March 27, 1951 V. CHRISTINA 2,546,385

APPARATUS FOR WASHING AND STERILIZING MEDICINAL CONTAINERS

Filed Nov. 29, 1944 2 Sheets-Sheet 1

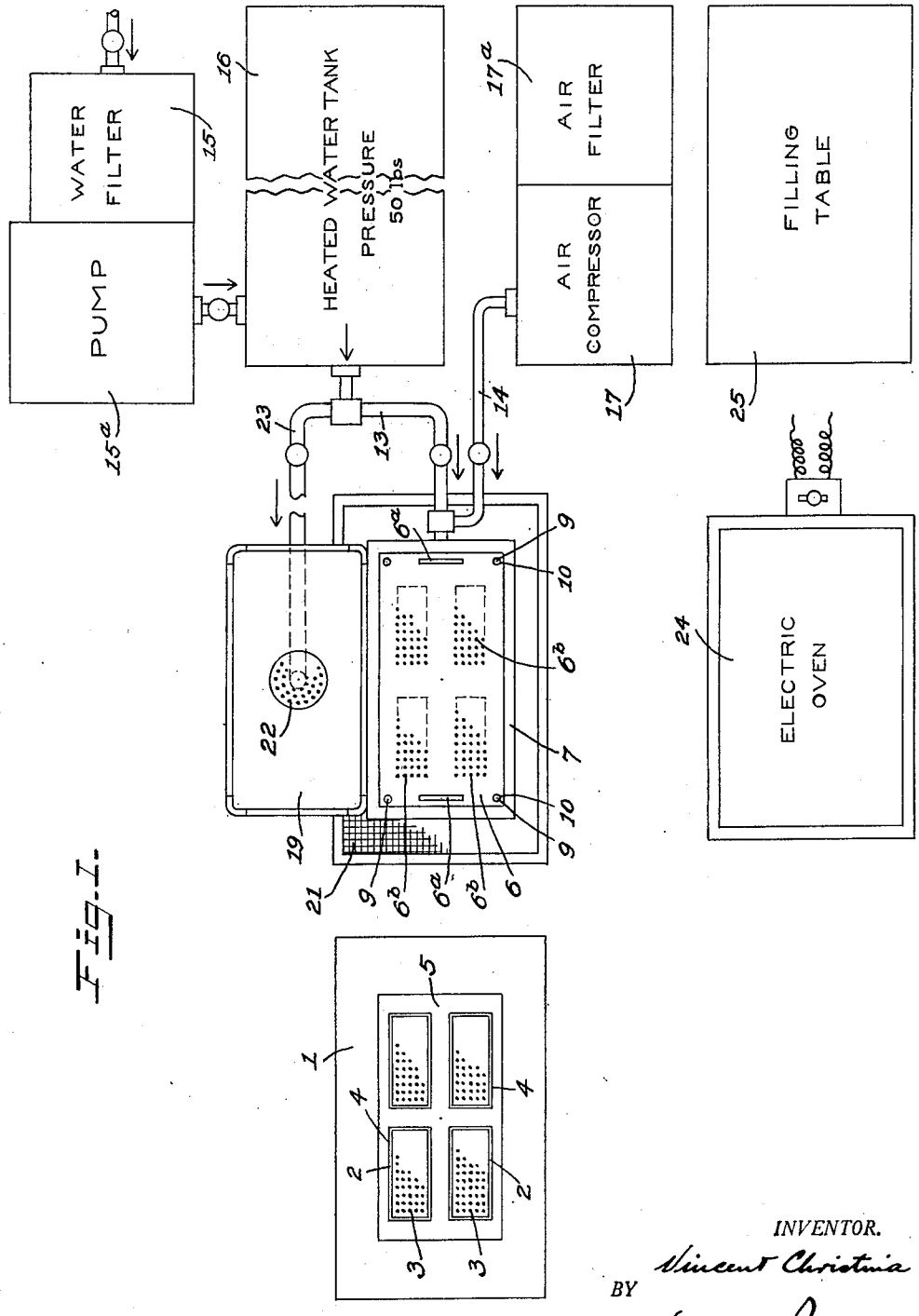


Fig. 1.

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Fig. 2.

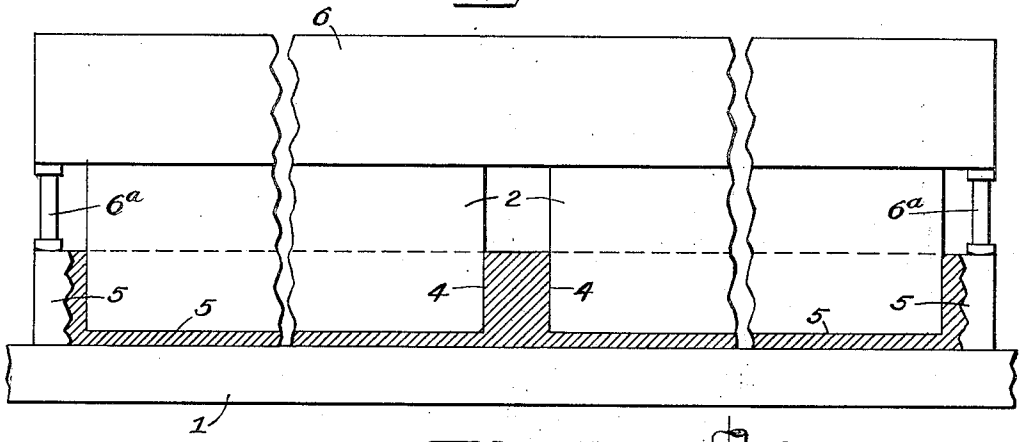
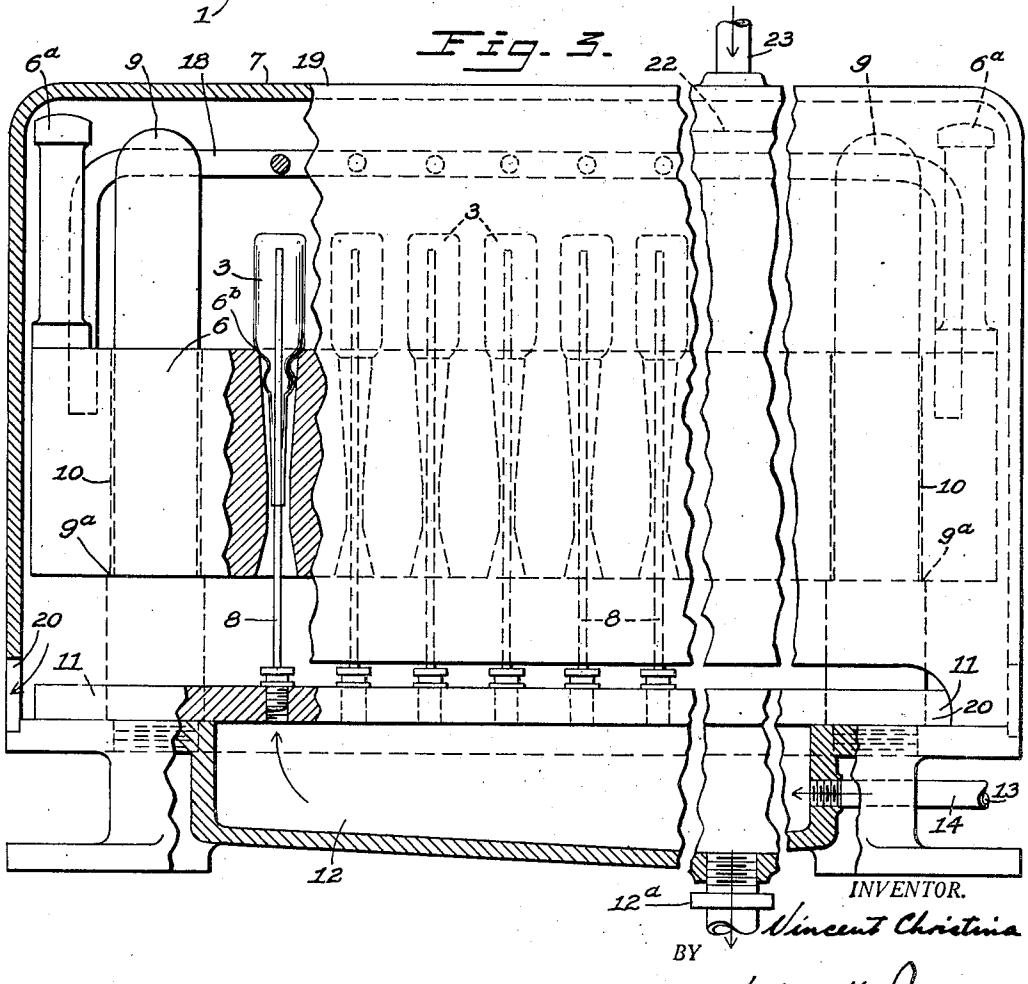


Fig. 3.



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APPARATUS FOR WASHING AND STERILIZING MEDICINAL CONTAINERS

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5 Claims. (Cl. 134—89)

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The invention relates to an apparatus for effecting mass washing and sterilization of ampules and other medicinal containers and is characterized, from the point of view of the medical profession, principally by an avoidance of hand contact with the ampules either collectively or individually at any time in the preliminary step of assembling or in the washing or sterilizing operations.

Prominent among the many advantages that result from mass washing and sterilization, may be mentioned the saving in time and labor that would be involved in individual handling of the ampules and while such saving is desirable, a more important purpose is served in that mass washing and sterilization materially aid in the accomplishment of the main object of the invention, which is to avoid direct hand contact with the ampules in any step or steps preliminary to the washing and/or sterilizing operations, also during such operations and thereafter, until the ampules are filled and sealed.

In carrying the invention into effect, the ampules are handled, preferably, in gross lots, in which they are commercially available, closely packed in stout paper cartons with removable covers.

A preliminary but necessary step in washing and sterilizing the ampules, is to transfer them in mass from their cartons to a holding tray of a washer. This is accomplished by placing the cartons, usually four in number, in closely fitting recesses, suitably spaced apart, in a light-weight shallow frame of wood or other material, resting upon a table or other support. After removing the covers of the cartons to expose the contained ampules, the ampule-holding tray is removed from the washer, being lifted therefrom by means of handles provided at opposite ends, and placed bottom up on the cartons. Then the wooden frame, cartons and tray are taken up together from the table, reversed, and given a light jolt or two, which causes the ampules to slide out of the cartons by their own weight, into the tray and individually enter spaced apart seats in the tray, arranged in four groups, each accommodating a gross of ampules.

The transfer of the ampules being thus effected, in mass, from the cartons to the tray of the washer, without hand contact, the tray with the seated ampules is replaced in the washer and is so positioned upon being entered therein, by guide posts engaging openings in the tray, that an upwardly projecting jet tube of the washer enters each ampule to a suitable depth, usually to a

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point near the closed end thereof. To prevent the ampules from being dislodged or blown from their seats in the subsequent treatment that follows, a reticulated guard plate or screen is arranged above them, to limit their upward movement and at the same time permit passage of wash water to the exterior of the ampules from a spray above, located on the inner side of a hinged cover of the washer.

The second step is to cleanse the ampules both interiorly and exteriorly and free the same from any and all contained foreign matter. For that purpose, water, preferably heated and under about fifty pounds pressure, is delivered through the jet tubes to the interior of the ampules and through the cover spray of the washer, to the exterior thereof and the washing is continued for a period of time sufficient to insure thorough cleansing. The force of the wash water tends to lift the ampules from their seats in the tray but the guard screen above them checks the action and prevents them from being completely unseated. In thus moving upward from their seats, the ampules open a way of escape for the wash water from the jet tubes which, in passing upward around the ampules, cooperates with the cover spray in washing them exteriorly.

During the early stage of development of the method, microscopic inspection of the ampules, after several test washings, disclosed that in certain localities, notably in New York City and vicinity, very fine particles of foreign matter remained in the ampules and, it having been determined that such matter was contained in and deposited by the wash water, provision was accordingly made for thoroughly filtering the water before admitting it to the washer, which is the practice now followed in the washing operation.

Associated with and completing the washing of the ampules, there is a third step, which follows the shutting off of the wash water, and consists in admitting a blast of filtered air, under twenty-five or thirty pounds pressure, through the jet tubes, to drive out the water from the ampules, preliminary to the next step of drying and baking the same.

The ampules being thus freed of wash water, are transferred in their holding tray from the washer to an oven, heated to 160 degrees Centigrade, where they are baked for half an hour, or such period of time as may be necessary to insure complete and thorough sterilization, as that expression is understood and accepted by the medical profession.

Sterilization of the ampules being now com-

pleted, the holding tray is removed from the oven and after cooling to room temperature, the ampules are ready for filling.

It will be noted that there is no limit to the number of ampules that may be simultaneously processed in a single operation and further, that regardless of the number treated, the entire operation is carried out to and including filling and sealing the ampules, free of hand contact with the same.

Apparatus suitable for carrying the above described method into effect is illustrated in the accompanying drawings but I do not wish to be understood as intending to limit myself to either the form or details shown, as various changes may be made therein within the meaning of the appended claims.

In the drawings—

Fig. 1 is a diagrammatic view, showing an assembly of apparatus employed in carrying out my improved method of washing and sterilization.

Fig. 2 is a view in front elevation, partly in section, showing the preliminary assembling of the several members to effect a mass transfer of the ampules from their containing cartons to the holding tray of the washer, and

Fig. 3 is a detail cross sectional view, on an enlarged scale, showing the manner in which the ampules are seated in the holding tray in the washer. As the seating is the same for all ampules, only one is shown in full lines.

Referring now to the drawings, and particularly to Fig. 1, a small table or shelf is shown at 1, on which the cartons 2, containing the ampules 3 to be washed and treated, indicated by dots, are assembled in closely fitting recesses 4 of a shallow frame 5 for transfer of the ampules to the holding tray 6 of a washer 7. After the cartons are assembled in the frame, their covers are taken off and the ampule-holding tray, removed from the washer by grasping the handles 6a and lifting it clear of the same, is placed bottom up on the cartons. The entire assembly is then raised from the table and after reversing it, to bring the ampule-holding tray on the bottom, it is jogged lightly, causing the ampules to slide out of the cartons by gravity or their own weight and enter and seat themselves in seats 6b of the tray, indicated by dots, which is then separated from the frame and empty cartons and replaced in the washer.

As the loaded holding tray is replaced, a jet tube 8 of the washer, enters each ampule to a suitable depth extending therein usually, to a point adjacent the closed end thereof, as shown in Fig. 3. Registering of the jet tubes with the ampules results from definitely positioning the holding tray in the washer and this is provided for by four guide posts 9, which enter openings 10 of the tray and are enlarged at their lower ends 9a to provide a support for the tray.

The jet tubes 8 are removably threaded in a plate 11, which forms the top of a chambered base 12 and is removably secured thereon watertight, by screws or otherwise, for convenience in making needed repairs, replacements, etc. A valved outlet from the chamber is indicated at 12a.

The jet tubes, like the seats in the holding tray, are spaced apart and arranged in separated groups, to correspond in number, spacing and grouping with the ampules in their cartons, as assembled for transfer, as above described.

Two valved connections 13 and 14 are provided to the base chamber, one from a source of supply of filtered water under about fifty pounds pressure and the other from a source of supply of filtered air under about twenty-five pounds pressure. The water filter employed is indicated at 15, the water pump at 15a, the supply tank at 16, the air compressor at 17 and the air filter at 17a.

To prevent the ampules from being blown out of their seats in the holding tray, by the force of the wash water, an open mesh guard screen or the like 18 is provided above them to limit their upward movement and is mounted for convenient removal, to permit the ampule-holding tray to be readily taken out or put back in the washer. It will be noted that as the ampules are lifted from their seats by the water pressure, a way of escape upward around the same is opened up for the water from the jet tubes, which assists in washing the ampules exteriorly.

A hinged cover 19, closes the top of the washer and is provided with openings or is cut away at the sides, as indicated at 20, to permit the escape of water from the washer to a drain tank 21, over which the washer is located.

Within the cover 19, centrally of the top thereof, a spray nozzle 22 is mounted and supplied from the tank 16 through a suitable valved connection 23, which may be flexible in part or of other suitable construction to permit the cover to be opened and closed.

The operation of washing the ampules, as previously set forth and carried out with the above described apparatus, is followed by the air blast for clearing the ampules of wash water, preparatory to drying and baking the same, which serves as the final step of the sterilizing treatment.

From the washer, the ampules, in the holding tray, are transferred to an oven 24 and subjected to a heat of 160 degrees centigrade, for half an hour or such period of time as may be considered necessary, under existing conditions, to insure complete and thorough sterilization. They are then removed in the holding tray to a table 25 and after cooling to room temperature, are ready for filling and sealing.

As the many important advantages of the invention will be apparent from the foregoing, it will not be necessary to describe them at further length.

Having described my invention, I claim:

1. In an apparatus for mass washing and sterilizing ampules free of hand contact with the same, the combination of an ampule washer having upwardly directed jet tubes, a sterilizer for the washed ampules providing a baking heat, a portable ampule-holding tray transferable to and from the washer to the sterilizer, the said tray providing individual seats for a mass assembly of ampules in which they are held solely by their own weight in definite spaced relation and without removal therefrom in conveyance in the tray to which they are transferred in mass from their packing cases to the washer for the washing operation and in subsequent conveyance from the washer to the sterilizer until the ampules are sterilized, removed from the sterilizer, and filled, and means wholly enclosed by said washer by which the entrance of the tray therein is mechanically guided to cause the open ends of the contained ampules to automatically register in centered relation with the jet tubes thereof, said means comprising vertically disposed pins that enter openings in the tray and are made of greater length than the jet tubes of the washer to definitely position the tray by

entering the openings thereof before the jet tubes enter the open ends of the ampules.

2. In an apparatus for mass washing and sterilizing ampules free of hand contact with the same, the combination of an ampule washer having upwardly directed jet tubes, a sterilizer for the washed ampules providing a baking heat, a portable ampule-holding tray transferable to and from the washer to the sterilizer, the said tray providing individual seats for a mass assembly of ampules in which they are held solely by their own weight in definite spaced relation and without removal therefrom in conveyance in the tray to which they are transferred in mass from their packing cases to the washer for the washing operation and in subsequent conveyance from the washer to the sterilizer until the ampules are sterilized, removed from the sterilizer, and filled, and means wholly enclosed by said washer by which the entrance of the tray therein is mechanically guided to cause the open ends of the contained ampules to automatically register in centered relation with the jet tubes thereof, said means comprising vertically extending pins that enter openings in the tray and each of which are provided with an annular shoulder for supporting the tray in a position in which the jet tubes of the washer extend through the ampules substantially to the inverted bottoms thereof.

3. In an apparatus for mass washing and sterilizing ampules free of hand contact with the same, the combination of an ampule washer having upwardly directed jet tubes, a sterilizer for the washed ampules providing a baking heat, a portable ampule-holding tray transferable to and from the washer to the sterilizer, the said tray providing individual seats for a mass assembly of ampules in which they are held solely by their own weight in definite spaced relation and without removal therefrom in conveyance in the tray to which they are transferred in mass from their packing cases to the washer for the washing operation and in subsequent conveyance from the washer to the sterilizer until the ampules are sterilized, removed from the sterilizer, and filled, and means wholly enclosed by said washer by which the entrance of the tray therein is mechanically guided to cause the open ends of the contained ampules to automatically register in centered relation with the jet tubes thereof, said ampule seats in said portable tray being formed as through openings coextensive with the entire length of the necks of the ampules, the upper portion of the openings being shaped to receive and limit entrance of the ampules therein to the tapered neck thereof with the open end downward and the lower portion being outwardly and downwardly flared to serve as centering guides for insuring unobstructed entrance of the jet tubes of the washer into the open ends of the ampules.

4. In an apparatus for mass washing and sterilizing ampules free of hand contact with the same, the combination of an ampule washer having upwardly directed jet tubes, a sterilizer for the washed ampules providing a baking heat, a portable ampule-holding tray transferable to and from the washer to the sterilizer, the said tray providing individual seats for a mass assembly of ampules in which they are held solely by their own weight in definite spaced relation and without removal therefrom in conveyance in the tray to which they are transferred in mass from their packing cases to the washer for the washing operation and in subsequent conveyance from the washer to the sterilizer until the ampules are sterilized, removed from the sterilizer, and filled, and means wholly enclosed by said washer by which the entrance of the tray therein is mechanically guided to cause the open ends of the contained ampules to automatically register in centered relation with the jet tubes thereof, said ampule seats in said portable tray being formed as through openings coextensive with the entire length of the necks of the ampules, the upper and lower portions of which are oppositely tapered, the upper tapered portion providing support for the tapered neck of the ampules with the open end thereof extending to the narrowest part of such tapered portion and the oppositely tapered lower portion serving as centering guides for the jet tubes of the washer in entering the ampules.

5. In an apparatus for mass washing and sterilizing ampules free of hand contact with the same, the combination of an ampule washer having upwardly directed jet tubes, a sterilizer for the washed ampules providing a baking heat, a portable ampule-holding tray transferable to and from the washer to the sterilizer, the said tray providing individual seats for a mass assembly of ampules in which they are held solely by their own weight in definite spaced relation and without removal therefrom in conveyance in the tray to which they are transferred in mass from their packing cases to the washer for the washing operation and in subsequent conveyance from the washer to the sterilizer until the ampules are sterilized, removed from the sterilizer, and filled, and means wholly enclosed by said washer by which the entrance of the tray therein is mechanically guided to cause the open ends of the contained ampules to automatically register in centered relation with the jet tubes thereof, said tray being provided with a reticulated removable guard suitably spaced above the ampules to limit their upward movement and prevent their being blown clear of their seats by the force of the wash water.

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