(No Model.) 2 Sheets—Sheet 1.

G. W. KELLOGG.

STERILIZING APPARATUS.

No. 573,273. Patented Dec. 15, 1896.

Fig. 5.

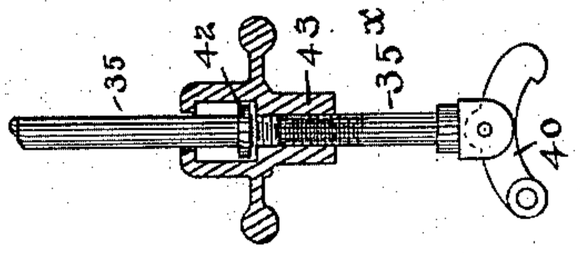

Fig. 4.

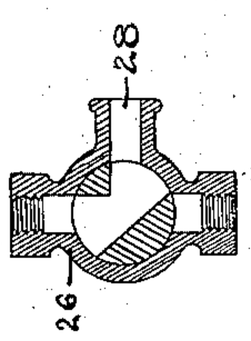

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

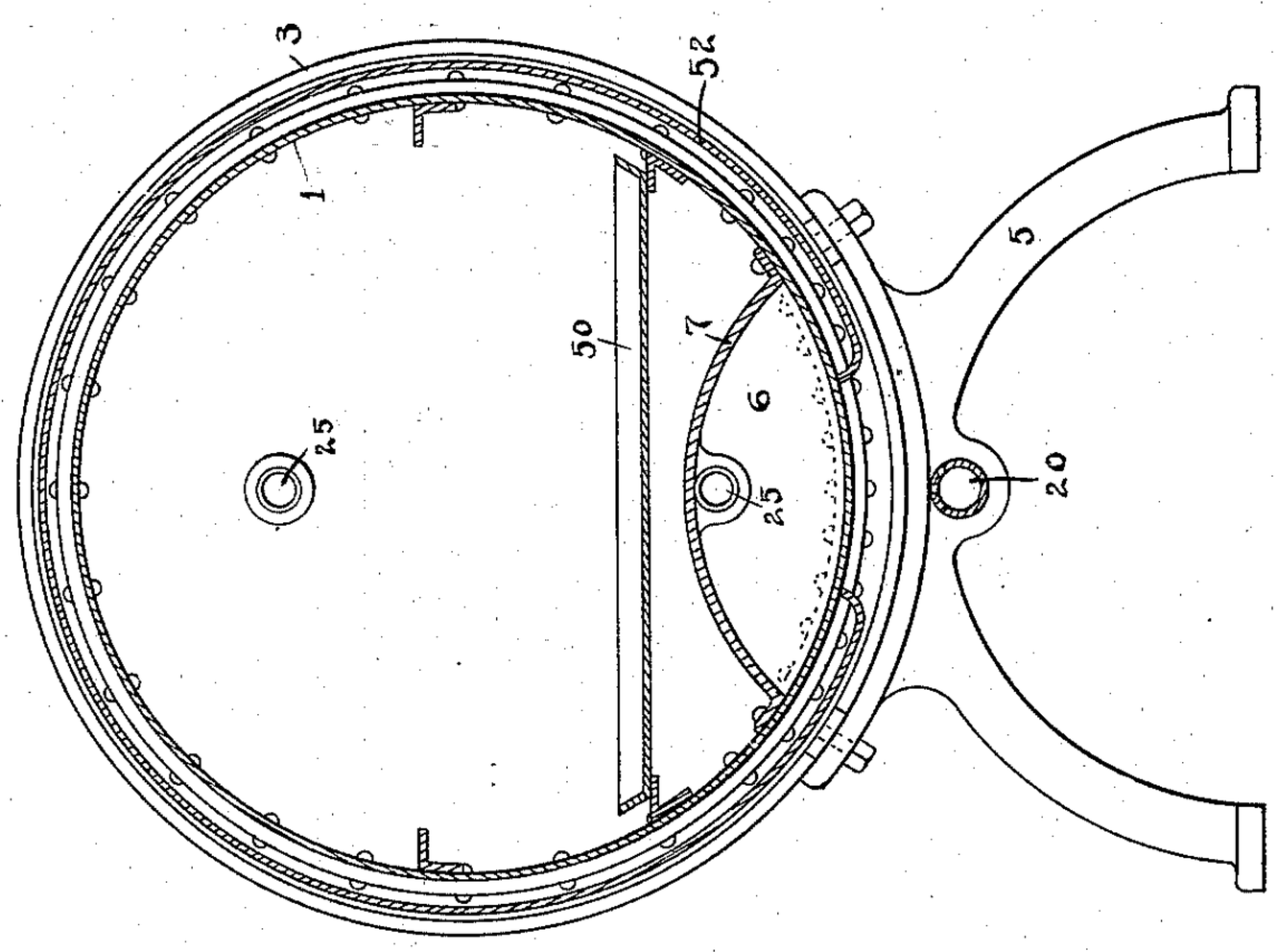


Fig. 6.

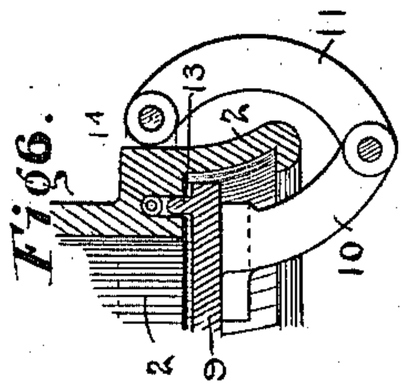
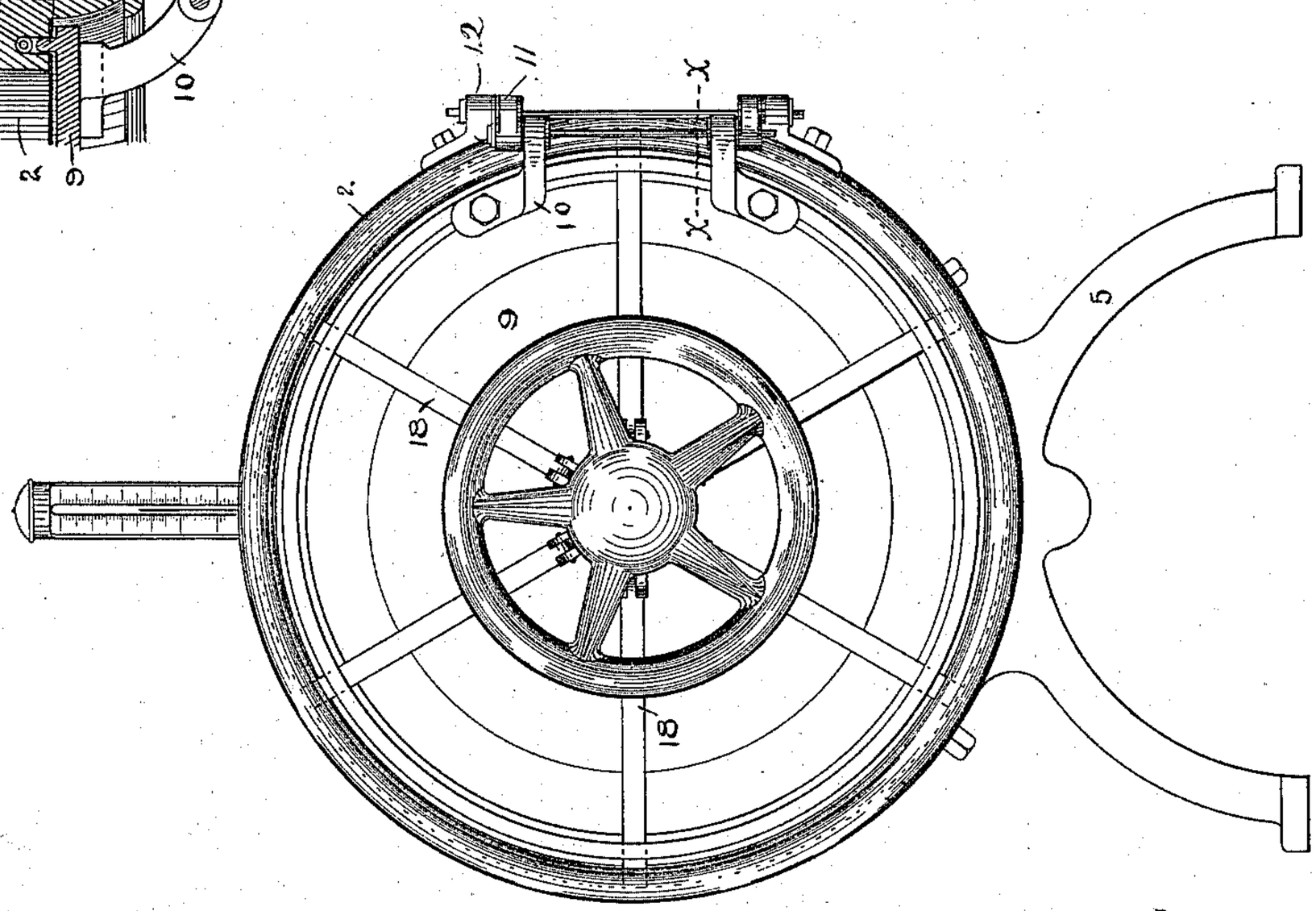


Fig. 2.



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UNITED STATES PATENT OFFICE.

GEORGE W. KELLOGG, OF ROCHESTER, NEW YORK.

STERILIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 573,273, dated December 15, 1896.

Application filed January 11, 1896. Serial No. 575,107. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. KELLOGG, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Sterilizing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention has for its object to provide an apparatus by means of which surgical instruments, dressings, bandages, &c., may be sterilized and any germs or bacilli destroyed by subjecting them to the action of steam and heat.

One of the objects of my present invention is to furnish a device which is automatic in its operation and by means of which not only may the dressings and instruments be sterilized, but dried as well, requiring no attention on the part of the operator excepting to start the apparatus; and it consists in certain improvements hereinafter described and the novel features pointed out in the claims at the end of this specification.

In the drawings, Figure 1 is a longitudinal sectional view of a sterilizer constructed in accordance with my invention; Fig. 2, an end view; Fig. 3, a cross-sectional view; Fig. 4, a sectional view of a valve; Fig. 5, a section of the adjustable connection between the valves or cocks; Fig. 6, a section of the door-hinge on the line *x x* of Fig. 2.

Similar reference-numerals in the several figures indicate similar parts.

The main body or sterilizing-chamber for containing the dressings or other objects to be sterilized is made in the present embodiment of my invention in the form of a cylinder 1, preferably composed of sheet metal, as copper, at the ends of which are riveted or otherwise suitably secured front and rear ring-frames 2 and 3, respectively, the latter having bolted to it a head 4, the said ring-frames being supported upon suitable legs or base-castings 5.

Within the cylinder or chamber is a water receptacle or boiler 6, preferably formed by a plate 7 of metal, riveted to the lower side and ends of the cylinder 1, having a filling-cap 8, preferably at the front end, by means of which the water to be converted into steam may be introduced into the boiler.

The front end of the sterilizing-chamber is provided with a movable door or closure 9, having secured to its outer side a bracket 10, pivoted to a link 11, the other end of said link being pivoted at 12 to the front ring-casting 2, as shown in Figs. 2 and 6, and the inner face of the door is provided with a projecting flange 13, adapted to coöperate with a suitable packing-ring 14, inserted in a groove in the front ring 2. The hinged connection shown permits the door not only to swing away from the front, but to have a straight inward movement to make a steam-tight joint with the packing, and while any suitable devices may be provided for closing this door tightly I prefer to employ the means shown, in which the door is provided near its center with a threaded projection or bolt 15, upon which screws a nut 16, connected to a hand-wheel, and sleeved upon this nut is a ring 17, to which are pivoted the inner ends of suitable arms 18, the outer ends of which extend through apertures in the edge of the door and serve to engage an overhanging flange 19, provided on the end frame 2. From this construction it will be understood that the outward movement of the nut 16 on the screw will withdraw the ends of the arms from engagement with the flange 19, and the door may be swung out on the hinge, permitting access to the interior of the chamber, and when the door is closed it may be tightened against the packing by screwing the nut 16 inward, causing the ends of the levers 18 to project, engage the flange, and press the door tightly against the packing.

Beneath the boiler on the under side of the chamber or receptacle is a gas and air burner 20, supplied with gas from a pipe 21, between which and the gas and air mixer 22 is arranged a cut-off valve or cock 23, to the plug of which is connected a weighted arm 24, operating to close the valve automatically when not retained and cut off the supply of gas to the burner.

25 indicates a pipe connected to the boiler, passing rearwardly through the end plate 4, preferably passing upward and communicating with the interior of the sterilizing-cham-

ber, so that the steam generated in the boiler may be supplied directly to the interior of the chamber for acting upon the dressings or instruments contained therein.

26 indicates a valve or cock located in the pipe 25 between the boiler and sterilizing-chamber, the plug of which valve having connected to it a weight 27 or other suitable device for automatically operating the valve in one direction, and the plug of this valve or cock is so arranged that when the weight 27 is elevated or in the position shown in full lines in Fig. 1 it will permit the passage of steam from the boiler into the chamber, and when in another position, as shown in full lines in Fig. 4, it will open communication between the sterilizing-chamber and the air through a port or passage 28.

Connected to the boiler, preferably through the pipes 25 and 29, is a diaphragm pressure-regulator 30, which may be of any suitable construction, but preferably embodies a movable stem 31, connected to a diaphragm operated upon by a spring 32, adjustable by means of a nut 33, to regulate the pressure at which the diaphragm moves upward. The upper end of the stem engages the under side of a lever 34, connected to a rod 35, to which are connected devices for controlling the operations of the cocks 23 and 26, so that when the steam from the boiler reaches a certain pressure communication between the boiler and the sterilizing-chamber will be closed and the sterilizing-chamber opened to the air by the valve 26, and thereafter the gas-cock will be operated and the flame extinguished, and by this means the dressings are first subjected to the action of live steam and then dried before the flame is extinguished. The preferred form of devices for accomplishing these results is as follows:

The plug of the valve 26 is provided with a small lug or catch 26^a, with which coöperates the hooked end of an arm 37, adjustably secured to the rod 35, the lower end of said rod 35 having a somewhat loose and adjustable connection with a pivoted catch 40, the hooked end of which engages with a projection or lug 41, arranged on the plug of the cock 23, as shown in Figs. 1 and 5. The connection between the catch 40 and the rod 35 is preferably such as shown in Fig. 5, the rod being provided with a head 42, operating loosely in an adjustable nut 43, screwing upon a short link $35^\times$, pivoted to the catch 40.

In using the apparatus the dressings or instruments are placed in suitable trays 50 in the sterilizing-chamber, and, water having been supplied to the boiler, the door is closed and made steam-tight, the handle of the cock 23 is raised and engaged by the catch on the arm 27, the cock 26 is opened and retained by the catch 40, and the gas-burner is lighted. Live steam being supplied to the interior of the sterilizing-chamber destroys any germs or bacilli contained in the dressings, and when the steam reaches a certain pressure, governed by the diaphragm-regulator, the diaphragm causes the rod 35 to rise, first releasing the cock or valve 26 and allowing its operating device, the weight, to turn it and open communication between the sterilizing-chamber and the air, and said rod continues to rise until the head 42 on its lower end engages the nut 43, lifts the catch 40, and allows the gas-cock 23 to close, the length of time the latter remains open after the steam is cut off being such as is sufficient to permit all the steam to pass out of the sterilizing-chamber and the heat from the boiler to thoroughly dry the dressings and instruments, so that when the operator opens the door the instruments and dressings are ready for immediate use.

The time between the closing of the cocks 26 and 23 may be regulated by the adjustment of the arm 37 on the rod 35, the adjustment of the nut 43, or the relative sizes of the end of the catch 40 and projections 41, but the adjustment of the nut 43 is usually sufficient.

A suitable pop or relief valve 51 is provided to prevent the bursting of the apparatus from excessive steam-pressure, and a covering 52 around the cylinder prevents loss of heat by radiation, a thermometer 53 indicating the heat and pressure on the chamber.

It will be understood that the form and arrangement of the various parts of my sterilizer may be changed or modified without departing from my invention, and I do not therefore desire to be confined to precisely the construction shown, as the general object of the invention is attained by the employment of suitable means for causing the automatic sterilization and the subsequent drying of the instruments or dressings contained in the chamber.

It is of course preferable that the boiler for generating the steam be located in or attached to the sterilizing-chamber, as by this means the heat of the boiler when the steam-supply is cut off serves to dry the dressings, but even if the boiler were elsewhere than as shown the heat of the chamber itself would serve to dry the dressings to some extent after the supply of steam was cut off and the valve 26 opened to permit the escape of the steam.

Instead of employing a gas-burner for heating the boiler a lamp, steam-coil, or other suitable source of heat could be employed capable of being cut off or extinguished, and though I much prefer the construction shown it could be modified in this particular without departing from my invention. I prefer to use a regulator operated by steam-pressure for governing the operation of the valves, as it is reliable and easily applied to the apparatus, but this I regard as but one form of device for regulating the pressure of steam, as a thermometer or thermostat would perform the same functions.

It is obvious that the valve 26 could be operated by hand, if desired, to shut off communication between the boiler and the sterilizing-chamber and open communication be-

tween the latter and the air, the proper time for operating the valve being indicated to the operator either by a thermometer or pressure-gage, but this arrangement would necessitate constant watchfulness on the part of the operator, and I do not regard it as advantageous as the construction embodying the automatic regulating devices, though in some instances it might be employed.

I claim as my invention—

1. In a sterilizing apparatus, the combination with the chamber for containing dressings, &c., a boiler and a pipe leading from the boiler to the interior of the chamber, of a valve arranged in said pipe and adapted to cut off the steam-supply and open the chamber to the air, and a pressure-regulator for actuating said valve, substantially as described.

2. In a sterilizing apparatus, the combination with the chamber for containing the dressings, &c., the boiler in contact with the chamber, and a steam-pipe leading from the boiler to the interior of the chamber, of a valve arranged in the pipe and adapted to cut off the steam-supply and open the chamber to the air, a heater for the boiler, a controller (as a valve) for the heater, a pressure-regulator, and connections between the regulator, the valve and controller for causing the successive operations of the two latter, substantially as described.

3. In a sterilizing apparatus, the combination with the chamber for containing the dressings, &c., the boiler in contact with the chamber, and a steam-pipe leading from the boiler to the interior of the chamber, of a valve arranged in the pipe and adapted to cut off the steam-supply and open the chamber to the air, a burner for heating the boiler, a controller, as a valve, for the burner, a pressure-regulator a movable rod actuated thereby controlling the steam-valve, and an adjustable connection between said rod and the burner-controller, substantially as described.

4. The combination with a chamber for containing dressings, &c., and a steam-supply therefor, of a valve adapted to cut off the steam-supply to the chamber and open the latter to the air, and an adjustable pressure-regulator for controlling the operation of said valve, substantially as described.

5. The combination with a chamber for containing dressings, &c., a steam-supply therefor, of an automatic valve adapted to cut off the steam-supply to the chamber and open the latter to the air, a retainer for said valve, and a pressure-regulator for releasing said valve-retainer, substantially as described.

6. The combination with a chamber for containing dressings, &c., a boiler connected thereto, and a steam-pipe between the boiler and chamber, of an automatic valve in said pipe for cutting off the steam to the chamber and opening the latter to the air, a retainer for the valve, a burner for heating the boiler, an automatic burner-controller, as a valve, a retainer for the controller, a pressure-regulator, and connections between it and the valve and controller retainers for operating them successively as the pressure increases, substantially as described.

7. The combination with a chamber for containing the dressings, &c., the boiler in contact therewith, the pipe connecting the boiler and chamber, the automatic valve in the pipe arranged to cut off steam to the chamber, and open the latter to the air, of a burner for heating the boiler, an automatic valve controlling it, and a retainer therefor, a pressure-regulator, a movable rod connected thereto, a retainer thereon for holding the steam-valve, and an adjustable connection between said rod and the burner-valve retainer, substantially as described.

8. In a sterilizing apparatus, the combination with the pressure-regulator having a progressively-moving rod, of an automatic valve for regulating steam to the sterilizing-chamber, a retainer for the valve, a second automatic valve governing the heat to the chamber, a retainer therefor, and adjustable connections between said valve-retainers and the rod of the regulator, whereby the steam-valve retainer will be first operated and then the other retainer, substantially as described.

9. In a sterilizing apparatus, the combination with two automatic valves and retainers therefor, of the pressure-regulator embodying a progressively-moving rod having the head and carrying one of the retainers, the adjustable nut connected with the other retainer and adapted to engage the head on the rod, substantially as described.

10. The combination with the chamber for containing dressings, &c., a steam-chamber in contact therewith and a pipe leading from the steam-chamber to the interior of the sterilizing-chamber, of valve devices for governing communication between the steam-chamber and sterilizing-chamber and between the sterilizing-chamber and the open air, whereby steam may be admitted from the steam-chamber to the sterilizing-chamber to sterilize the contents thereof and communication opened between the sterilizing-chamber and the air, the heat derived from the steam-chamber serving to dry the dressings, &c., in the sterilizing-chamber, substantially as described.

11. The combination with the chamber, the boiler, the gas-burner, the valve for controlling it having the weighted valve and the lug thereon, of the pressure-regulator, the rod connected thereto having the head or projection, the catch or retainer for the valve, and the nut adjustably connected thereto and arranged to engage the head on the rod, substantially as described.

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