

No. 843,555.

PATENTED FEB. 5, 1907.

E. WEYMAR.
PROCESS FOR CLEANING BOTTLES AND THE LIKE.

APPLICATION FILED NOV. 3, 1904.

4 SHEETS—SHEET 1.

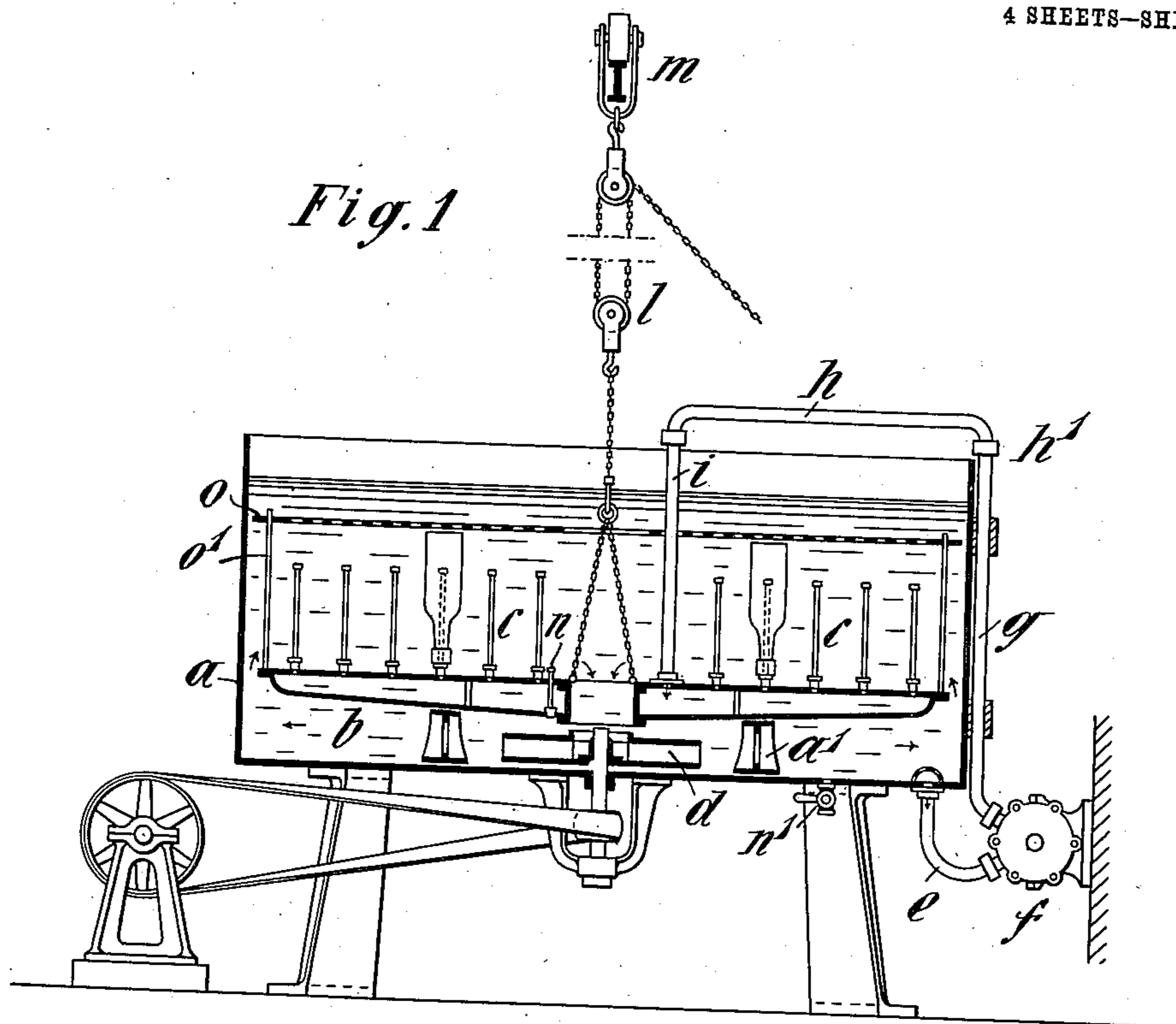
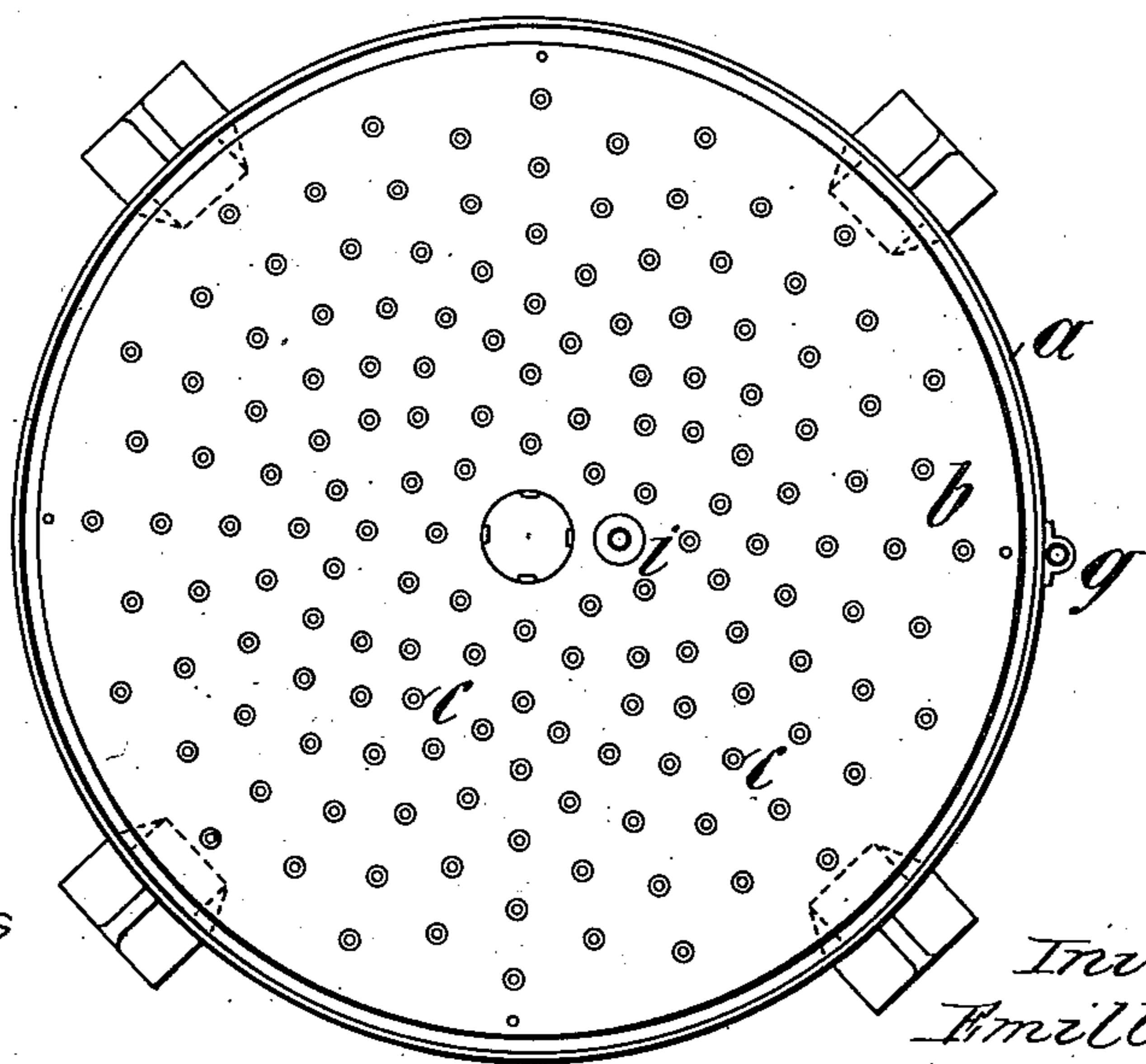


Fig. 2



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Fig. 3

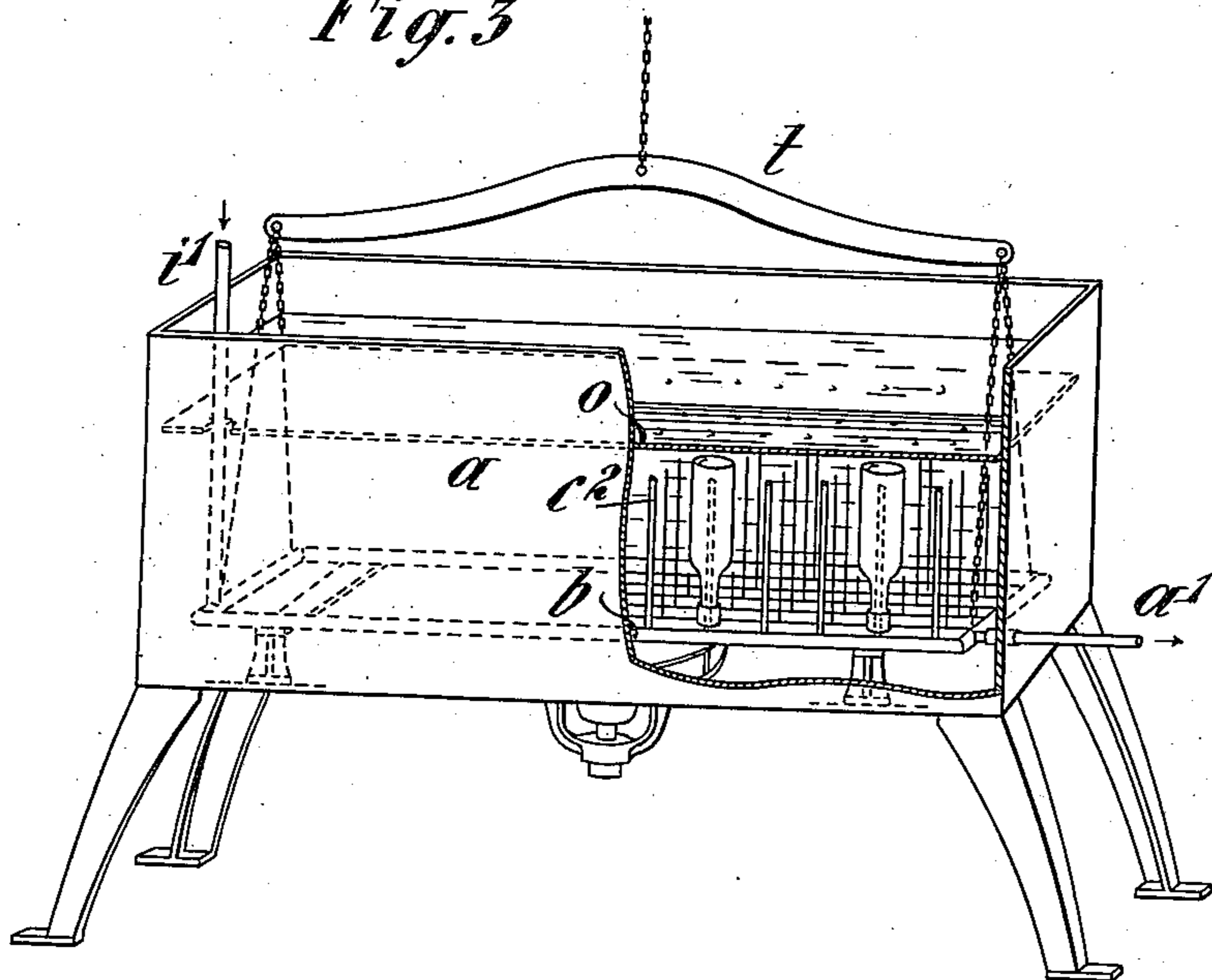


Fig. 4

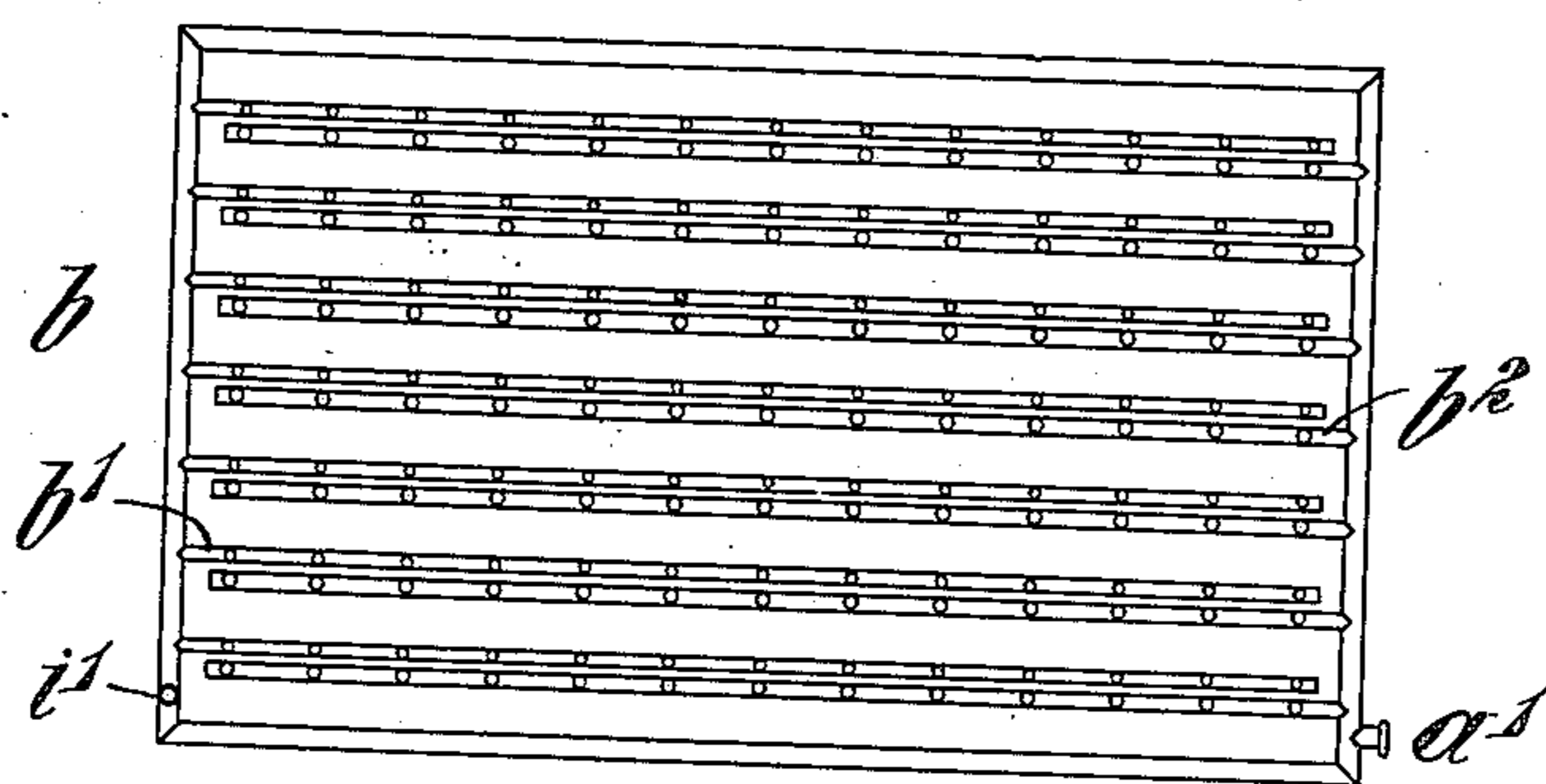
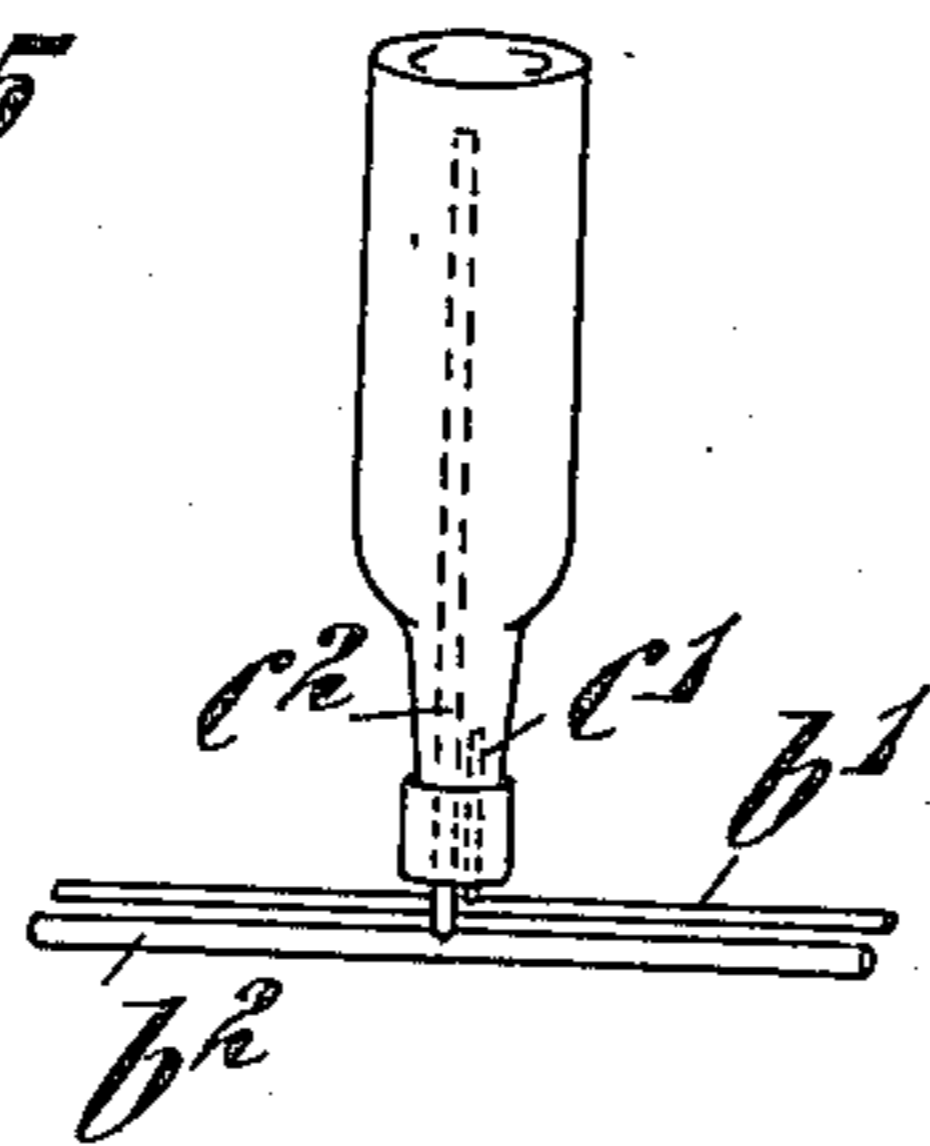


Fig. 5



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Fig. 6

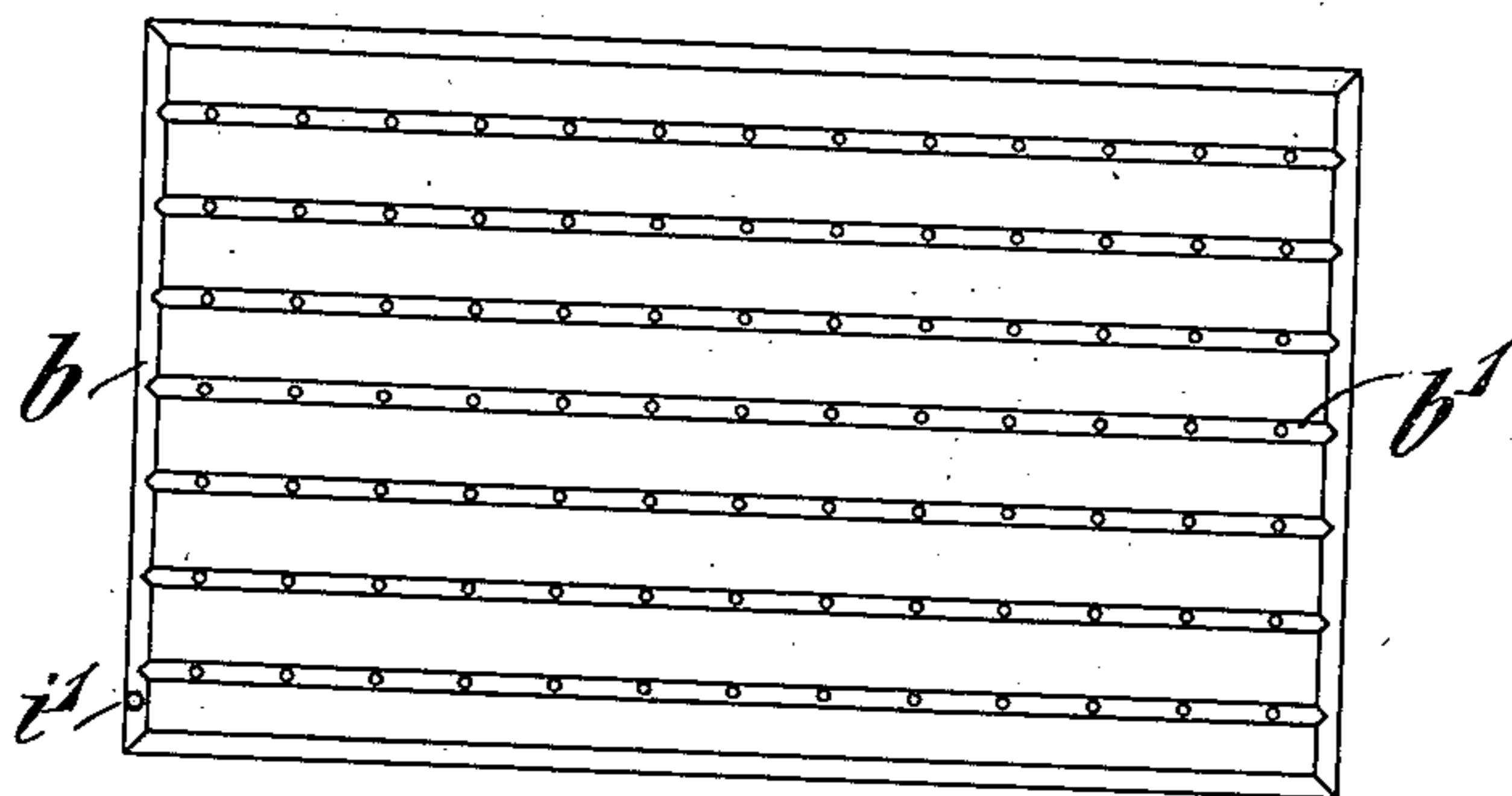


Fig. 7

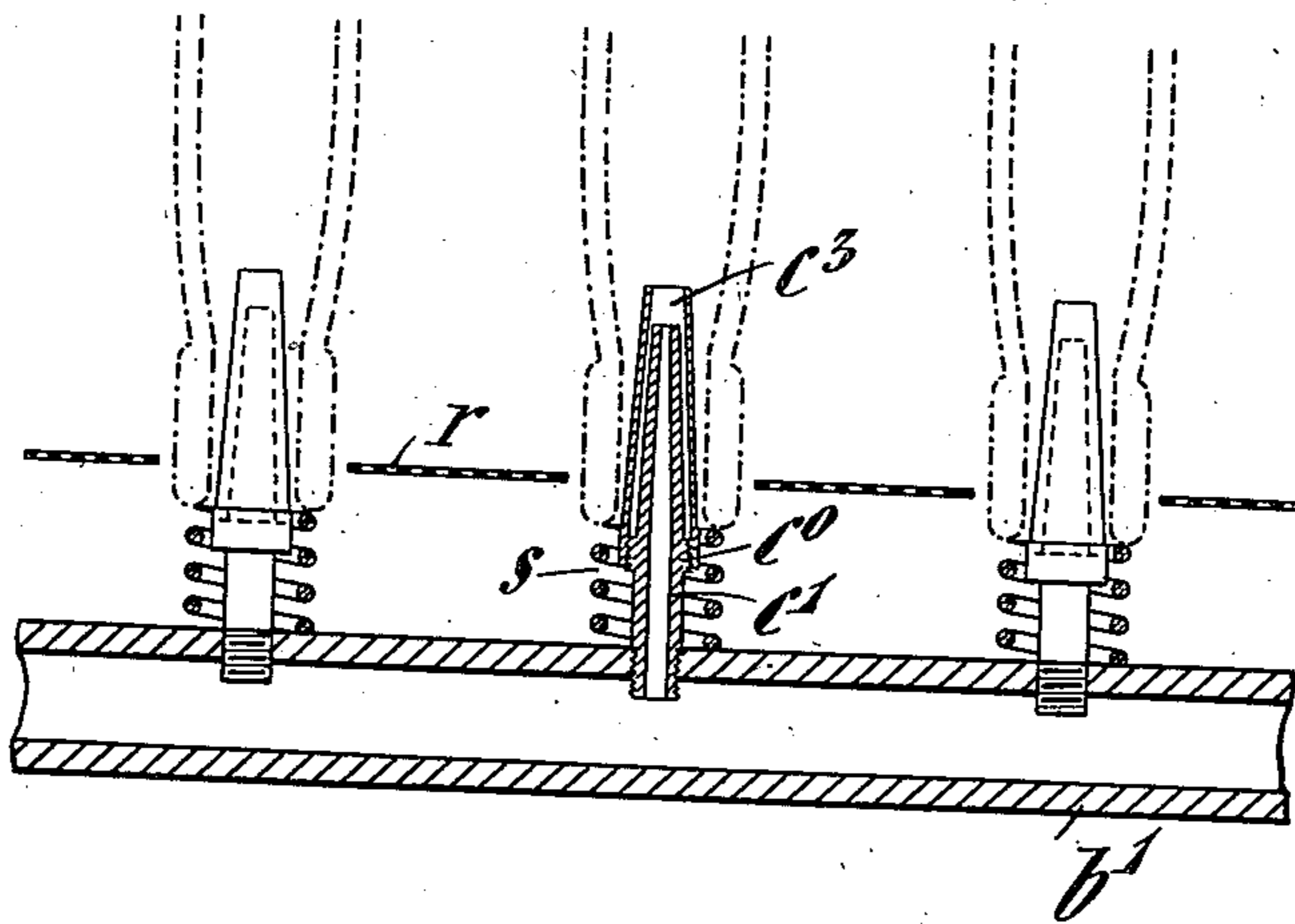
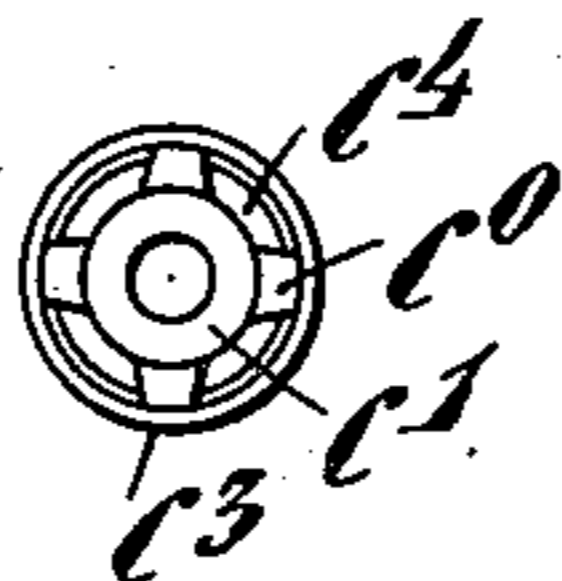


Fig. 8



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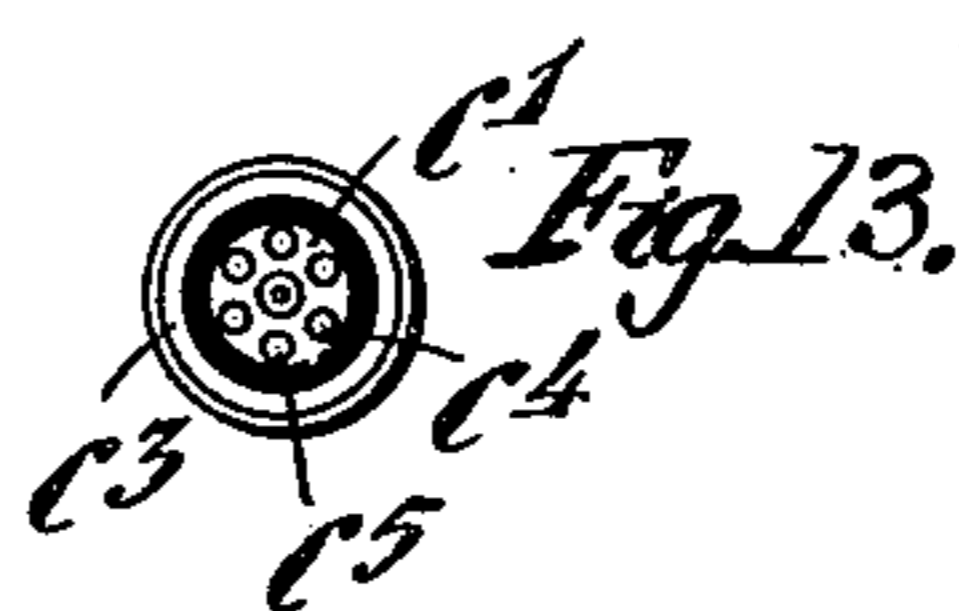
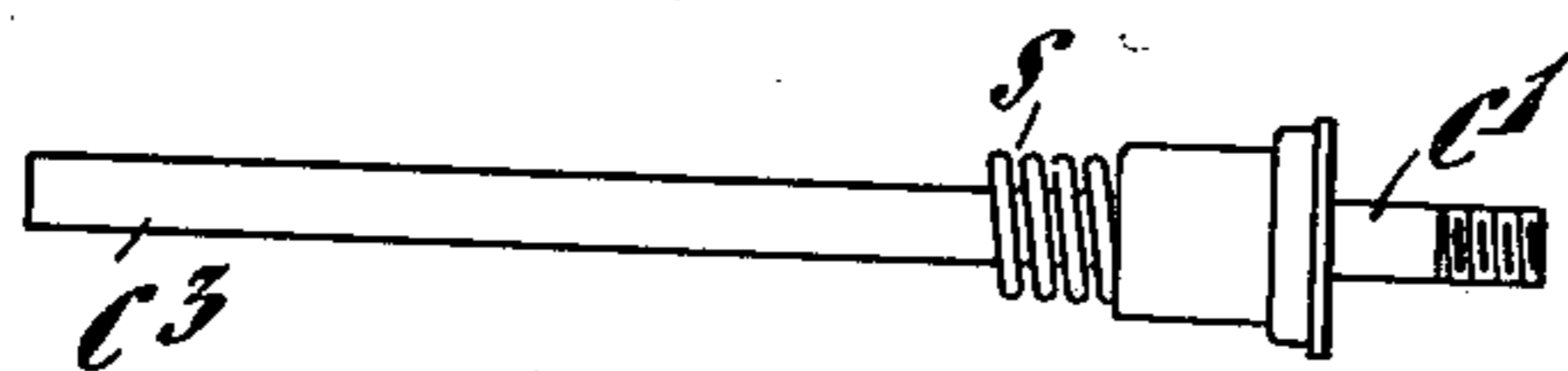
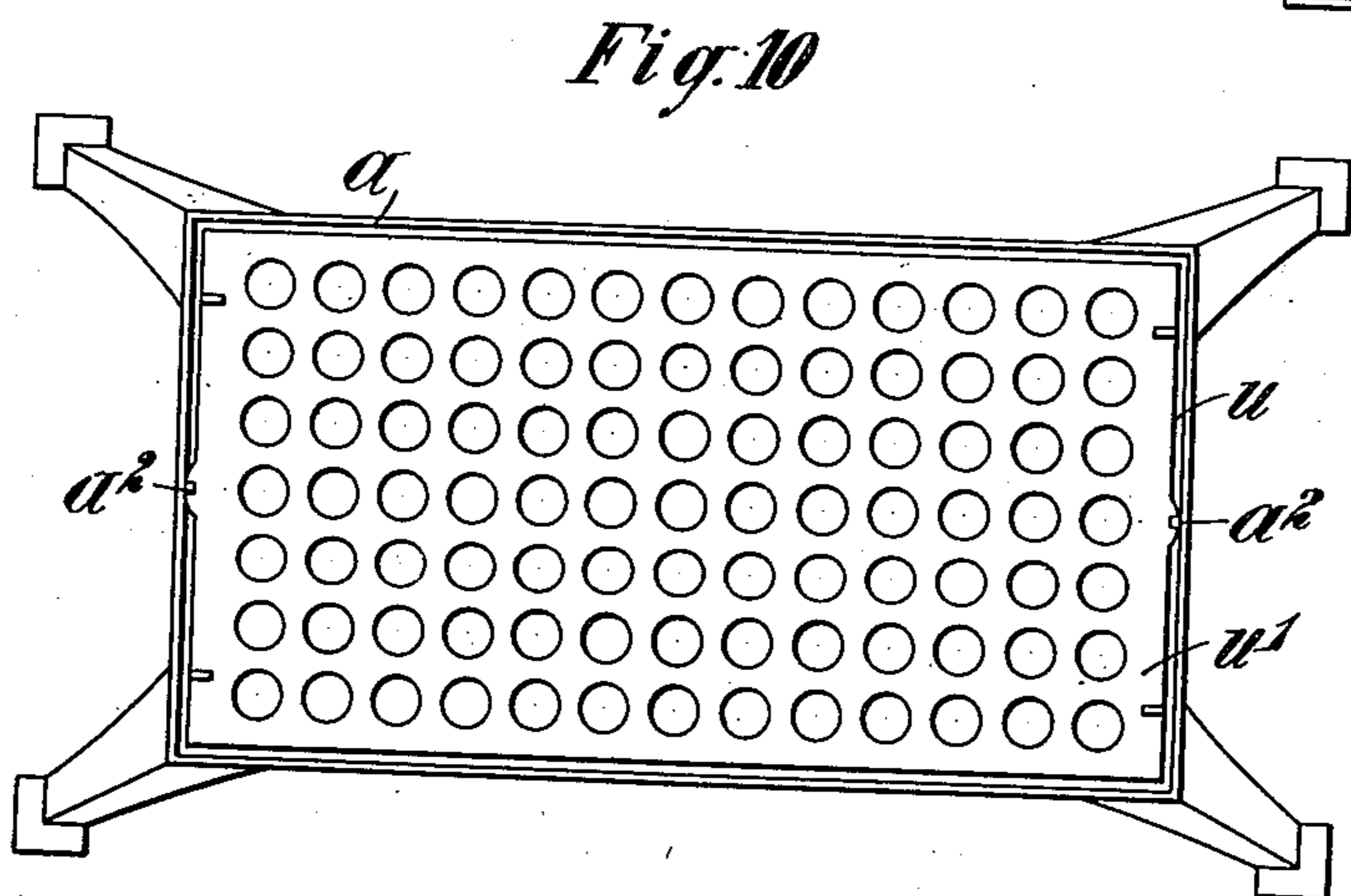
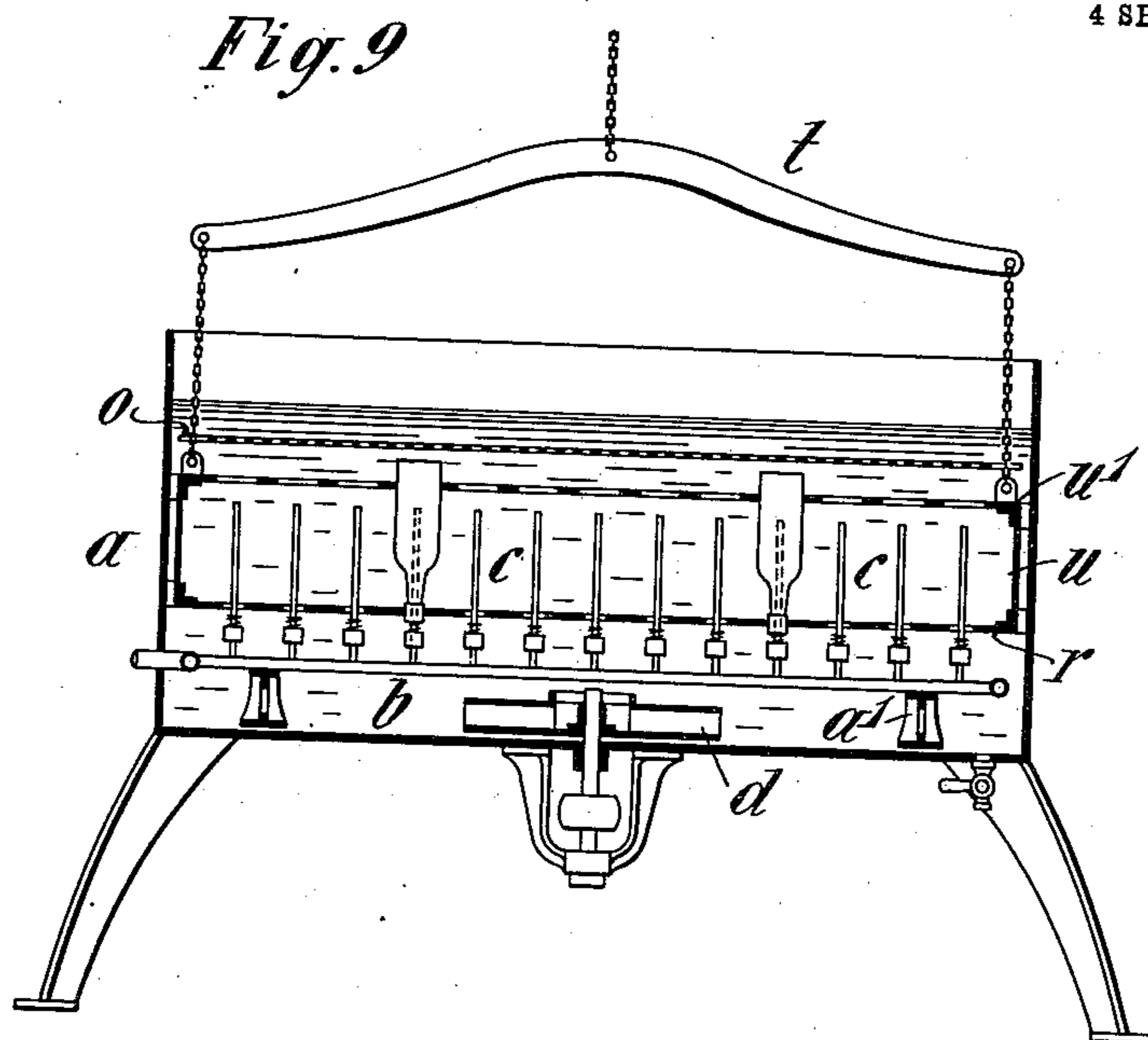
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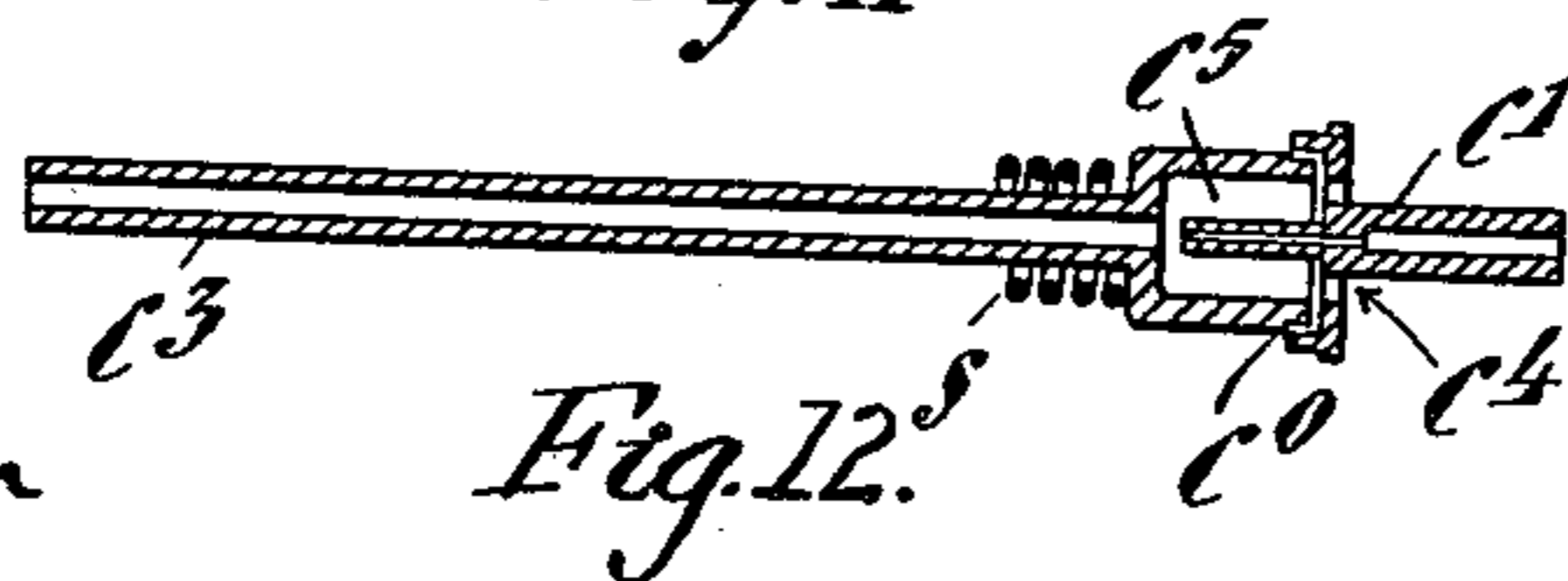
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UNITED STATES PATENT OFFICE.

EMIL WEYMAR, OF MÜHLHAUSEN, GERMANY.

PROCESS FOR CLEANING BOTTLES AND THE LIKE.

No. 843,555.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed November 3, 1904. Serial No. 231,220.

To all whom it may concern:

Be it known that I, EMIL WEYMAR, a subject of the King of Prussia, Emperor of Germany, residing at Mühlhausen, in Thüringen, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Processes for Cleaning Bottles and the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to a process for washing or cleaning bottles or other vessels open at one end, such as jugs, glasses, tins, and the like.

The invention consists in immersing the inverted bottles in a cleansing-machine and in agitating the fluid contained in the machine to wash the exterior surfaces of the bottles and at the same time forcing the fluid into the bottles to wash the interior surfaces thereof.

In order to carry out this process, one or more vessels which contain the liquid with which the bottles are to be internally and externally cleansed are employed, on the one hand, and, on the other hand, special suitably-constructed holders provided with means (tubes) upon which the bottles can be placed and which serve for the supply of the washing liquid or of the compressed air operating on the latter are also employed. The one or more above-mentioned vessels can be provided with devices for setting in motion the liquid in the respective vessels, and they possess, moreover, pipes leading to a pump in case the liquid is also to serve for washing out the bottles, whereas with the utilization of compressed air the above-mentioned devices for setting the liquid in motion can be omitted and likewise the pump and its connecting-pipes be dispensed with. Into these vessels which are filled with the liquid are let down the holders, which have been charged with the dirty bottles and which have been brought from the store-room—for example, by means of a crane—to the washing-room, said holders being let down by suitable means, such as pulley-blocks. Thereupon the connection of the pressure-pipe of the pump or of the compressed-air pipe with the apparatus is produced. The liquid in the

vessel is set in motion, the pump is set going, or the compressed-air-pipe cock is opened, and the purification of all the bottles begins immediately, both internally and externally.

The above-mentioned device is represented in several constructional forms in the accompanying drawings, which serve as examples for the elucidation of the invention, which is not confined to one determined form.

In said drawings, Figure 1 is a vertical longitudinal section of a device for cleaning bottles, the liquid in the vessel being employed for washing out the bottles. Fig. 2 is a plan of the vessel and of the bottle-holder shown in Fig. 1. Fig. 3 is a device for washing bottles, compressed air being employed for the washing out of the same, said figure being a perspective view of the device, a part of the wall of which is broken away to show internal parts. Fig. 4 is a plan of the tube-network employed in the apparatus shown in Fig. 3. Fig. 5 is a detail view of a bottle inserted on a part of the holder shown in Fig. 4. Fig. 6 is a plan of a tube-network for use in a modified form of the device shown in Fig. 3 when using compressed air. Fig. 7 shows in part sectional side elevation the nozzle arrangement of a tube-network according to Fig. 6. Fig. 8 is a plan of one of said nozzles. Fig. 9 is a vertical section of a modified form of the device shown in Fig. 3 with a fixed tube-network and a movable auxiliary frame. Fig. 10 is a plan of the device shown in Fig. 9, some parts being removed. Fig. 11 is a side elevation, Fig. 12 a longitudinal sectional view, and Fig. 13 a cross-section view, of the nozzle used in connection with the form of device shown in Fig. 9.

In the case of the constructional forms shown in Figs. 1 and 2 the device consists of the suitably-constructed vessel *a* for the reception of the cleansing and washing liquid and of the holder *b*, which is, for example, constructed as an approximately flat closed vessel, which possesses on its upper surface mandrels *c*, which are in the form of tubes, said mandrels being employed for holding the bottles. Said tubes are connected with the interior of the holder *b*. The vessel *a* possesses on its bottom a device—for example, the centrifugal device *d*—in order to set the liquid in rapid motion or rotation. A

central opening in the holder *b* corresponds with this centrifugal device, the liquid above the holder being thereby enabled to flow to the centrifugal device. From the bottom of the vessel *a* a suction or delivery tube *e*, provided with a strainer, leads to the pump *f*, and from the latter the pressure-tube *g* leads to the swinging tube *h*, which is revolvably mounted at *h'*. Said tube *h* can be connected in a suitable manner with the tube *i*, leading into the interior of the holder *b*.

The holder *b* is suspended by means of chains and can be raised or lowered by means of a pulley-block *l* and can be conveyed away by means of a crane or conveyer provided with the wheel *m*. The holder *b* is suspended in the reservoir either freely on its chain or it is set upon suitable blocks *a'*.

n is a valve for discharging the holder, and *n'* is a cock for emptying the vessel *a*.

o is finally a perforated cover which can be held over the holder *b* in a suitable manner—for example, by means of the rods *o'*.

The holders *b* after having been charged in the store-room with the dirty bottles and having then been brought by means of the crane or conveyer to the washing-room are let down into the liquid in the vessel *a*, and the perforated cover *o* is then placed upon the bottles in order to weigh down the same.

The swinging tube *h* is hereupon connected with the tube *i*, and the centrifugal device and the pump are set in action. The liquid in the vessel *a* is hereby set in rapid motion in the direction indicated by the arrows in Fig. 1 in order to cleanse the external surfaces of the bottles. The pump *f* simultaneously by its suction action draws the liquid from the vessel and drives the same into the holder *b* and through the tubes *c* directly into the individual bottles, and thereby washes out the latter. In consequence of the fact that the bottles are let down perpendicularly into the liquid and in consequence of their being weighed down by the cover *o* the bottles remain filled with air, and the liquid which is forced in immediately runs back into the vessel *a*, whereupon it can be used once more.

The constructional form represented in Fig. 3 also corresponds to this arrangement; but a tube-network (see Fig. 4) is there employed as a holder *b*, said network consisting of the (thinner) air-admission pipes *b'* and of the (thicker) air-outlet pipes *b''*. Both sets of pipes possess the mandrels for the support of the bottles, said mandrels each consisting of two small tubes *c'* and *c''* for each bottle, or (see Fig. 5) the bottle is placed on the air-supply tube *c''* of the outlet system *b''*, which latter tube *c''* projects nearly to the bottom of the bottle, whereas close to this tube *c''* the air-admission system *b'* by means of a branch *c'* of small diameter projects a short way up into the bottle. The air-admission pipes *b'*

are all connected with the pipe *i'*, through which compressed air is led to the holder *b*—that is, to its tubes *b'* and *c'*—whereas the air-outlet system opens in a pipe connection, which at the height of the mouth of the bottles is connected, by means of a piece of tubing, with the outlet-tube *a'*, situated laterally on the vessel *a*, so that the air can escape unimpeded and without counter-pressure. The kind and the action of the cleaning or washing out of the bottles in the case of this form correspond, essentially, with that described in Fig. 1. Nevertheless it is to be noticed that in this case in consequence of the air-outlet tubes *c''* projecting into the bottles nearly to their bottoms the bottles become full when they are placed with the holder *b* in the liquid. After starting the device compressed air enters through the tubes *c'* into each bottle, bubbles vigorously through the liquid in the bottles, so that it serves to supply the force for moving the liquid in the bottles, and thereby cleans the bottles and leaves again at the air-outlet *a'*.

The holder *b* in the case of the embodiment shown in Fig. 3 is adapted to be removable from the vessel *a* in the same manner as in the constructional form shown in Fig. 1, this being effected in a suitable manner by means of the chain of a carrier *t* of the pulley-block, which chain can be hooked onto the tube-network after the piece of piping leading to the exit-tube *a'* has been taken off.

In the following description the use of air as a driving force and as the force moving the cleaning liquid will be elucidated in detail, and likewise a special suitable constructional form of the device adapted to this purpose will be described.

The modification of the process consists accordingly, essentially, in the bottles or other vessels, open at one end and placed on a common tube-network, being dipped into the cleaning liquid of the reservoir *a*, whereupon air is conducted or forced, by means of the tube-network, into the separate bottles, which air mixes with the cleaning liquid, and hereby brings about the washing out of the bottles, in their interior simultaneously also, however, with the cleansing of the bottles outside on account of the motion or circulation of the liquid in the reservoir *a*, which is produced by said air, so that no special means are required any longer exclusively for the latter purpose, although such may be added in order to reinforce the action. Accordingly the device serving to carry out this further evolved process, as well as the vessel *a* for holding the cleaning or washing liquid, consists of a holder *b*, which in contrast with the constructional form shown in Fig. 4 is formed as a simple tube-network, which possesses a suitable number of air-nozzles (injectors) on which the bottles can be set. These nozzles are so arranged that the com-

pressed air on passing out acts as a driving force, driving the liquid in the vessel *a* into the interior of the bottles, and so effects the washing out of the latter. This compressed air then, however, immediately leaves the bottles again through the liquid in which the bottles stand immersed, bubbles upward, and hereby causes the cleansing of the stopper devices and of the outside surfaces of the bottles.

The bottle *b* (represented in Fig. 6) is in the form of a tube-network, with the air-distribution pipes *b'* and the tube *i'* for the admission of the compressed air. The small air-tubes *c'*, Fig. 7, are arranged or screwed on the air-pipes *b'*, said tubes *c'* possessing a screw-thread *c⁰*, on which a second small tube *c³* is screwed. On the tube *c'* or in the screw-thread *c⁰* channels or incisions *c⁴* (compare Fig. 8) are provided, which lead into the interior of the outer tube *c³*. These nozzles serve for the setting on of the bottles, and, indeed, it is advantageous for the channels *c⁴*, serving for the conduction of the liquid into the nozzle to be removed a sufficient distance from the bottle-mouth. This is effected by means of a spiral spring *s* or the like placed over each nozzle on which the bottle-head is adapted to sit, so that the bottles come accordingly between these springs and the cover *o* into a position in which they are not able to be displaced. Over the whole of the tube-network *b* a moderately fine-wire-gauze sheet *r* is stretched in a suitable manner, through which the nozzles project and in which and around each nozzle an opening of such a size is provided that the head of the bottle can be brought through this hole onto the spiral spring, the stopper devices resting on the wire-gauze *r*.

When the holder *b*, as described above, is brought into the reservoir *a* with the cleaning liquid, the compressed air is led into the tube-network by means of the air-pipe *i'*. The nozzles then perform their work. The air leaving through the tube *c'* and carrying with itself the liquid through the channels *c⁴* enters through the tube *c³* into the interior of the bottle, out of which the liquid and air pass through the bottle-mouth back into the reservoir and here set the liquid in violent motion or pass upward, cleaning the outside surfaces of the bottles and their stopper devices. In order to reinforce the cleansing action, fine sand or fine shot can also be brought into the reservoir, which sand or shot is carried in and against the bottles by the circulation of the liquid, and, indeed, as special stirring means *d* would be in this case dispensable, the holder *b* can be let down nearly to the bottom of the reservoir *a*, so that the air passing out of the bottles whirls round the sand or the shot from the bottom of the reservoir *a*, so that said sand or shot is

also not sucked up by the nozzles. Impurities, particularly labels, which come loose during the washing of the bottles, are thereby kept away by the wire-gauze *r* from the bottle-mouths and nozzles, so that they are not drawn in by the latter. These impurities remain on the gauze after the holder has been taken out and can afterward be easily removed before the holder is recharged.

A tube-network with air-nozzles, as above described, can also be constructed in the form according to Figs. 9 and 10. In this case, however, the tube-network *b* is not removable; but it remains resting continuously on blocks *a'* in the vessel *a*. A special auxiliary holder serves for the insertion, removal, and carriage of the bottles, said auxiliary holder consisting, essentially, of a movable frame *u*, adapted to be attached to the pulley-block and to be moved by means of the crane, which frame may consist of metal sheet or have one or more sheets, which latter sheets possess a number of openings or holes corresponding in number and position to the nozzles *c c' c²*, respectively. In Figs. 9 and 10 the frame *u* is connected below with the sheet *r* and above with the sheet *u'*, both of which, as can be seen, have the above-mentioned openings or holes. In or upon these openings of the auxiliary frame the bottles are placed upside down. The auxiliary frame, guided on the fixed guide *a²*, is hereupon let into the vessel *a* and the bottles without further trouble fit on their respective nozzles—that is to say, the latter penetrate through the openings of the sheet *r* of the frame into the bottles and support the latter, while the auxiliary frame sinks downward toward the frame *b*. The bottles are also here held firmly in the liquid by means of the perforated sheet *r*, which after the auxiliary frame has been charged can be immediately laid on the latter and transported with the same.

The nozzles, Fig. 11, here shown correspond in their arrangement with the nozzles explained with reference to Figs. 7 and 8; but nevertheless the tube *c³* in this case possesses at its bottom end or foot an extension for the formation of a mixing-chamber *c⁵* for the air streaming in through *c'* with the water entering through *c⁴*. This extension simultaneously serves also as an abutment for the spring *s*.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The herein-described process of cleaning bottles which consists in immersing them inverted in a body of cleaning fluid, and forcing washing fluid into the interior of the bottles with compressed air, substantially as described.

2. The herein-described process of cleaning bottles which consists in simultaneously immersing a plurality of bottles in an inverted position in a body of washing liquid, 5 agitating the liquid, and forcing a portion of said liquid into the interior of the bottles, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

EMIL WEYMAR.

Witnesses:

CARL RUPPERT,
RICHARD WIENRICH.