

No. 606,738.

Patented July 5, 1898.

A. L. ROCKSTRÖM.

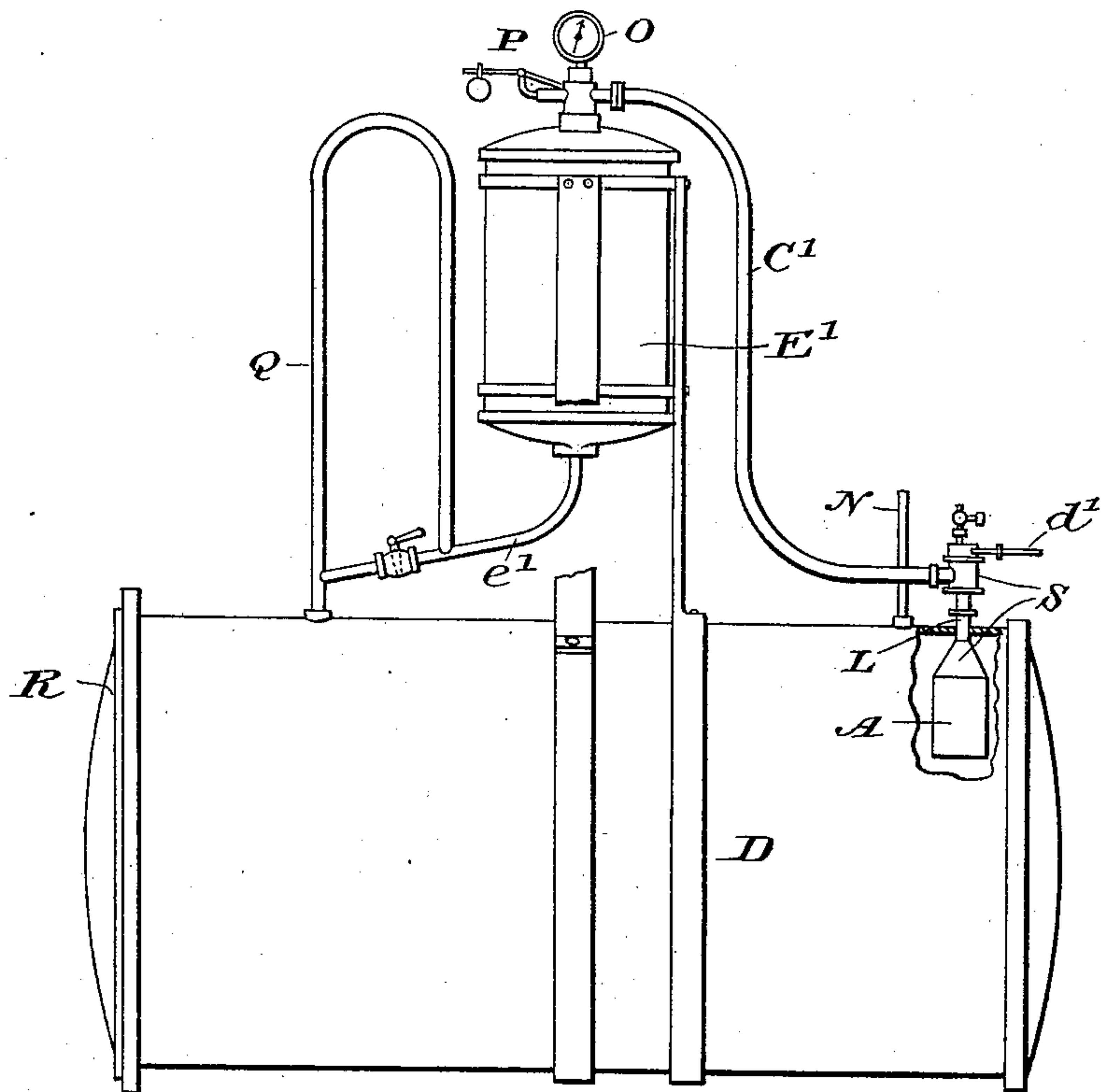
PRESSURE REGULATOR FOR LIQUID STERILIZERS.

(Application filed Aug. 12, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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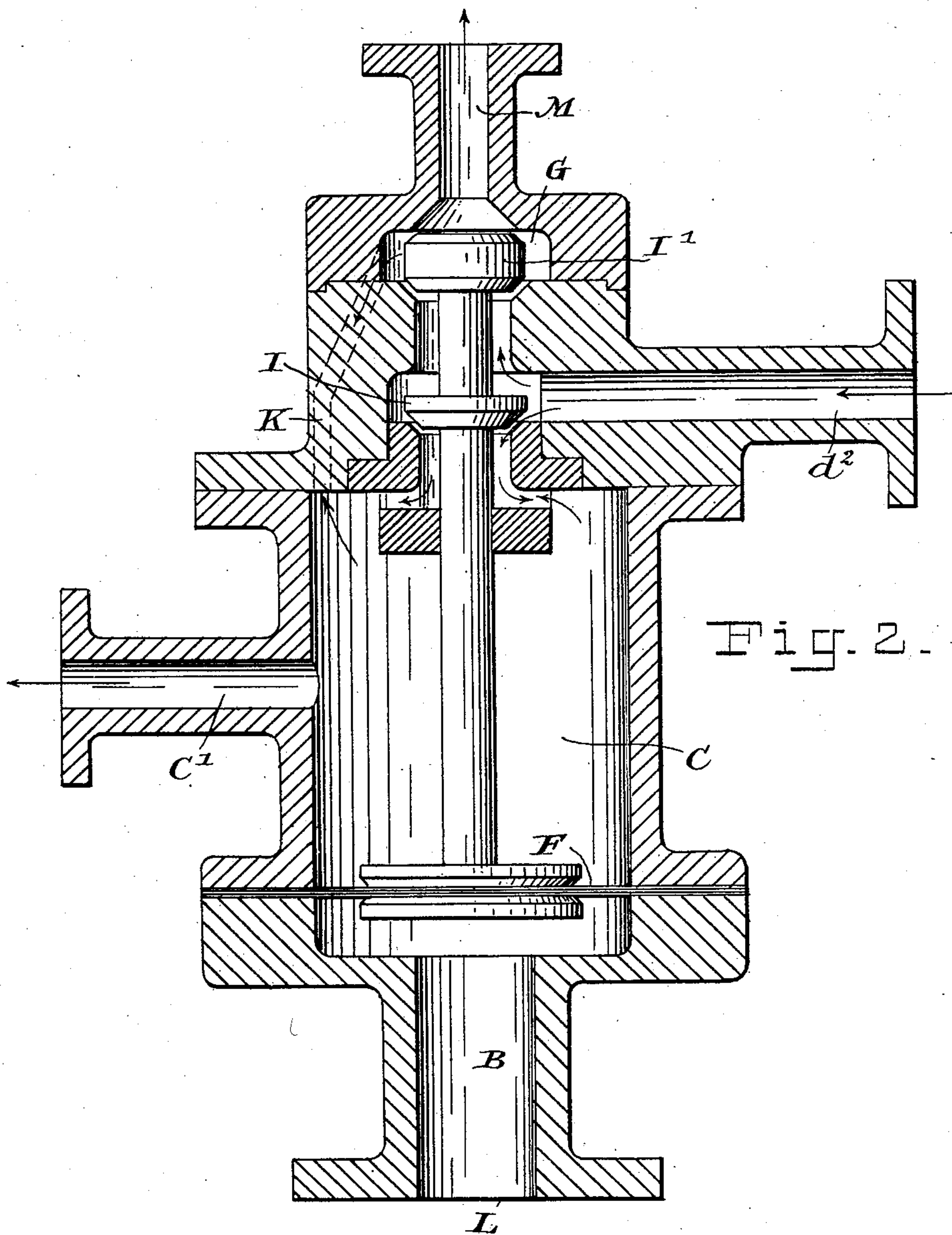


Fig. 2.

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AXEL LEONARD ROCKSTRÖM, OF NORBERG, SWEDEN.

PRESSURE-REGULATOR FOR LIQUID-STERILIZERS.

SPECIFICATION forming part of Letters Patent No. 606,738, dated July 5, 1898.

Application filed August 12, 1897. Serial No. 648,055. (No model.)

To all whom it may concern:

Be it known that I, AXEL LEONARD ROCKSTRÖM, brewer, a subject of the King of Sweden and Norway, and a resident of Norberg, in the Kingdom of Sweden, have invented certain new and useful Improvements in Pressure-Regulators for Liquid-Sterilizers, of which the following is a specification, reference being had therein to the accompanying drawings.

My object is to maintain during the whole pasteurizing process, both while heating and while cooling the substance, a pressure around the vessels which always equals or slightly exceeds the pressure in the interior of the vessels. This is accomplished in the following manner: The vessels are placed in a closed receptacle, which is filled with water, and by forcing into said receptacle or drawing off from it water or a gas during the heating or cooling operation the vessels are subjected to an external pressure equaling or exceeding that which simultaneously exists in their interior. The fluid under pressure may be supplied or drawn off by hand or automatically. In the former case enough is supplied of the fluid to obtain an external pressure equaling or slightly exceeding that which has been found by previous investigation to exist in the interior of the vessels during the operation. In the latter case the internal pressure itself is used for the purpose by allowing it to act upon a valve or the like, by which the communication is opened or shut between a pressure-generator, the open air or a reservoir, and the closed receptacle. During the heating operation the internal pressure rises, and owing to this increase in pressure the valve leading to the pressure-generator is actuated, so as to cause a corresponding quantity of pressure fluid to flow into the receptacle and make the external pressure equal to that of the interior. While cooling takes place and the pressure consequently is sinking, a valve is actuated, permitting of the discharge of the pressure fluid into the open air or into a reservoir or back to the pressure-generator, and thus causing the external pressure to fall in the same degree as the internal one.

In the drawings the pasteurizing apparatus referred to is shown combined with an automatic pressure-regulator.

Figure 1 is an elevation of the pasteurizing apparatus having a portion of the closed receptacle removed, so as to show the pressure-regulator. Fig. 2 represents a vertical sectional view, on enlarged scale, of the upper portion of the pressure-regulator.

D is the closed receptacle, which may be of any convenient shape and size and may be heated and cooled either from within or from without and is provided with a hermetically-closing cover R, through which the bottles are introduced and removed. Above this receptacle D there is a smaller receptacle E, having a volume equal to about six per cent. of the cubic contents of the receptacle D. Said receptacle E is provided with a pressure-gage O and a safety-valve P and communicates, through the pipes Q and *e'*, with the receptacle D and through the pipe *c'* with a pressure-regulator S. This is so mounted that its lower portion is in the interior of the receptacle, while its upper portion falls outside the latter. The regulator S, through a pipe *d'*, communicates with a holder containing carbonic acid or with an air-compressor or other pressure-generator.

A is a beer-bottle or other vessel having the same volume and coefficient of expansion as the other vessels used. This vessel A at its upper portion fits hermetically to the wall of the receptacle D. When filled up to L, it holds the same amount of liquid as is ordinarily tapped into a bottle.

Fig. 2 shows in a sectional view the upper portion of the pressure-regulator, which is outside of the receptacle.

d' is the conduit communicating with the pressure-generator and arranged so as to be shut off from the latter by means of two valves *I* and *i'* of equal size and covering valve-openings of equal size. These valves are mounted on a vertical spindle which is movable lengthwise and at the lower end of which there is fixed between two round metal disks a round disk F of rubber, horn, thin flexible steel, or the like. The disk F is at its outer edge fastened to the wall of the apparatus, so that the latter will be hermetically divided horizontally.

C is a low-pressure chamber, the cross-sectional area of which is many times greater than that of the valve-openings. Said chamber C communicates through a passage K

(shown in dotted lines in the drawings) with the chamber G.

B is a chamber of the same volume as the air-space between the cork and the beer in a beer-bottle filled to the ordinary extent.

M is a discharge-conduit from a third valve-opening, which may be closed by means of the double valve I'. The distance between the two upper valve-openings is not greater than to allow of one being only slightly (about one millimeter) open when the valve closes the other.

On placing the beer-bottles in the receptacle D and closing it up said receptacle is filled with water, which may be done through a cock arranged for the purpose. The vessel A is filled with beer up to L, and the pressure-regulator S is brought in communication at *d'* with the pressure-generator and at *e'* with the receptacle E. The receptacle D is then heated. As the pressure in the beer-bottles increases that in the vessel A will also increase, the pressure under the flexible disk F consequently forcing the latter upward and causing it to open the valves I and I', which will again close the valve-openings as soon as the pressure on the upper side of the disk increases and the latter as a result thereof is forced downward. The valves again open as soon as the pressure in the vessel A and the beer-bottles increases. In this manner there is successively created in the apparatus around the bottles a pressure which, so to speak, regulates itself in such a manner that it will always correspond to the pressure generated in the bottles during the pasteurizing process, the bursting of the bottles and the blowing out of the corks being thus prevented.

The temperature is observed by means of the thermometer N. When the cooling is commenced, the communication with the pressure-generator is shut off and the cock in the discharge-conduit M (see Fig. 1) is opened. As the pressure in the vessel A falls the higher pressure on the upper side of the disk F forces the latter downward, causing the third or top valve to open and remain so until the external and internal pressures become equal. Instead of the thin flexible membrane there may be used a piston attached to the valve-spindle and arranged so as to be shifted when the internal and external pressures differ, said piston evidently doing the same service as the flexible membrane.

The receptacle E serves to receive the surplus of water accumulating during the heating operation in the receptacle D, said surplus during the cooling again descending into the latter receptacle, which is thus kept filled during the whole process.

If the external pressure is to be produced by forcing in cold water, the pipe *e'*, Fig. 1, is shut off by means of the cock mounted in the same. The cold, and therefore heavier, water forced in is thus prevented from entering directly into the receptacle D, which

would cause partial disturbances in the heating of the bottles, and, when the differences of temperature are considerable, cracks in the bottles, owing to the contraction of the glass. When cooling is to take place, the cock in the pipe *e'* is again opened.

The portion of the pressure-regulator S which is just above the receptacle D ought to be surrounded by some heat-insulating material, so as to prevent loss of heat during the heating operation. As long as excessively high pressure is not used the pressure-regulator is very sensitive, the differences of pressure being brought about so suddenly that the disk F and the valves I and I' are kept continually vibrating, provided that heating and cooling continue without interruption.

As mentioned, the pressure may also be regulated by hand, the pressure-regulator described being then unnecessary. In this case the pressure in the vessels must have been previously determined for different temperatures and a table of these variations prepared, so as to enable of finding the minimum pressure, corresponding to a reading of the temperature on a thermometer, required outside the vessels for producing equilibrium with the internal pressure. By the pressure-gage it is afterward ascertained that the pressure for greater security be kept somewhat higher than that given by the table, this being accomplished by supplying to or drawing from the receptacle a greater or less quantity of the pressure fluid.

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

1. In combination, the receptacle D adapted to receive the containing vessels and the regulator adapted to connect with the interior of the receptacle and with one containing vessel, said pressure-regulator being exposed to the internal pressure of said containing vessel, substantially as described.

2. In combination in a pasteurizing apparatus, the receptacle D for receiving the containing vessels and a pressure fluid, a generator located above the receptacle and connected therewith and an automatic pressure-regulator controlled by the relative pressure in one containing vessel and the generator and receptacle, substantially as described.

3. In combination, the receptacle D adapted to receive the containing vessels and a pressure-regulator for regulating the pressure therein to exert an external pressure on the exterior of the containing vessels, the said regulator being connected with a vessel having the same interior volume and containing the same substances to be sterilized as the regular containing vessels and having a valve with controlling means therefor acted upon by the pressure in the aforesaid vessel, said valve controlling the pressure in the receptacle D, substantially as described.

4. In combination, the receptacle D adapted

to receive the containing vessels, the regulator adapted to connect with the interior of the receptacle and with one containing vessel, said pressure-regulator having a valve and a
5 diaphragm connected therewith and exposed to the internal pressure of said containing vessel, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

AXEL LEONARD ROCKSTRÖM.

Witnesses:

ERNST SVANQVIST,
HANS B. OHLSSON.