No. 701,971. Patented June 10, 1902.

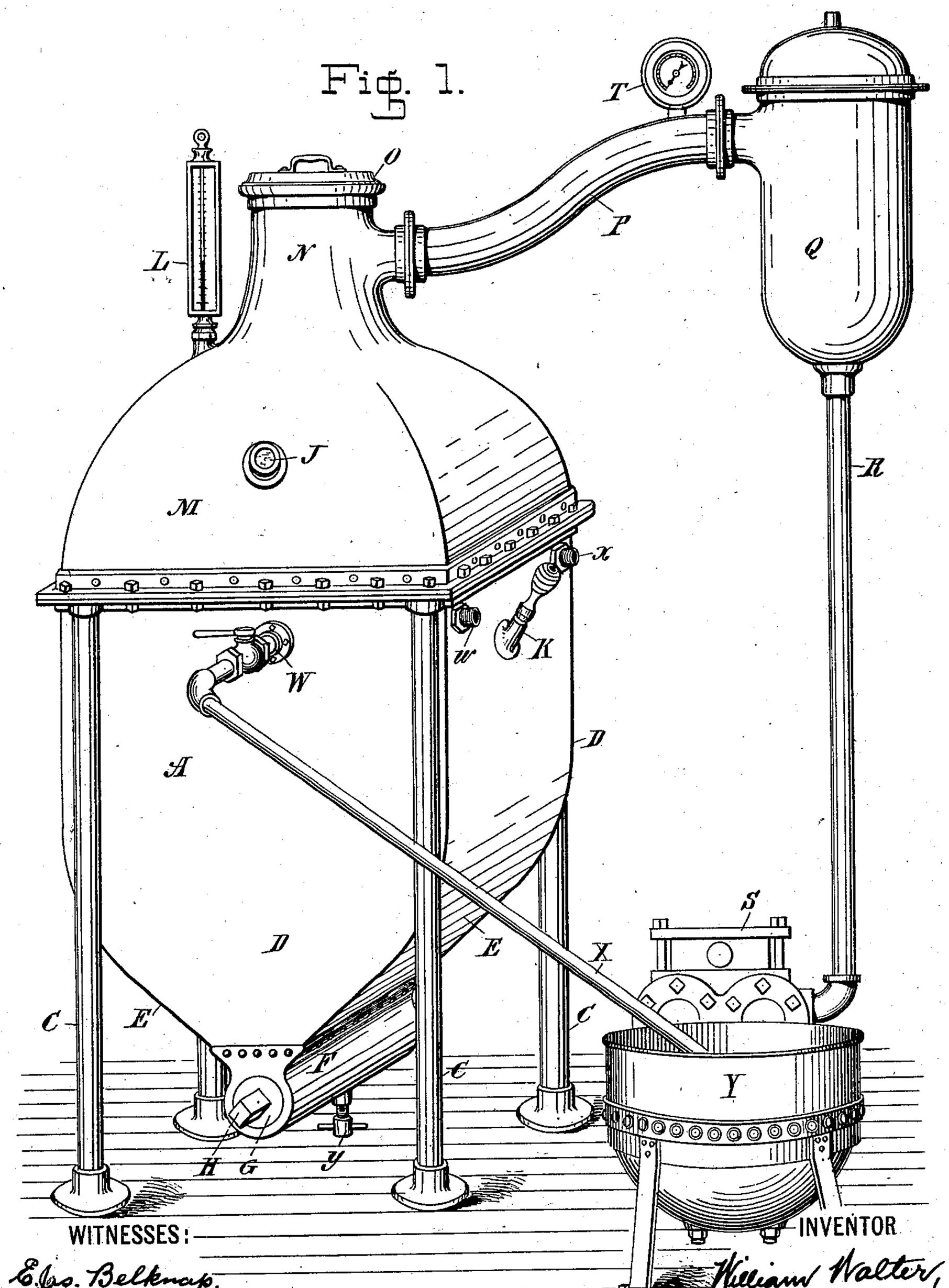
W. WALTER.

APPARATUS FOR COOLING SYRUPS.

(Application filed Jan. 9, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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No. 701,971. Patented June 10, 1902.

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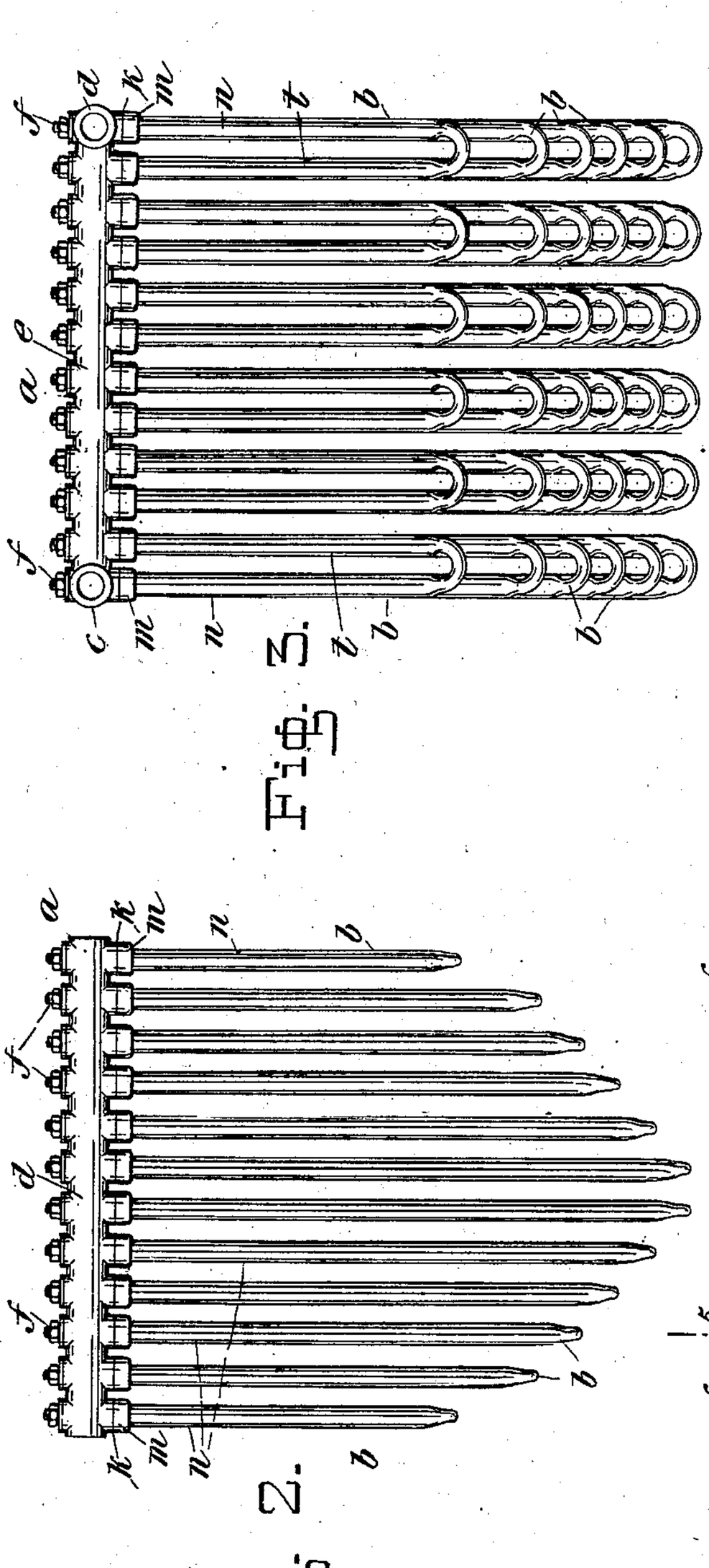

Fig. 3.

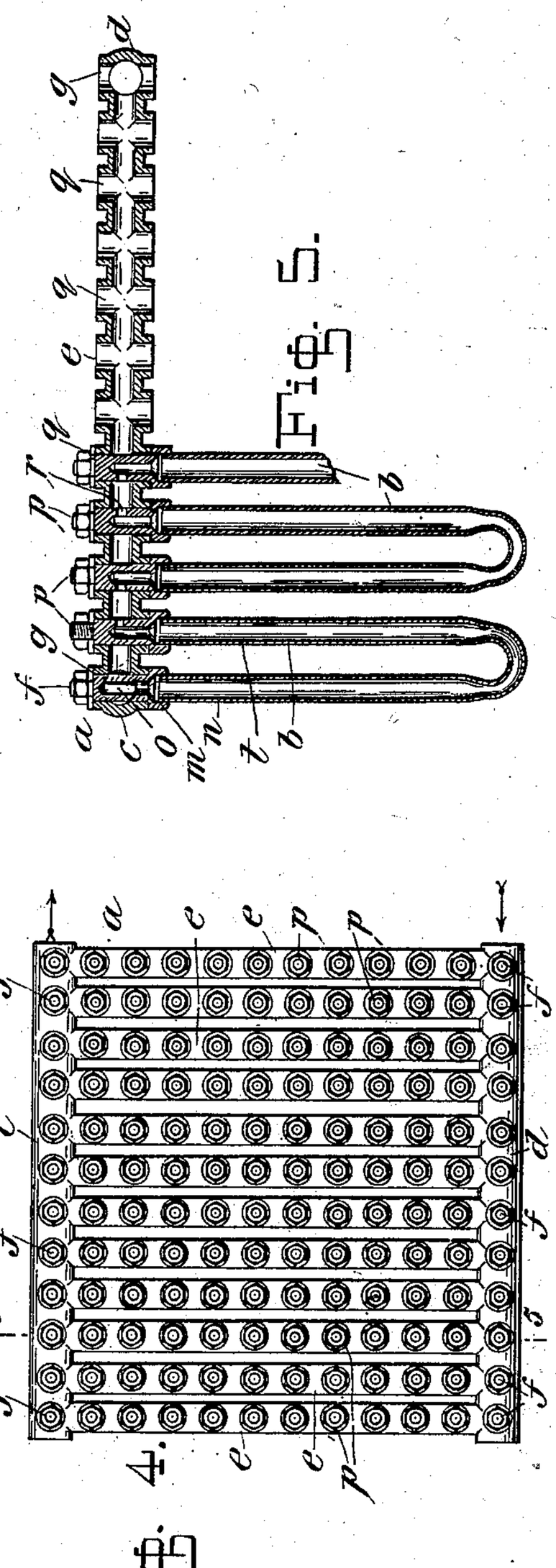

Fig. 5.

Fig. 2.

Fig. 4.

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4 Sheets—Sheet 3.

Fig. 11.

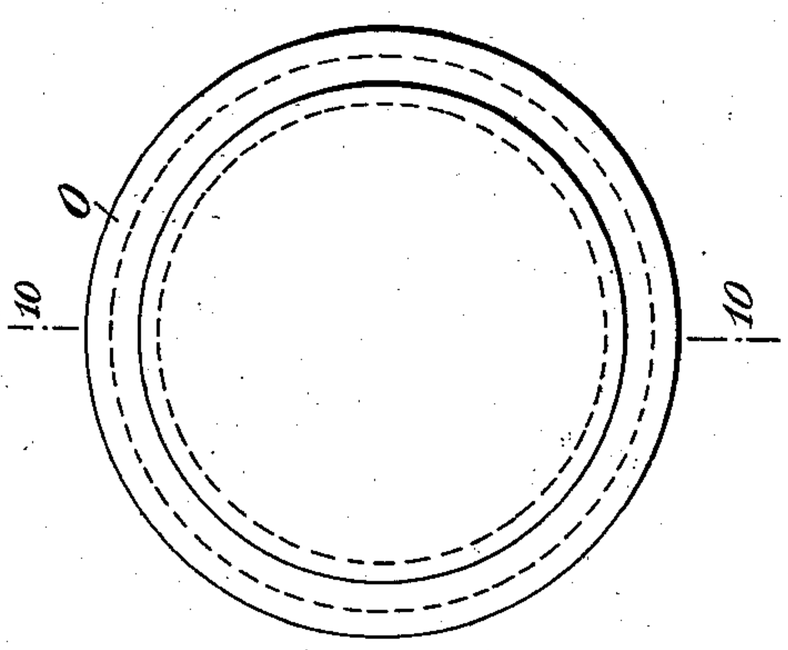

Fig. 10.

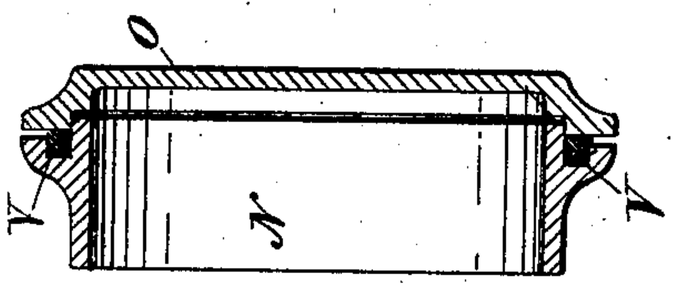

Fig. 13.

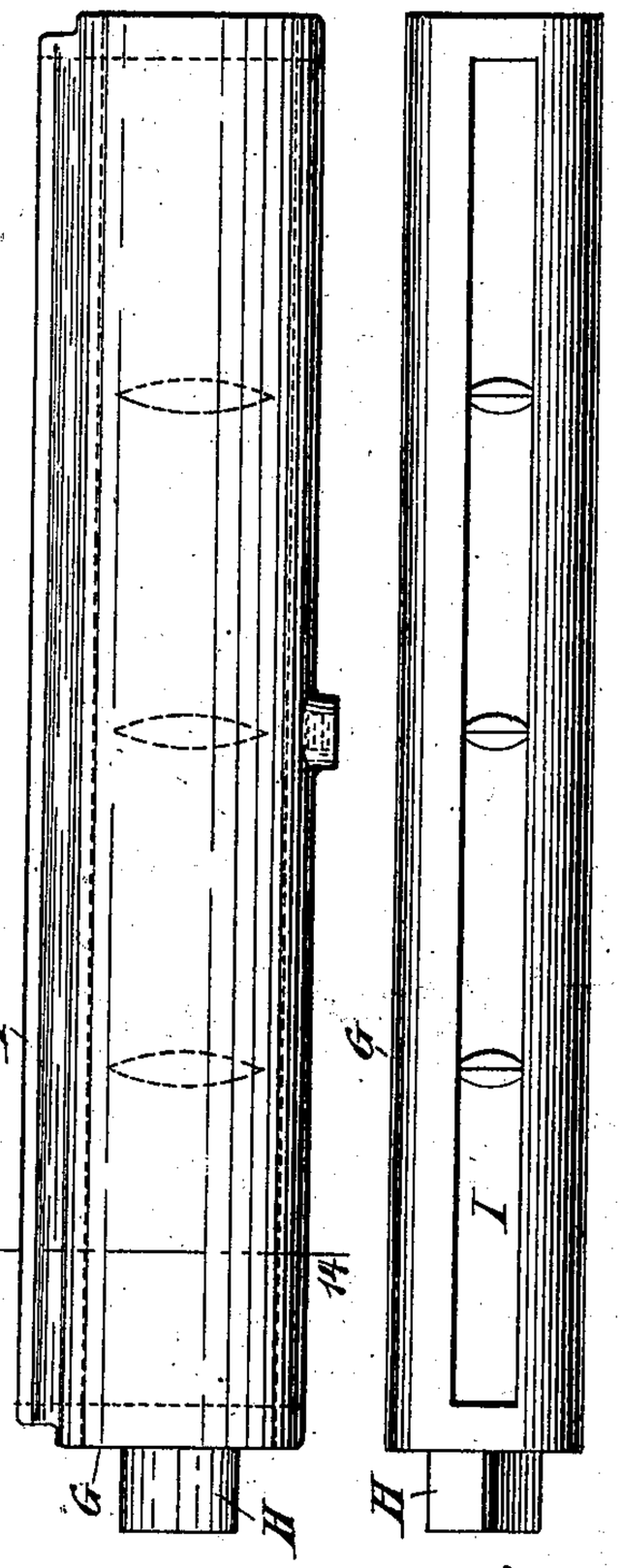

Fig. 8.

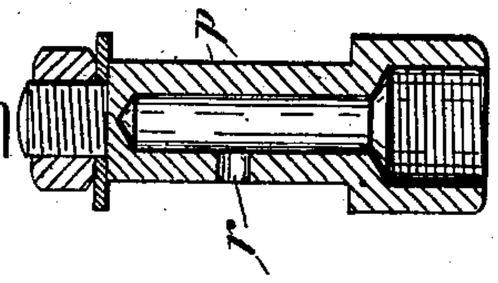

Fig. 9.

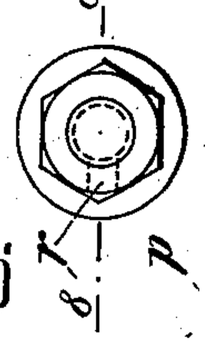

Fig. 6.

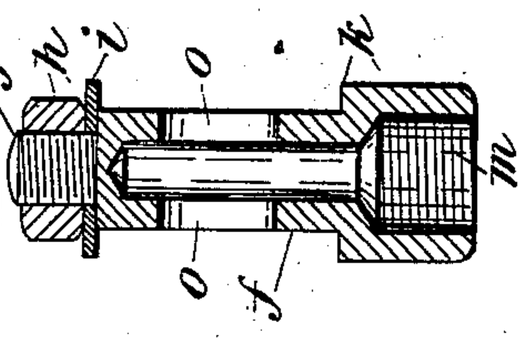

Fig. 7.

Fig. 12.

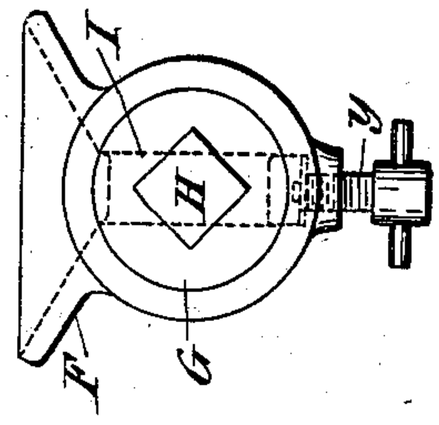

Fig. 15.

Fig. 14.

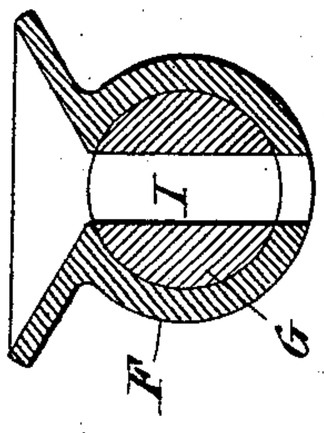

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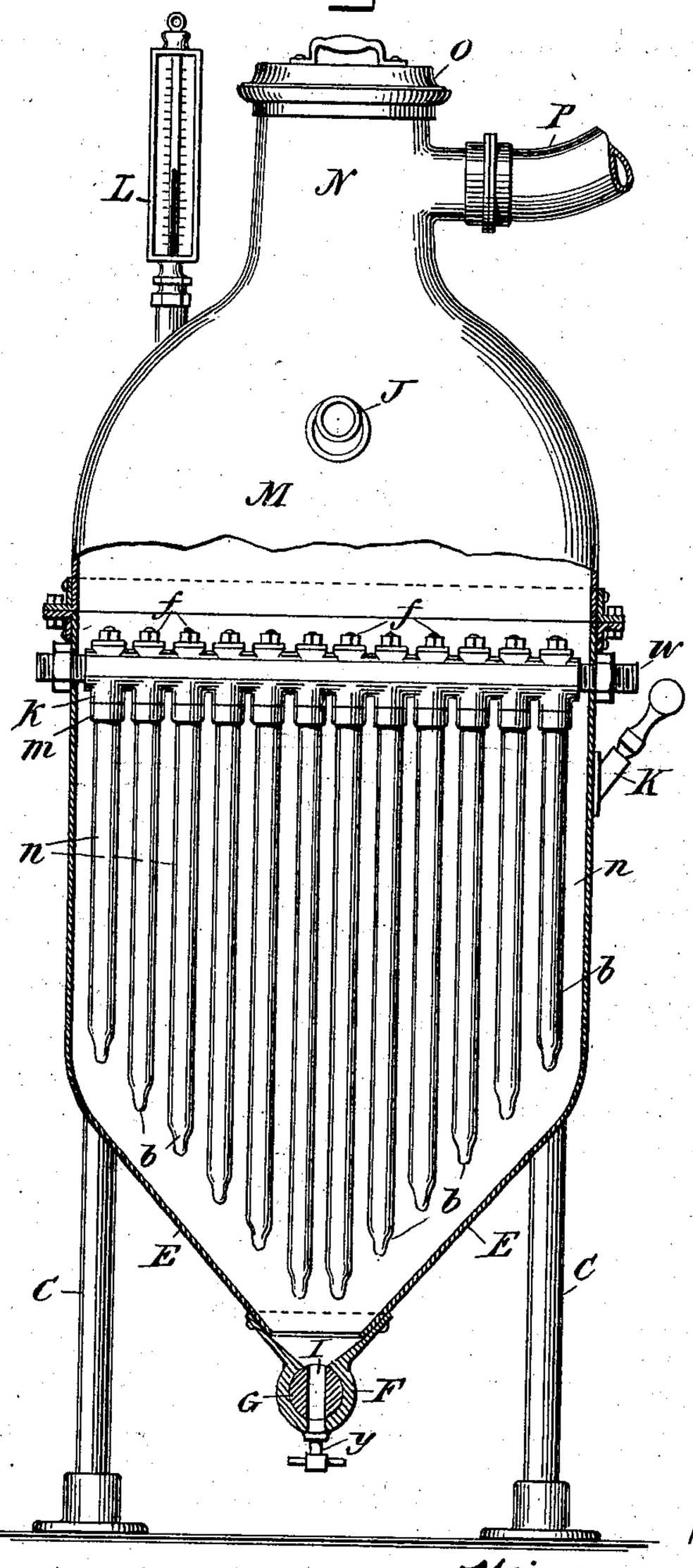
Fig. 16.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR COOLING SYRUPS.

SPECIFICATION forming part of Letters Patent No. 701,971, dated June 10, 1902.

Application filed January 9, 1899. Serial No. 701,583. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WALTER, a citizen of Switzerland, and a resident of Rosebank, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Apparatus for Cooling Syrups, of which the following is a specification.

The invention relates to improvements in apparatus for cooling syrup; and it consists in the novel features and combinations hereinafter described, and particularly pointed out in the claims.

The apparatus made the subject of this application is intended for the use of manufacturers of candy for cooling the syrup, which usually consists of melted sugar and glucose; and said apparatus consists, in general terms, of a substantially sealed receptacle having means for cooling its contents and connected at its upper end with an exhaust-pump or vacuum-pump and at a point below its upper end with a kettle containing the syrup. The lower end of the receptacle is provided with an elongated valve adapted to be opened and closed by hand and which when opened will permit of the automatic discharge of the cool syrup from the receptacle. By means of the apparatus described the air is extracted by means of the exhaust-pump from the receptacle, and by the operation of said pump the syrup is caused to pass from the kettle into said receptacle. Thus the hot syrup is automatically delivered to the cooling-receptacle by the means which extracts the air from said receptacle. Within the cooling-receptacle is suspended a head or frame from which depend a series of coils, preferably of copper, through which the cooling medium, such as water, is caused to flow for the purpose of cooling the syrup within the receptacle.

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

Figure 1 is a perspective view of an apparatus constructed in accordance with and embodying the invention. Fig. 2 is a front elevation of the head and cooling-coils removed from the cooling-receptacle. Fig. 3 is a side elevation of same. Fig. 4 is a top view of same. Fig. 5 is a sectional view of same on the dotted line 5 5 of Fig. 4. Fig. 6 is an enlarged central vertical section of one of the couplings for connecting the cooling-coils to the head from which they are suspended. Fig. 7 is a top view of same and indicates by the dotted line 6 6 the section on which Fig. 6 is taken. Fig. 8 is a view corresponding with Fig. 6 of another one of the couplings by which the cooling-coils are suspended. Fig. 9 is a top view of same and indicates by the dotted line 8 8 the section on which Fig. 8 is taken. Fig. 10 is a central vertical section, on an enlarged scale, of the cap at the upper end of the main cooling apparatus. Fig. 11 is a top view of same and indicates by the dotted line 10 10 the section on which Fig. 10 is taken. Fig. 12 is an enlarged front elevation of the lower end of the cooling apparatus and more especially of the valve and valve-casing constituting said lower end. Fig. 13 is a side elevation of same. Fig. 14 is a vertical section of the outlet-valve and its casing on the dotted line 14 14 of Fig. 13. Fig. 15 is a detached top view of the outlet-valve. Fig. 16 is a front elevation, partly broken away and partly in section, of the cooling-receptacle and cooling-coils, the latter being shown in place within said receptacle.

In the drawings, A designates a cooling-receptacle, which receptacle is supported upon suitable legs C. The receptacle A has the opposite vertical flat sides D D and opposite inwardly-converging sides E E, the latter extending inward and downward to the valve-casing F, which extends from one side D to the other side D of the receptacle A and contains the rotary valve G, adapted to be turned by means of a suitable key applied to the stem H. When the valve G is turned in one direction, it will close the lower end of the receptacle A, and when it is turned in the other direction it will permit the discharge of the contents of said receptacle through the elongated gate I in said valve. The gate I is indicated by dotted lines in Fig. 12 and in a position to permit the discharge of the contents of the receptacle A.

The receptacle A is supplied with a spy-

hole J, a try-hole K, and a thermometer L, and the upper portion M of the receptacle A is dome-shaped and terminates in a contracted upper end or neck N, upon which a cap O is applied and which is by means of a pipe P connected with a condenser Q, the latter by means of a pipe R being connected with a suitable exhaust-pump or vacuum-pump S. The pipe P is supplied with a suitable gage T. The cap O is seated upon a rubber gasket V, as shown more clearly in Fig. 10, held within a groove formed along the upper edges of the neck N. It will be well understood that when the exhaust-pump S is in operation or when the vacuum is formed within the receptacle A the cap O will firmly bind upon the gasket V and that when the pump S is not in operation or when the vacuum is not within the receptacle A the cap O may be readily elevated from said receptacle.

The receptacle A has at one side the coupling-nozzle W, to which the pipe X is connected. The pipe X leads from the kettle Y, containing the hot syrup, to the nozzle W of the receptacle A, and in the operation of the apparatus the hot syrup from the kettle Y is caused to pass through the pipe X and enter the receptacle A, due to the operation of the exhaust or vacuum pump S, as hereinafter more clearly explained.

Within the receptacle A and about on the same horizontal plane with the frame B is suspended the head *a*, (shown more clearly in Figs. 2, 3, 4, and 5,) which head supports the series of bent copper tubes *b*, which extend downward within the receptacle A and are varied in their length, as shown in Figs. 2 and 3, to correspond with the lower converging sides E of said receptacle. The head *a* is in one casting and comprises the sides *c d* and connecting-sections *e*, the latter being parallel with one another, as shown in Fig. 4, and connecting and communicating with the sides *c d*. The copper tubes *b* are independent of one another; but each tube has its legs connected with the head *a* by means of the couplings shown in Figs. 6 and 8. The coupling shown in Fig. 6 is lettered *f*, and all of the couplings in the sides *c d* are lettered *f* and correspond exactly with the coupling shown on an enlarged scale in Fig. 6. The sides *c d* are formed with through-apertures *g* to receive the couplings *f*, the latter being passed upward through said apertures *g* and being held in place by the nuts *h* and washers *i*, applied upon the upper threaded ends *j* of said couplings. The couplings *f* are hollow and at their lower ends are formed with the shoulders *k* and threaded nozzles *m*, the latter to receive the upper threaded end of one leg *n* of the outer side tubes *b*, while the shoulders *k* of the couplings *f* engage the lower tubular edges of the head *a*, as indicated in the drawings. The couplings *f* of the sides *c d* of the head *a* are hollow and within said sides *c d* are formed in their opposite sides with the elongated openings *o*, as shown in Fig. 6, through which the cooling agent, such as cold water, may pass. It may be considered that the side *d* of the head *a* is the inlet side for the cooling agent and that the side *c* of the head *a* is the outlet side for the cooling agent, and this being the case the cooling agent entering the end of the side *d* would pass through all of the couplings *f* at said side, (passing through the elongated openings *o*,) and thus be enabled to reach the legs *n* of all of the tubes *b* connected with said side *d*. The cooling agent entering the side *d* and finding its way in the manner hereinafter described through the line of tubes *b* to the side *c* will be enabled by means of the elongated openings *o* in the couplings *f*, connected with said side *c*, to pass through said side *c* to the outlet from said side *c*. Thus the couplings *f* (shown in Fig. 6) are provided for the sides *c d* alone, whereas the couplings lettered *p* and shown on an enlarged scale in Fig. 8 are provided for the connections *e* intermediate the said sides *c d*. The couplings *p* pass through the vertical apertures *q* in the connections *e* and are identical in construction with the couplings *f* of the sides *c d*, with the exception that they (said couplings *p*) omit the elongated openings *o o* and possess in lieu thereof the one small opening *r* in one side thereof.

In all instances where both legs of the bent tubes *b* are connected with the sections *e* of the head *a* the couplings *p* of the character shown in Fig. 8 are employed to effect this connection, and likewise the legs *t* of the tubes *b*, which have one leg connected with the sides *c d*, are, as indicated in Fig. 5, connected with the sections *e* by means of the couplings *p*. The cooling agent, which enters the side *d* of the head *a* and passes through the openings *o* of the couplings *f*, will pass downward through the legs *n* of all of the tubes *b* connected with said side *d*, and will then ascend through the legs *t* of said tubes *b* and enter the couplings *p* at the upper ends of said legs *t*, whence said cooling agent will pass through the openings *r* of said couplings *p* and, passing through a short space of the sections *e*, will enter the corresponding openings *r* of the adjacent couplings *p* and thence descend through the legs of the tubes connected thereto and ascend through the other legs of said tubes to like couplings *p*, supported in said sections *e*. The cooling agent passes in continuous circulation through all of the tubes *b* connected with the sections *e*, escaping from one coupling *p* through the opening *r* therein and entering the adjacent coupling through the like opening *r* therein, and finally ascending through the outer legs of the last row of tubes *b* and entering the couplings *f*, connected with the side *c*, from which it will escape to the outlet, as above explained. It will thus be seen that the cooling agent fills the side *d* of the head *a* and thence

passes along independent lines through the sections *e* and the tubes connected therewith to the side *c*, which constitutes the outlet side of the head *a* for the cooling agent. The tubes *b* all extend downward into the hot syrup within the main receptacle A, and hence the effect of the cooling agent passing through said tubes *b* is to cool said syrup. The head *a* will be suspended within the receptacle A upon nozzles *w x*, (shown in Fig. 1,) which will be utilized as a means of connection for the supply and delivery pipes for the cooling agent, which will be delivered to the head *a* and tubes *b* under pressure.

The couplings *f p* in connection with the tubes *b* and head *a* are novel in construction, and a further novelty in this part of the apparatus consists in the construction of the middle or bent portions of the tubes *b*. It will be observed upon reference to Figs. 2, 3, and 5 that the bent portions of the tubes are less in diameter than the other portions of said tubes, and this is due to the fact that in the manufacture of said tubes I reduce the diameter of the middle portions thereof by spinning it about one-half of the diameter of the other portions of said tubes, and in this way I change the physical character of the metal of said tubes at their central portions to such extent that I am enabled to form the bend in said tubes with the greatest ease and facility and without the slightest injury to the tubes themselves. The tubes *b* are therefore each in a separate piece of metal and seamless, and the bent portions of the tubes do not become flattened transversely during the bending of the tubes, and the reduced diameter of the bent portions of the tubes creates a sufficient retardation in the flow of the cooling agent to enable said agent on its passage through the tubes to extract the maximum amount of heat from the hot syrup.

The casing F for the rotary valve G is secured to the lower contracted end of the main receptacle A, as illustrated in Fig. 1, and this valve G is in the form of a cylinder having an elongated slot or gate I cut through it and adapted when turned into a vertical position to form a direct outlet from the receptacle A. The opposite sides of the valve G will for the purposes of strength be connected together at several points intermediate their ends by rounded or tapered pieces of metal, as indicated by the dotted lines in Fig. 13, said pieces of metal being rounded or tapered, so as to present the least possible obstruction to the outward passage of the cooled syrup. When the valve G is turned so that the gate I is not in line with the vertical center of the receptacle, the lower end of the latter will be thereby closed, and in order that the closure may be entirely complete and at all times effectual I provide in the valve-casing below the valve a tightening-screw *y*, which when the valve is closed may be screwed upward against the body of the valve in order to drive the latter tightly against the upper surfaces of the valve-casing F.

In the operation of the apparatus hereinabove described, the exhaust or vacuum pump S having been set in motion and the hot syrup having been placed within the kettle Y, the air will be exhausted from within the receptacle A, and the hot syrup will thereby be caused to flow upward through the pipe X and fill the body of the receptacle A and pass around and between the cooling-tubes *b*, which become submerged within the hot syrup. The cooling agent will, by well-known means, be circulated through the cooling-tubes *b*, and the pump S will continue its operation to a sufficient extent to draw off the air and ascending moisture from the upper dome-like portion M of the receptacle A. The hot syrup is thus by means of the pump S and the exhaust within the receptacle A created thereby caused to enter the said receptacle A and to become cooled substantially in the presence of a vacuum. The operation of the apparatus is, as shown, substantially automatic and efficient, and the delivery of the hot syrup to the receptacle is rapid and convenient, and the cooling of the syrup after it has entered the receptacle A is rapid and effectual. After the syrup has become cooled the valve G will be opened and the contents of the receptacle A allowed to pass out through the elongated gate I, formed in said valve. The sides D D of the receptacle A are flat and vertical and form no obstruction whatever to the outward passage of the cool syrup, while the sides E E of said receptacle converge downward toward the valve G and serve to aid in directing the cooled syrup to said valve. By having the sides D D of the receptacle A flat and vertical I am enabled to secure the maximum extent of elongation in the gate I of the valve G, and thus by the form of the receptacle A illustrated the greatest facility for the discharge of the syrup is attained.

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

1. The cooling-receptacle, combined with the cooling-coil mounted therein and comprising the head *a* having the hollow sides *c*, *d*, and series of hollow sections *e* connecting and in communication with said sides, the bent tubes *b* suspended from said head, the hollow couplings *f* extending vertically through said sides and having the side openings *o*, *o*, therein, and the hollow couplings *p* extending vertically through said sections *e* and having therein at one side the opening *r*, the said couplings *f* being in communication with the outer leg *n* of the outer side tubes *b*, and the couplings *p* being in communication with the leg *t* of said outer side tubes *b* and also in communication with the legs of the tubes *b* suspended from said sections *e*; substantially as set forth.

2. The receptacle, and the cooling-coil

mounted therein, the latter consisting of the head and the seamless bent copper tubes *b* suspended therefrom, the middle portions of said tubes prior to their being bent being concentric with and materially less in diameter than the other portions of the tubes; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 30th day of December, A. D. 1898.

WILLIAM WALTER.

Witnesses:
CHAS. C. GILL,
ANNA V. BRODERICK.