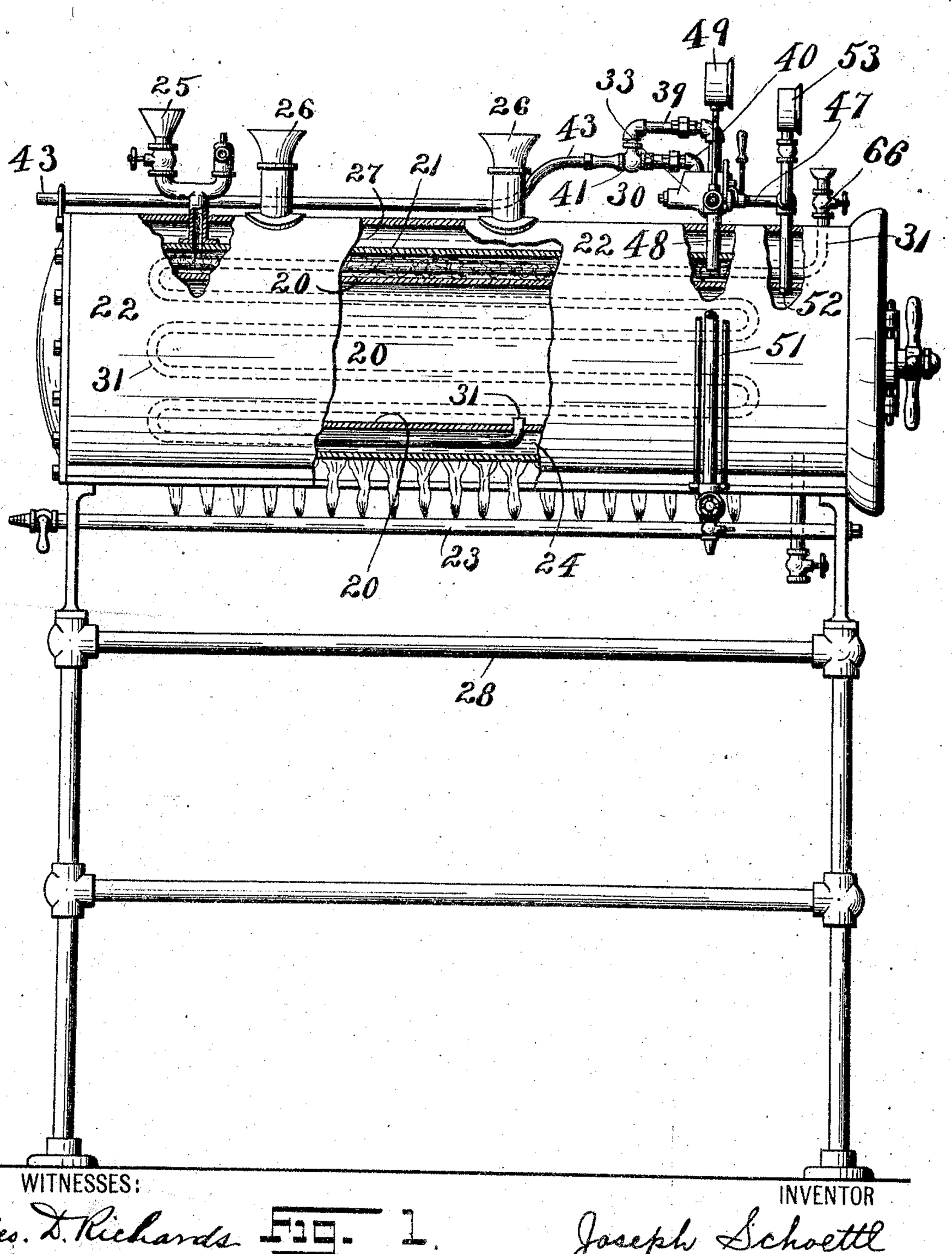

Fig. 1.

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F. H. W. Krantzel

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4 SHEETS—SHEET 2.

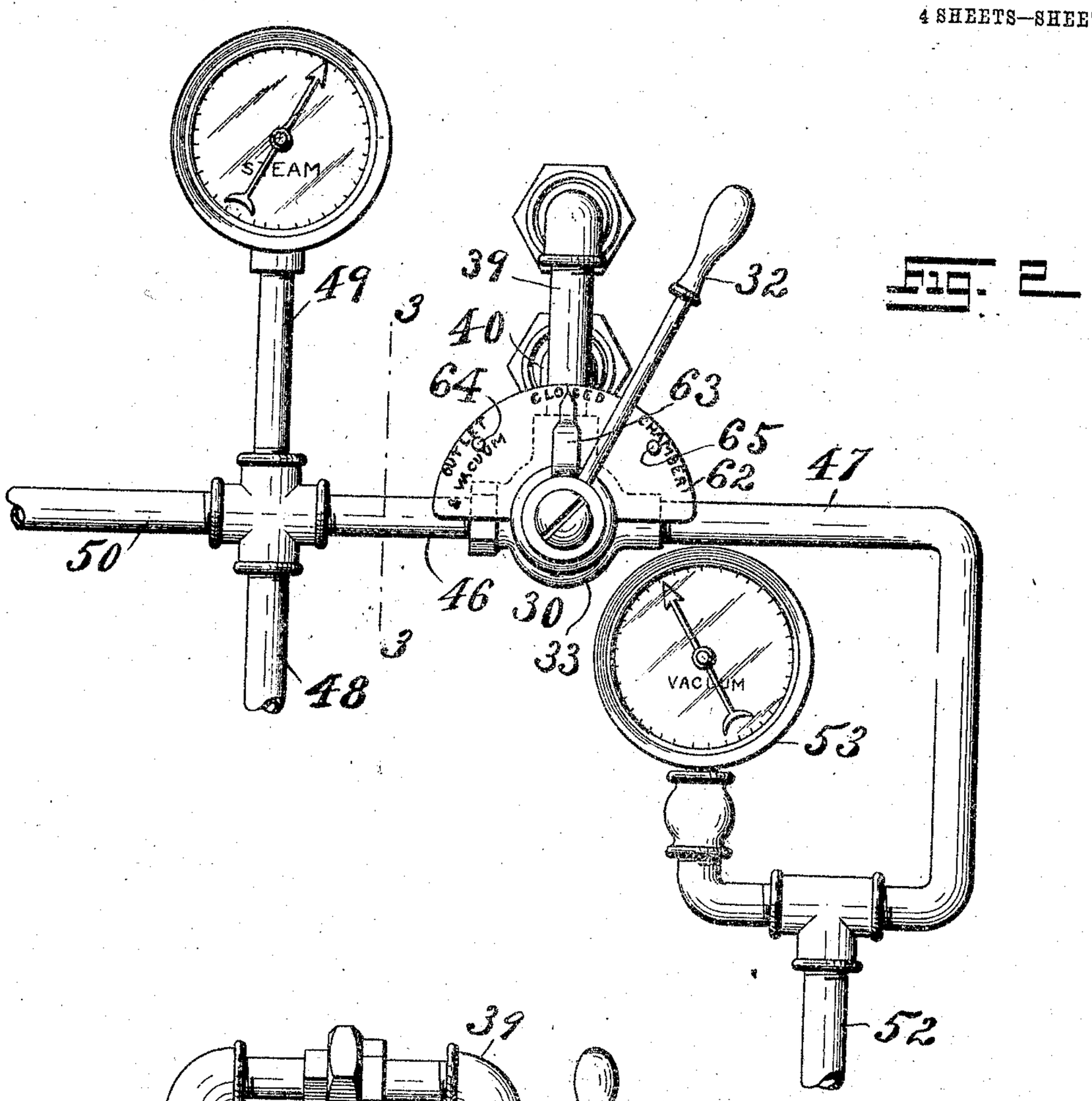

FIG. 2

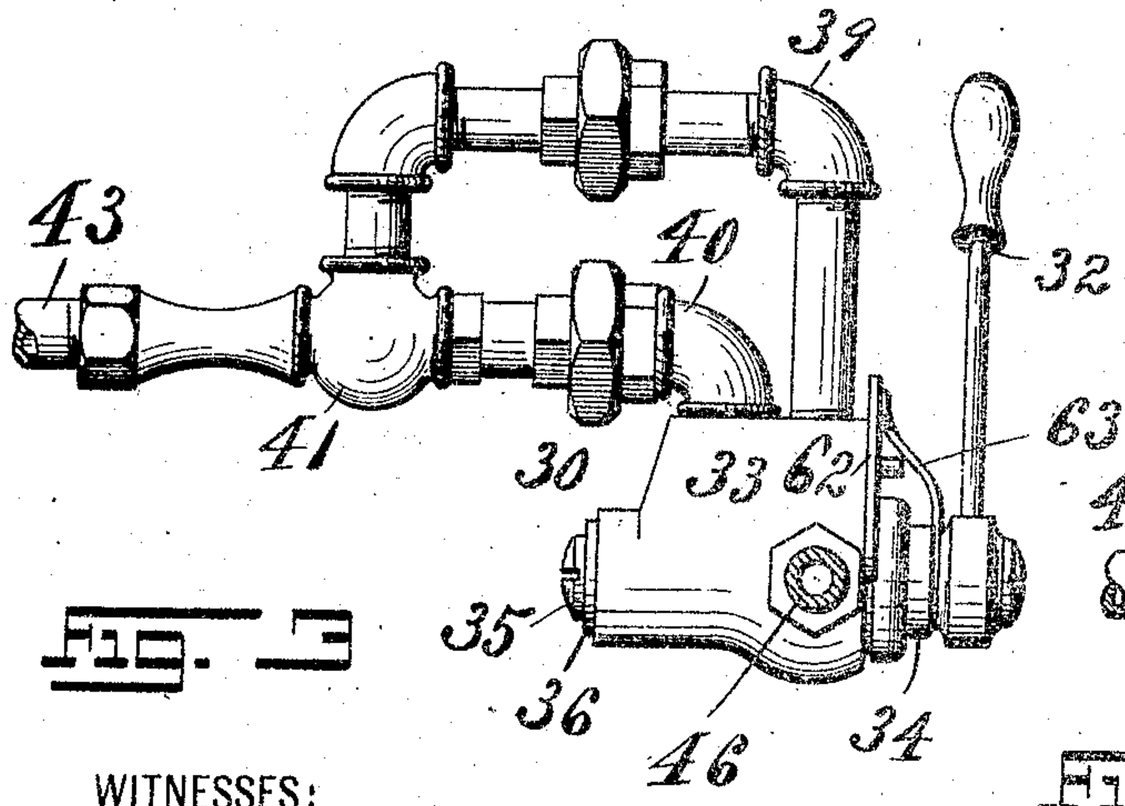

FIG. 3

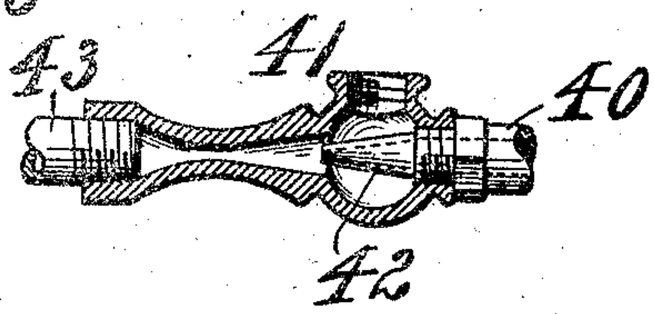

FIG. 4

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4 SHEETS—SHEET 3.

Fig. 5

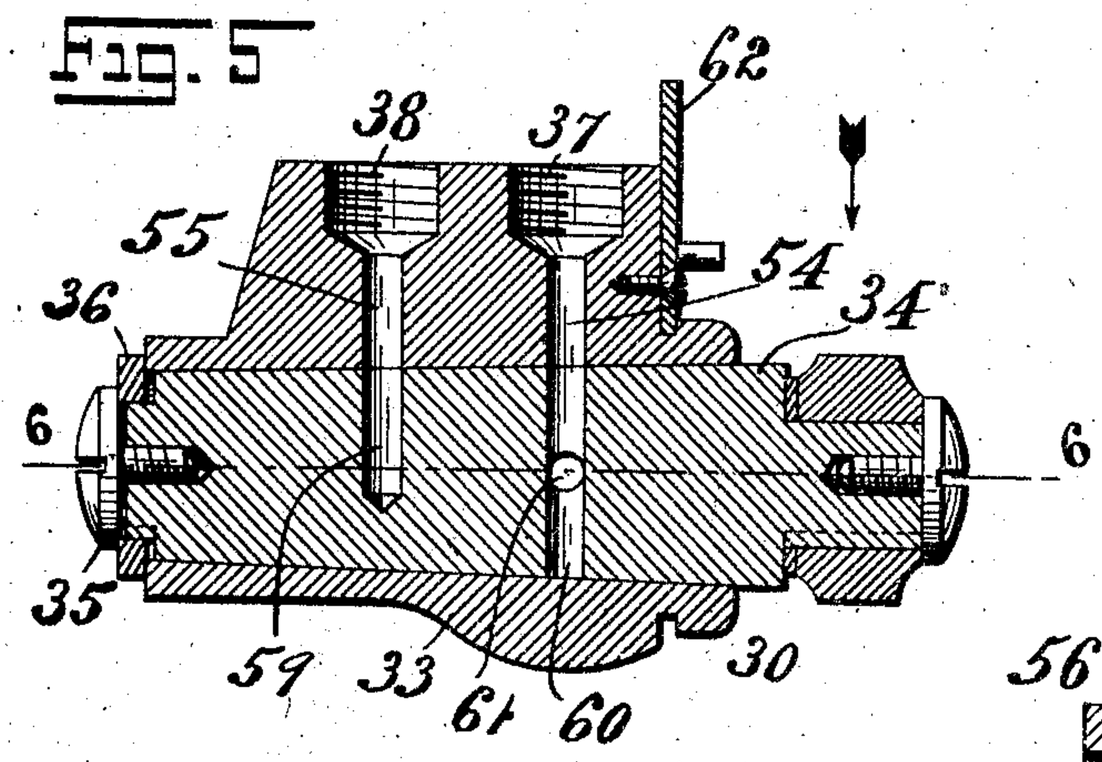


Fig. 6

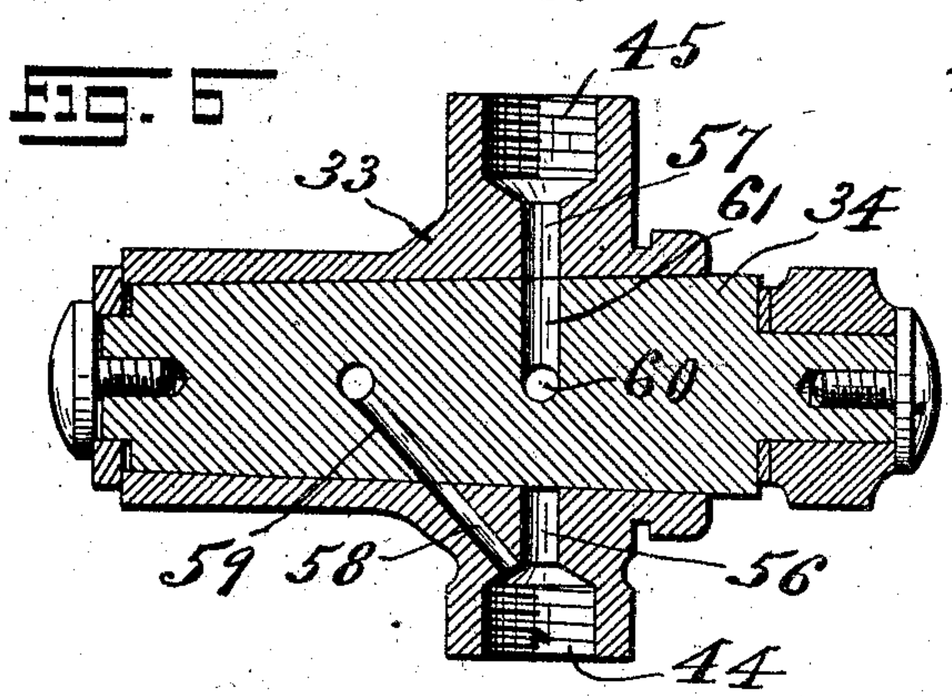


Fig. 7

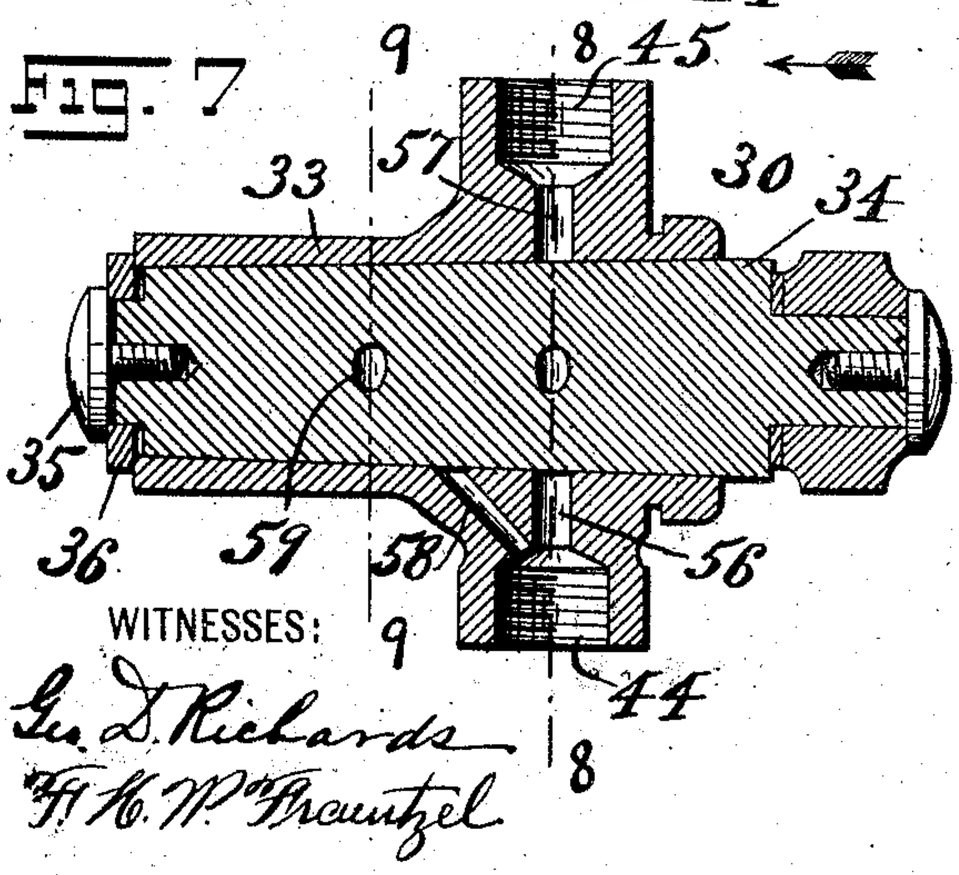


Fig. 8

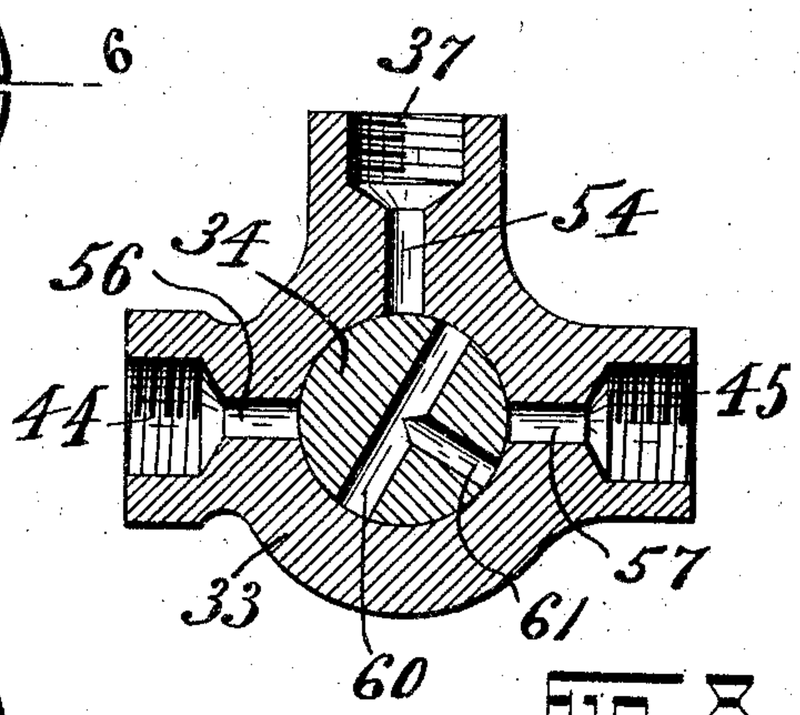
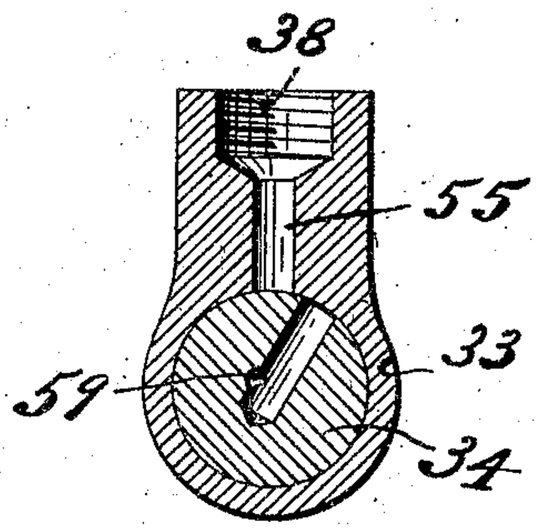


Fig. 9



WITNESSES:

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STERILIZING APPARATUS.

APPLICATION FILED JAN. 16, 1907.

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Patented Mar. 30, 1909.

4 SHEETS—SHEET 4.

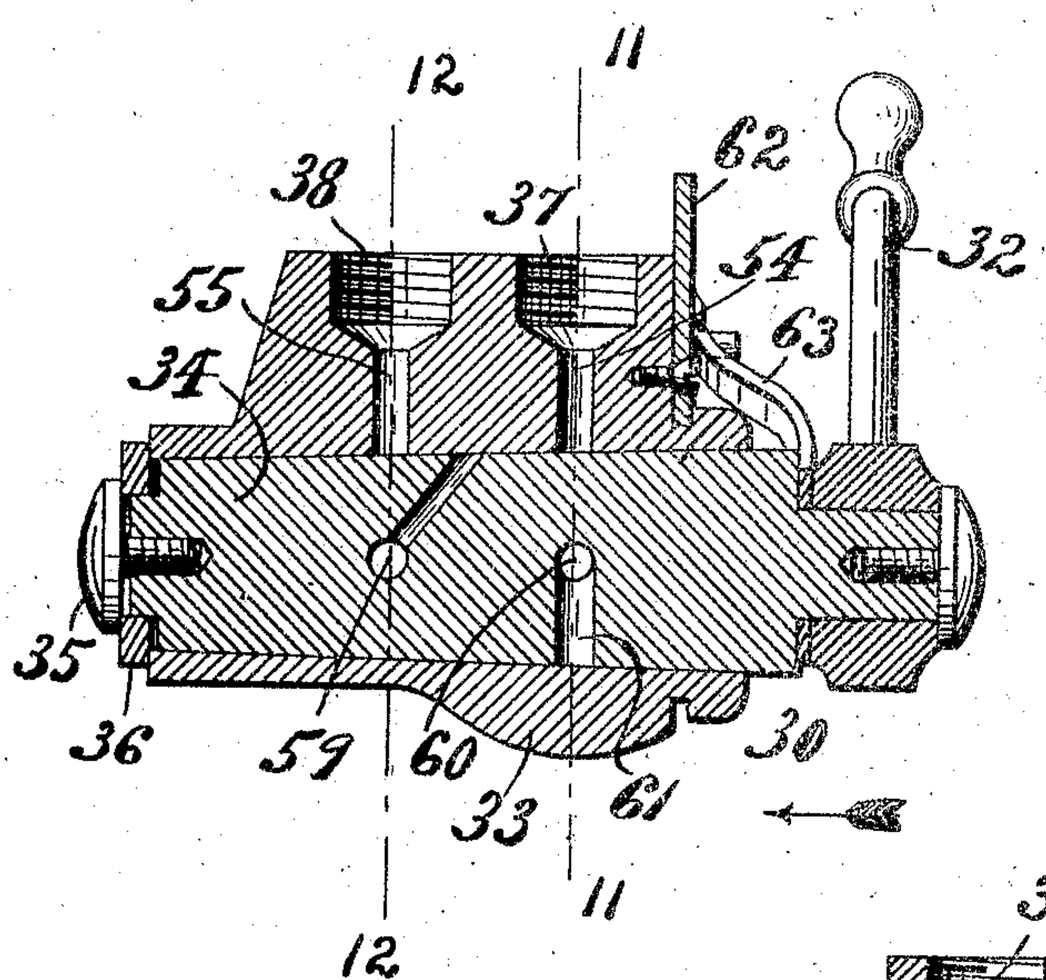

Fig. 10

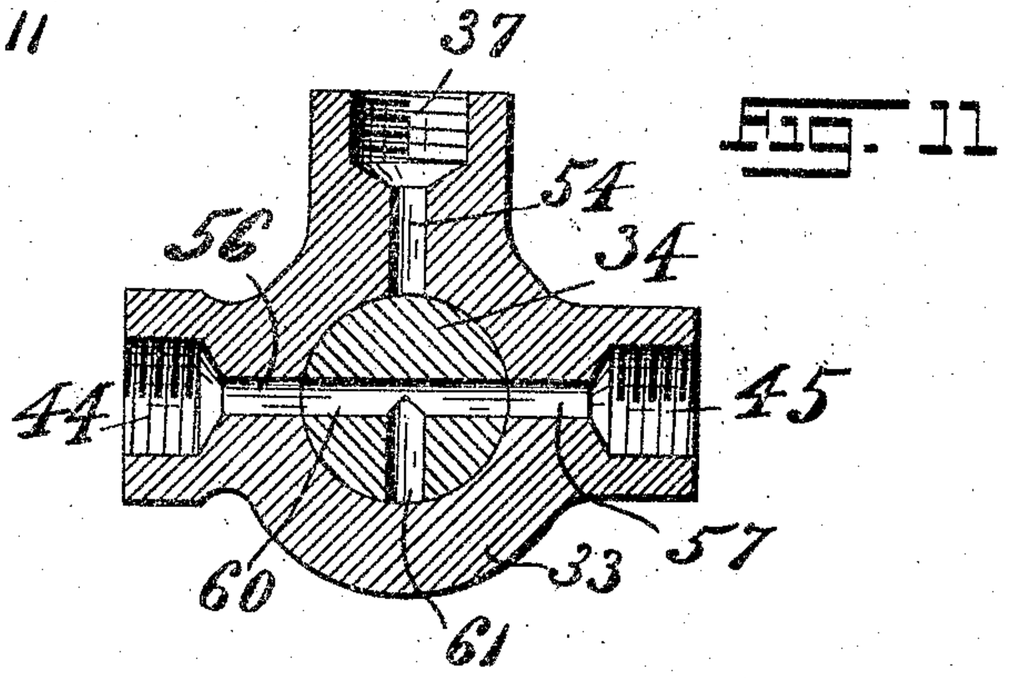

Fig. 11

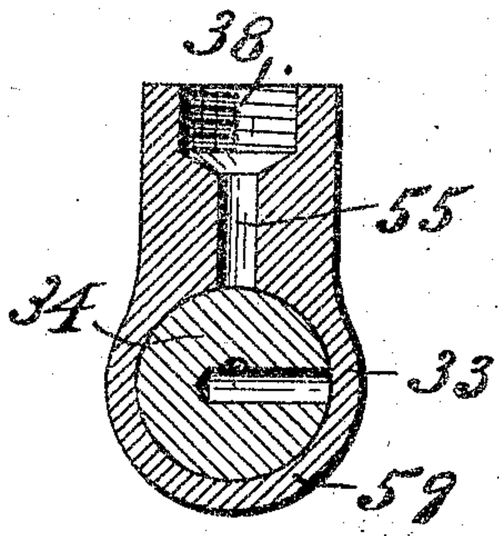

Fig. 12

WITNESSES:

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UNITED STATES PATENT OFFICE.

JOSEPH SCHOETTL, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO DAVID FRANK, OF BROOKLYN, NEW YORK, AND ONE-HALF TO JOHN TROUNSTINE, OF NEW YORK, N. Y.

STERILIZING APPARATUS.

No. 916,611. Specification of Letters Patent. Patented March 30, 1909.

Application filed January 16, 1907. Serial No. 352,490.

To all whom it may concern:

Be it known that I, JOSEPH SCHOETTL, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sterilizing Apparatus, of which the following is a specification.

The invention relates to improvements in sterilizing apparatus, of the character used by physicians, surgeons and other persons for the purpose of sterilizing dressings, surgical instruments and other articles, and said invention consists in the novel features hereinafter described, and particularly pointed out in the claims.

The sterilizer embodying my invention comprises a sterilizing chamber or oven, a water and steam jacket surrounding the same; a hot air jacket inclosing said sterilizing chamber and water and steam jacket, a burner for heating the water so as to generate steam, means for creating a vacuum within the sterilizing chamber, means for thereafter admitting steam to said chamber, means for exhausting the steam from said chamber and means for admitting sterilized air to said chamber.

The general principle of providing a sterilizing chamber with a steam and hot water jacket, an outer inclosing shell and a burner for heating the water for the purpose of generating the steam to be used within the sterilizing chamber is not new, and my invention has to do more particularly with the means provided by me for creating the vacuum within the sterilizing chamber, admitting the steam thereto, exhausting the steam therefrom and delivering sterilized air to said chamber.

One object of my invention is to simplify the valve operating mechanism connected with the sterilizer, so that an attendant may readily understand how to accurately utilize the apparatus, and the correct and thorough sterilization of the dressings and other articles be positively assured.

A further object of the invention is to provide means for introducing sterilized air to the sterilizing chamber, this being the last step in the operation of the apparatus, whereby the beneficial effects to be secured by the sterilization of the articles may not be vitiated by the introduction to the sterilizing chamber of non-sterilized air as heretofore.

The means employed by me for securing the introduction of sterilized air into the oven or sterilizing chamber of the apparatus are such that they cannot be used, either intentionally, by neglect or otherwise, in any manner whereby non-sterilized air shall be admitted to the sterilizing oven or chamber upon the exhaust of the steam therefrom.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation, partly broken away and partly in section, of a sterilizer constructed in accordance with and embodying the invention; Fig. 2 is an enlarged detached diagrammatic front view of the valve mechanism constituting one portion of the invention, this view showing the vacuum gage and its connecting pipe as lowered from the normal position of the same when upon the sterilizer, so that said gage and its pipe may not conceal the upper central portions of the figure; Fig. 3 is a side elevation of a portion of same, taken from the left hand side of Fig. 2 and being partly in section on the dotted line 3—3 of Fig. 2; Fig. 4 is a detached vertical, longitudinal section of a portion of the discharge pipe from the valve casing shown in Fig. 3 and is presented to indicate the ejector located in said pipe; Fig. 5 is a central, vertical, longitudinal section through the valve casing of Fig. 3 with the rotary valve or plug therein; Fig. 6 is a horizontal section of the same on the dotted line 6—6 of Fig. 5; Fig. 7 is a like view of the same, with the rotary plug or valve turned to a different position; Fig. 8 is a vertical transverse section of the same on the dotted line 8—8 of Fig. 7; Fig. 9 is a vertical transverse section of the same on the dotted line 9—9 of Fig. 7; Fig. 10 is a section corresponding with Fig. 5 but showing the rotary plug or valve turned to a different position; Fig. 11 is a vertical transverse section of the same on the dotted line 11—11 of Fig. 10, and Fig. 12 is a vertical transverse section of the same on the dotted line 12—12 of Fig. 10.

In the drawings, 20 designates a cylinder whose interior constitutes the sterilizing chamber or oven, 21 an encompassing cylin-

der forming between its inner wall and the outer wall of the cylinder 20 a hot water and steam chamber, 22 an exterior cylindrical casing encompassing the cylinders 20, 21 and forming between its inner wall and the outer wall of the cylinder 21 a hot air chamber, 23 a gas burner for heating the water within the lower portion of the steam and water chamber 24, and 25 an inlet of known construction for water to said chamber 24. The lower portion of the exterior casing or cylinder 22 is open above the burner 23 so that the heat of the gas flames may reach the cylinder 21, and at its upper side the casing 22 is provided with outlets 26 from the upper portion of the hot air chamber 27.

The features hereinbefore indicated by reference numerals are not new and constitute general structural features of sterilizers. At the front end of the cylinder 20 is provided a door of usual construction adapted to be securely locked in its closed position, and the general apparatus is supported upon a suitable frame 28.

My invention resides more particularly (1) in the valve mechanism, numbered 30, and piping connected therewith, and (2) in the pipe 31, the latter being utilized, under the manipulation of the valve mechanism 30, for introducing sterilized air into the oven or sterilizing chamber formed by the cylinder 20.

The valve mechanism, indicated by 30, comprises a plural-way valve operated by a handle 32 for exhausting air from and thereby creating a vacuum within the oven or sterilizing chamber, thereafter admitting steam to said chamber, and thereafter exhausting the steam from said chamber and compelling the flow of the sterilized air through the coiled pipe 31 into said chamber, said air becoming sterilized during its passage through the pipe 31, which is located within the steam and hot water chamber 24, as shown.

The valve mechanism 30 comprises an exterior casing 33, and a rotary plug or valve 34 seated within said casing and operated by means of the handle 32, which is secured upon the front end of the plug 34, while the rear end of said plug, which is slightly tapered, is secured by means of a screw 35 and washer 36. At its upper side the casing 33 is provided with threaded sockets 37, 38 respectively (Figs. 5 and 10) to receive the ends of the pipes 39, 40, as shown in Figs. 1 and 3. Both pipes 39, 40 serve as outlets from the valve casing 33, the pipe 39 being provided for the passage of air and the pipe 40 for the flow of steam, and these pipes 39, 40 are connected to each other by a coupling member 41 within which is located an ejector 42 (Fig. 4) for steam. The coupling member 41 at its outer end is connected with the main discharge pipe 43 extending along the top of the sterilizer and open to the atmosphere at its outer end. When the plug 34 is turned by the handle 32 to effect the flow of steam through the pipe 40 and ejector 42, said plug will also place the sterilizing chamber or oven into communication with the pipe 39, and under this condition the flow of the steam through the pipe 40 and ejector 42 will compel the air within the sterilizing chamber or oven to exhaust through the pipe 39 and into the main discharge pipe 43, whereby a vacuum will be created within said chamber.

At its opposite sides the valve casing 33 is formed with the threaded sockets 44, 45 (Fig. 6) to receive the pipes 46, 47 respectively (Fig. 2), said pipe 46 being in communication with a pipe 48 which, as shown in Fig. 1, extends downwardly into the dome or upper portion of the steam and water chamber 24, the purpose of said pipe 48 being to lead the steam from said chamber to the pipe 46 which directs it to the valve casing 33, wherein its course is controlled by means of the valve plug 34, as hereinafter explained. The steam-pipe 48 also communicates with the usual steam pressure gage 49 and with a pipe 50 leading to the usual water gage 51.

The pipe 47 connected with the socket 45 of the valve casing 33 is in communication with a pipe 52 (Figs. 1 and 2) which extends downwardly into the sterilizing chamber or oven and is employed to exhaust air from and then to deliver steam to said chamber or oven, the air exhausted from the chamber or oven being conducted by the pipe 47 to the valve casing 33 and thence by means of the valve-plug 34 and said casing to the pipe 39, whence the air is forced to and through the pipe 43 by the steam issuing from the ejector 42. The pipe 52 is also in communication with a vacuum gage 53.

The valve casing 33 is, as shown in Fig. 5, formed with two vertical ports 54, 55 which lead from the chamber tightly inclosing the valve plug 34 and are respectively in communication with the pipes 39, 40. The valve casing 33 is also formed with horizontal ports (Fig. 6) 56, 57 respectively in communication with the steam pipe 46 and exhaust pipe 47. The valve casing 33 is also formed with a horizontal port 58 which is in communication with the steam pipe 46 and is used exclusively (the port 56 at the time being closed) for conducting the steam to the passage 59 leading through the valve plug 34 to the steam-pipe 40, this passage 59 being in action only when it is desired that the steam shall flow through the pipe 40 for the purpose of exhausting from the sterilizing chamber through the pipes 52, 47, 39. The passage 59 comprises a horizontal portion shown in Fig. 6 and a vertical portion shown in Fig. 5, and the vertical portion of the passage 59 is shown in Fig. 5 as being in communication with the port 55 of the valve casing, said port 55 leading to the steam-pipe 40.

The valve-plug 34 is formed (in vertical line with the ports 54, 56, 57) with a through transverse passage 60 (Fig. 8) and a passage 61 which communicates with and is at right angles to the passage 60. The passage 60 may be placed in direct communication with the ports 56, 57, as shown in Fig. 11, and this is the position of said passage when it is desired that steam, in lieu of flowing to the pipe 40, shall pass directly through the valve casing 33 to the pipes 47 and 52 and enter the sterilizing chamber or oven. In Figs. 5 and 6 I however illustrate the valve-plug 34 as it stands at the time steam is flowing to the pipe 40 and air exhausting from the sterilizing chamber or oven through the pipes 52, 47, 39, and at such time the valve-plug 34 will have its passage 61 in communication with the pipe 47 and port 57 and its passage 60, standing vertically, in communication with the port 54 and pipe 39, the valve-plug 34 then closing the port 56 and holding its steam passage 59 in communication with the port 58 of the valve casing. When the valve plug 34 is in the position indicated in Figs. 5 and 6, steam will flow from the steam and hot water chamber 24 through the pipe 48 and pipe 46 to the valve casing 33 and thence through the port 58, passage 59 and port 55 to the ejector-pipe 40; and the flow of the steam in the direction just indicated will cause the air to exhaust from the sterilizing chamber or oven up through the pipe 52 and through the pipe 47 to the valve casing 33, whence the air will pass through the port 57, valve passages 61, 60 and port 54 to the air exhaust pipe 39.

After the valve-plug 34 has remained in the position shown in Figs. 5 and 6 for a sufficient length of time to create the proper vacuum within the sterilizing chamber or oven, the operator may, by means of the handle 32, turn the valve-plug to its other extreme position shown in Figs. 10 and 11 for cutting off the steam from the pipe 40 and directing it from the pipe 48 through the valve casing 33 and into the pipes 47, 52, whence it will pass into the sterilizing chamber or oven; and when the operating handle 32 has been turned to its extreme position to the right for this purpose, the valve-plug 34 will close or cut off the ports 58, 54 of the valve casing and the through passage 60 of the valve-plug will be placed in direct communication with the horizontal ports 56, 57 of said casing, as shown in Fig. 11, under which condition the steam will flow directly from the pipes 48, 46 through the valve casing and valve-plug and into the pipes 47, 52, being conducted thereby to the sterilizing chamber or oven.

After the steam has been admitted for a sufficient length of time to the sterilizing chamber or oven the valve-plug 34 may be moved to an intermediate position, shown in Fig. 8, in which it may be observed that the passages through the plug are not in communication with any of the passages through the valve casing, this being the closed position of the valve, since no steam is then passing through it and no exhaust can take place through it. When it is desired to again exhaust from the sterilizing chamber or oven the valve-plug 34 will be restored to its position shown in Figs. 5 and 6, so that the steam may flow to and out from the ejector pipe 40 and compel an exhaust through the pipe 39.

I provide upon the front of the valve-casing 33 an index-plate 62 across which the operating handle 32 may be moved, and I secure upon the stem of the valve-plug a finger 63 whose outer pointed end is close to the face of the plate 62. At one side of the plate 62 is provided a stop pin 64 (Fig. 2) near which are the words "Outlet vacuum". When the handle 32 is moved until the end of the finger 63 contacts with the pin 64, the valve plug will be in the position shown in Figs. 5 and 6, allowing the steam to reach the pipe 40 and the vacuum to be created within the sterilizing chamber through the pipe 39. Near the right hand edge of the plate 62 I provide a stop pin 65, and upon the plate the word "Chamber" is placed. When the handle 32 is turned to the right until the finger 63 engages the stop pin 65 the valve-plug will be in the position shown in Figs. 10 and 11, steam at such time being admitted to the sterilizing chamber or oven and the pipes 39, 40 being cut off. When the handle 32 is moved to the intermediate position shown in Fig. 2, the finger 63 will point to the word "Closed", and at such time the valve-plug 34 will be in the position shown in Fig. 8, with all of its passages cut off from communication with all of the pipes.

In the regular operation of the sterilizing apparatus, the door of the sterilizing oven or chamber is opened, the dressings or other articles to be sterilized placed within said oven and said door closed and locked. Steam having been generated within the water and steam chamber 24, the valve operating arm 32 will be moved to the left from its position shown in Fig. 2 until the finger 63 becomes arrested by the stop 64, this movement of said arm having the effect of turning the valve-plug 34 from its closed position shown in Fig. 8 to the position in which it is illustrated in Figs. 5 and 6, thereby, as hereinbefore described, establishing a passage for steam from the chamber 24, pipe 48, pipe 46, port 58, passage 59 and port 55 to the ejector steam-pipe 40, and placing the discharge air pipe 39 into communication with the interior of the sterilizing chamber or oven through the pipe 52, pipe 47, port 57, valve-passages 61, 60 and port 54. The valve-plug 34 will be permitted to remain in the

position just above indicated a suitable length of time to extract the air from within the sterilizing chamber or oven and thereby create a vacuum therein, and thereupon the valve operating arm 32 will be turned to the right, (looking at Fig. 2), until the finger 63 becomes arrested by the stop 65, this movement of the said arm turning the valve-plug 34 into the position shown in Figs. 10 and 11, thereby cutting off the pipes 39, 40 and establishing a direct communication from the steam pipes 48, 46 through the casing 33, valve-plug 34 and pipes 47, 52 with the sterilizing chamber or oven, the purpose being that the steam shall then flow into said chamber or oven and act to sterilize the articles therein. After the flow of steam to the sterilizing chamber or oven has continued for a suitable period, the operator may turn the handle or arm 32 to its intermediate position for restoring the valve-plug 34 to the position shown in Fig. 8, all of its passages then being removed from communication with all of the pipe connections, or in lieu of thus moving the valve-plug to its closed position, the valve arm 32 may be immediately moved to its extreme position at the left (looking at Fig. 2), thereby again placing the ejector steam-pipe 40 into communication with the steam pipes 48, 46 and the exhaust pipes 52, 47 into communication with the pipe 39, whereupon the steam which previously was directed to the sterilizing chamber or oven, will flow through the pipe 40 and create an exhaust through the pipes 52, 47 and 39, thus extracting the steam and moisture from said chamber or oven.

Upon the extraction of the steam from the sterilizing chamber or oven, a vacuum is created therein, and this vacuum if permitted to continue would prevent the opening of the door to said chamber or oven and consequently prevent the removal of the articles that had been placed therein to be sterilized. It is therefore not only desirable that air should be admitted to the sterilizing chamber or oven, after or during the extraction of the steam therefrom, but it is of the greatest importance that the air thus admitted shall not carry with it any contaminating germs which might vitiate all of the beneficial effects sought to be secured by the sterilizing operation. In accordance with my invention I therefore provide the coiled pipe 31 through which the air to enter the sterilizing chamber or oven passes and within which the air becomes sterilized by the heat imparted to the same from the pipe 31, which is coiled within the steam and hot water chamber 24 and, as shown in Fig. 1, opens into the sterilizing chamber or oven. The outer end of the coiled pipe 31 is disposed near the front end of the apparatus and is provided with a valve 66 by which the passage through the pipe may be opened or closed. The valve 66 in the pipe 31 will normally be kept closed but after the extraction of the steam from the sterilizing chamber or oven or during such extraction, the valve 66 will be opened so that the exhaust created by the valve mechanism 30 may compel the flow of the air through the coiled pipe 31 and into the sterilizing chamber or oven, said air during its passage through said pipe becoming heated and sterilized.

The flow of the sterilized air through the pipe 31 into the sterilizing chamber or oven may be continued as long as may be desired and will continue so long as the valve operating arm 32 is in its extreme position to the left (looking at Fig. 2). The air flowing into the sterilizing chamber or oven through the pipe 31 may, under any and all conditions, be relied upon to remove the last trace of moisture from the articles within the oven, from the walls of the oven and from the interior of the piping connected with the oven, all of which is of very great advantage. If the operator should decide to exhaust all of the steam from the sterilizing chamber or oven before opening the valve 66 of the pipe 31, thereby creating a vacuum in said oven, he will thereafter open the valve 66, with the valve operating handle 32 in its extreme position to the left, so as to compel the flow of sterilized air through the pipe 31 and into the oven, under which condition the sterilized air would first relieve the vacuum within the over and thereafter perform its further beneficial effects above indicated.

It will be understood from the description hereinbefore presented that almost the entire operation of the sterilizing apparatus is placed under the control of the one valve operating arm 32, and since this arm may be used in connection with an index-plate 62 for guiding the operator, obviously, the correct operation of the apparatus may be readily carried out and the proper sterilization of the articles assured.

In view of the number of valves commonly employed on sterilizers heretofore placed in use for sterilizing surgical instruments, dressings and the like, some difficulty has been encountered in assuredly effecting the correct operation of the sterilizer, and this difficulty is overcome by my invention and especially by reason of the fact that the attendant may by the manipulation of the one handle arm 32 effect and control substantially all of the different steps in the operation of the apparatus. Air has heretofore been introduced to the sterilizing oven, but in accordance with my invention this air becomes highly heated and therefore sterilized and of drying and sterilizing value before it is permitted to enter the oven, and as hereinbefore indicated, it is of advantage to be able to continue the flow of the heated air

through the oven and through the piping connected therewith and with the valve mechanism after the vacuum created within the oven by the exhaust of the steam has been relieved.

What I claim as my invention and desire to secure by Letters Patent, is:—

1. A sterilizing apparatus comprising an oven, a steam chamber and an individual valve mechanism and pipe connections for exhausting air from the oven, then delivering steam into the oven and then exhausting the steam from the oven, said valve mechanism and connections comprising a valve casing 33 having a port 54 connected with an exhaust pipe 39, a port 55 connected with an outlet steam-pipe 40, a port 57 connected by piping with the sterilizing oven, two ports 56, 58 connected by piping with the steam chamber, a rotary plug valve 34 seated within said casing and having on its exposed end a handle by which the valve may be manually set, an index adjacent to said handle for guiding the operator in setting said valve, an ejector 42 in said steam outlet pipe, means connecting said exhaust pipe and said steam pipe together adjacent to said ejector, and a main discharge pipe 43 leading from said ejector, said valve having a through transverse passage 60 in line with the aforesaid ports 54, 56, 57, a passage 61 in communication with said passage 60 and at an angle thereto, and a passage 59 to connect said ports 58, 55 when it is desired to exhaust from said oven; substantially as set forth.

2. A sterilizing apparatus comprising an oven, a steam chamber, a pipe extending from the outer atmosphere through said steam chamber into said oven and being of appropriate length within said chamber to assure the heating of the air passing through the pipe before its entrance to said oven, and valve mechanism and pipe connections for exhausting air from the oven, then delivering steam into the oven and then exhausting the steam from the oven, said valve mechanism and connections comprising a valve casing 33 having a port 54 connected with an exhaust pipe 39, a port 55 connected with an outlet steam-pipe 40, a port 57 connected by piping with the sterilizing oven, two ports 56, 58 connected by piping with the steam chamber, a rotary plug valve 34 seated within said casing and having on its exposed end a handle by which the valve may be manually set, an index adjacent to said handle for guiding the operator in setting said valve, an ejector 42 in said steam outlet pipe, means connecting said exhaust pipe and said steam pipe together adjacent to said ejector, and a main discharge pipe 43 leading from said ejector, said valve having passages through it for, according to its position permitting the flow of steam to said steam-pipe and placing said exhaust pipe in communication with the oven and for cutting off said steam and exhaust pipes and directing the steam into said oven; substantially as set forth.

3. A sterilizing apparatus comprising an oven, a steam chamber and an individual valve mechanism and pipe connections for exhausting air from the oven, then delivering steam into the oven and then exhausting the steam from the oven, said valve mechanism and connections comprising a valve casing 33 having a port 54 connected with an exhaust pipe 39, a port 55 connected with an outlet steam-pipe 40, a port 57 connected by piping with the sterilizing oven, two ports 56, 58 connected by piping with the steam chamber, a rotary plug valve 34 seated within said casing and having on its exposed end a handle by which the valve may be manually set, an index adjacent to said handle for guiding the operator in setting said valve, an ejector 42 in said steam outlet pipe, means connecting said exhaust pipe and said steam pipe together adjacent to said ejector, and a main discharge pipe 43 leading from said ejector, said valve having passages through it for, according to its position, permitting the flow of steam to said steam-pipe and placing said exhaust pipe in communication with the oven and for cutting off said steam and exhaust pipes and directing the steam into said oven; substantially as set forth.

4. A sterilizing apparatus comprising a horizontal oven, an encompassing steam chamber, an air-pipe extending from the open atmosphere through said steam chamber and into said oven for leading air into the latter and enabling the same to become heated on its passage through the pipe by the heat of said steam chamber, a valve for opening and closing said air-pipe, and valve mechanism and an ejector and pipe connections connecting said valve mechanism with said steam chamber and oven for exhausting air from said oven, then delivering steam from said steam chamber into said oven and then exhausting the steam from and effecting the flow of the heated air through said air-pipe into said oven; substantially as set forth.

5. A sterilizing apparatus comprising a horizontal oven, an encompassing steam chamber, a pipe extending from the open atmosphere into said steam chamber wherein it is coiled back and forth and thence enters said oven for leading air into the latter and enabling the same to become heated on its passage through the pipe by the heat of said steam chamber, a valve for opening and closing said air-pipe, and valve mechanism and an ejector and pipe connections connecting said valve mechanism with said

steam chamber and oven for exhausting air from said oven, then delivering steam from said steam chamber into said oven and then exhausting the steam from and effecting the flow of the heated air through said air-pipe into said oven; substantially as set forth.

Signed at Brooklyn, in the county of Kings and State of New York, this 14th day of January, A. D. 1907.

JOSEPH SCHOETTL.

Witnesses:
LOUIS B. FUNK,
WM. L. SHAUGHNESSY.