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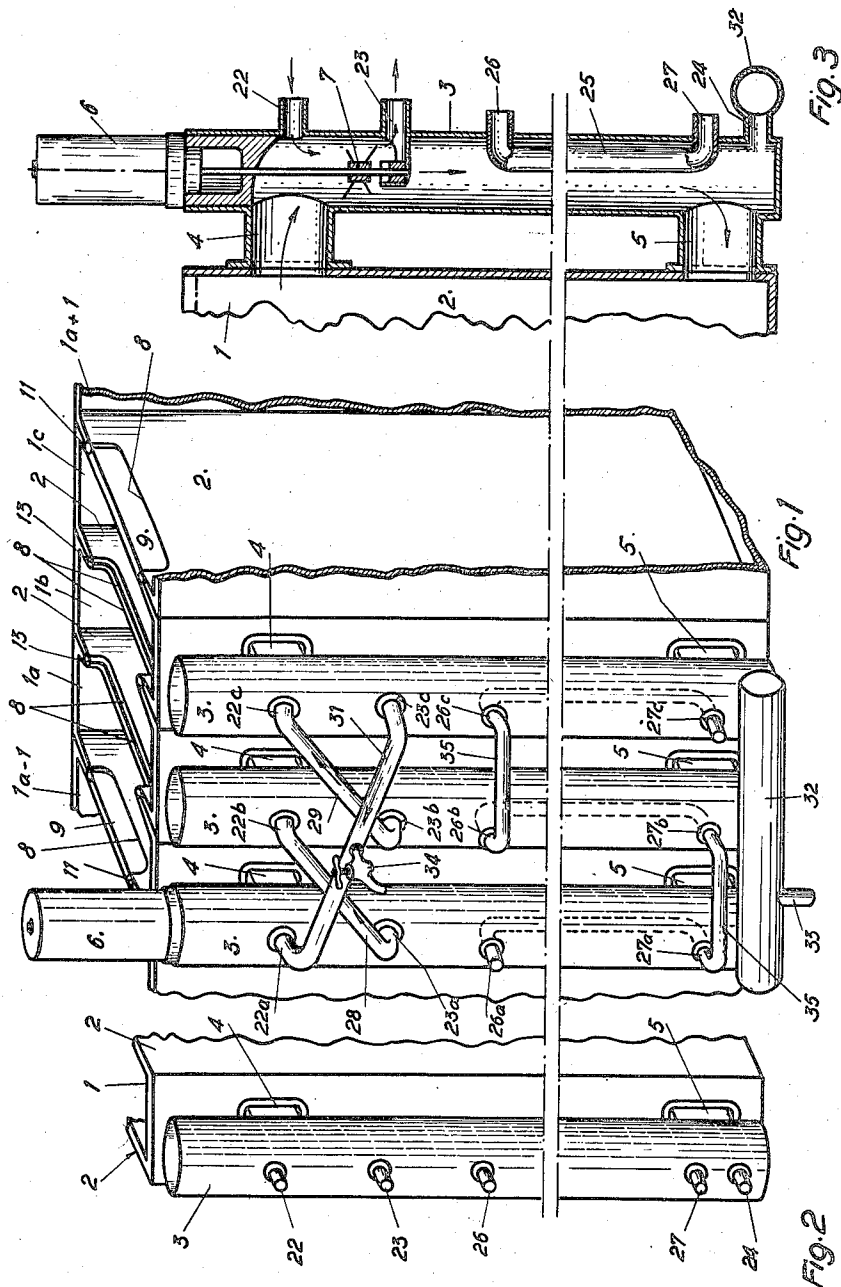
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CELLS FOR THE TREATMENT OF CINEMATOGRAPHIC FILMS

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2 Sheets-Sheet 1



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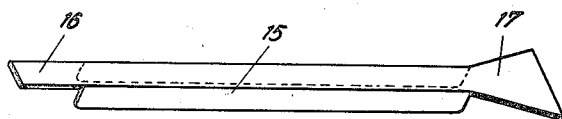
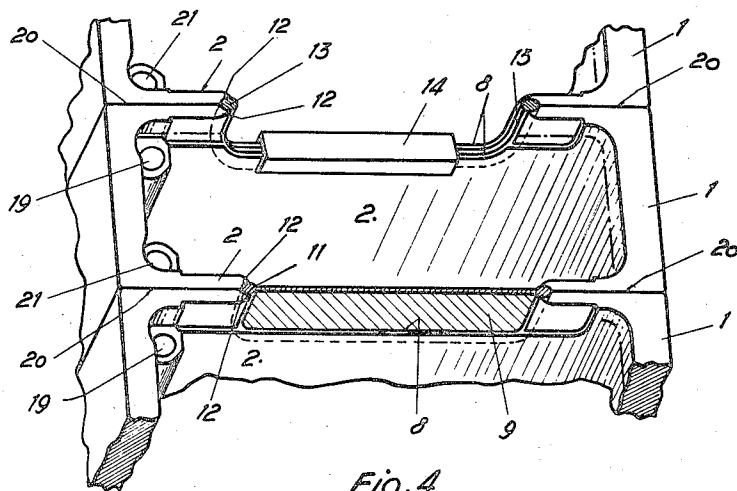
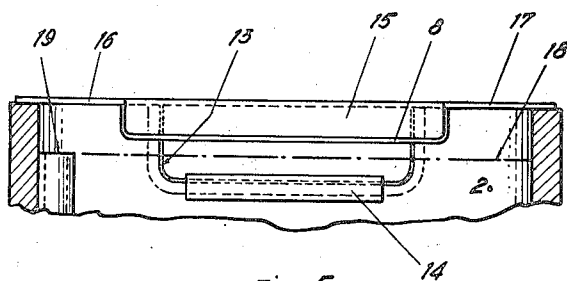
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CELLS FOR THE TREATMENT OF CINEMATOGRAPHIC FILMS

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19 Claims. (Cl. 95—96)

In the machines used for treating (developing, washing, inverting, fixing, dyeing, etc.) cinematographic films, the operations are controlled by the length of time each portion of the film travels through each type of bath. This procedure makes it necessary not only to adjust the baths beforehand in order to secure a correct general process, but also to precisely maintain constant the composition and the temperatures of said baths.

The mass circulation within cells by means of auxiliary cells according to the patent application filed by the applicant on the 21st of July 1953 for "Improvements in Arrangement for Circulating Films Treating Liquids" under Serial Number 369,492, now abandoned, brings about, together with a brushing effect upon the limit layers on the films, due to the broad circulation of the whole body of liquid, a great homogeneity of the latter.

The standardization of the equipment in order to obtain cell assemblies adapted to mass treatment in which, by the use of the only cell associations for the baths utilised, any kind of film treatment (either black, colour negative or positive films) may be readily carried out, would be particularly handy with identical cell elements, each having its auxiliary cell and intensive mass circulation device.

Hence, one is often led, however, to arrange a plurality of cells one behind another for treating the film with the same bath and, for the versatility of the associations, it is even advantageous to secure cells not of too large dimensions, which is made possible by the mass circulation.

If the cells are independent from one another, variations in the composition of the bath intended for a given treatment (development, for instance) may occur from one cell to another, which of course may be detrimental.

The object of the present invention is to obviate these drawbacks by making it possible, using cells with mass circulation provided by auxiliary cells, identical with one another, readily to establish either intercommunications between the cells or isolation from one another, in order to achieve any series association corresponding to the treatments to be carried out, while securing a constant composition of the bath contained in the cells of any given group intended for a particular operation.

This device mainly consists in a series juxtaposition of cells with a circulation obtained by an auxiliary cell, identical with one another, each cell having an upper notch in each of its opposite faces adapted to be joined flat against a similar face of the adjoining cell, said notch being intended for the passage of the bath which for any reason whatever: variations on the motor speed, irregularities in the helical propelling surfaces, etc. might reach a different level in two adjoining cells. These notches are provided, near their peripheral edges, with a resilient cord seal.

Conversely, when it is desired to isolate two adjoining cells the resilient cord seal is replaced by a similarly shaped seal arranged about a central portion serving as a liquid tight partition therebetween.

The cells are pressed against these seals by any known suitable means, and, locally, by the pressure of a part in the shape of an inverted U made of a resilient metal not liable to attack the baths, which straddles the edges of two adjoining cells in the bottom of the communication notch and which helps press the faces against the cord seal interposed therebetween.

Should the cells communicate through the notches or not, a similar joint covering part in the shape of an inverted U is arranged in the upper portion of said cells and presses the upper adjoining edges of the cells, in the central portion, but the flat bottom of which, protruding on each side, covers the interstice between the cells at the top thereof. This joint-covering part does not interfere with the passage of the liquid from one cell to the next, in the case when a communication is provided.

In order to secure the mixing by means of an intercommunication between the cells which contain the same treating liquid, two outlet connection collars are arranged above each other in the auxiliary cells at different levels. In the auxiliary cells adapted for a given treatment, the lower connection collar of the first is connected to the upper connection collar of the next cell by means of a duct secured to the former. The lower connection collar of the second cell is, in turn, connected to the upper connection collar of the next auxiliary cell, and so on, to the last cell of the treating group involved, the lower connection collar of which is connected to the upper connection collar of the first auxiliary cell by means of a return duct passing across the others.

On this return duct, for instance, a tap may be provided for readily obtaining a small quantity of liquid with a view to examining its properties, particularly its pH, while the process is taking place.

In order to heat the liquid contained in the cells or to maintain its temperature at a predetermined value, each auxiliary cell encloses, in its lower portion, a vertical pipe section which extends through the wall of the cell at two points thereof into two junctions that may be connected to the junctions of the adjoining auxiliary cells, so that a liquid at the suitable temperature may be circulated in series through these pipes and exchange heat with the circulating treatment liquids.

Arranged at the lowermost point of each auxiliary cell is a pipe which in a group of the same treatment may be connected to a topping fresh bath supplying manifold.

Thus, the connections between the cells may be effected quite readily and any desired assembly may be built up by using cell units provided with their auxiliary cell and its equipment, all the units for the same purpose being identical with one another, so that each bath may be made homogeneous in spite of the possible use of several cell units for a single operation.

Other and further objects and advantages of the invention will be apparent to those skilled in the art, from a consideration of the following description of some embodiments of the invention shown by way of examples, in the accompanying drawings in which:

Fig. 1 diagrammatically illustrates in perspective elevational view, three cell-units in operation with a single bath.

Fig. 2 is a fragmentary perspective elevational view of a cell unit with its auxiliary cell.

Fig. 3 is a fragmentary transverse section of a cell unit.

Fig. 4 is a perspective top-view of a cell together with two portions of adjoining cells.

Fig. 5 is a corresponding transverse elevational view showing the passage managed between the top portions of the cells, and

Fig. 6 shows the upper seal covering part.

In all the figures of the drawings, like reference numbers denote similar parts. 1 is the cell element with its

transverse faces 2, for instance the longer ones, preferably planar so that the elements may be placed against each other flat on said faces.

One narrow face of each cell is, according to a known practice, provided with an auxiliary cylindrical cell 3 connected with the cell 1 by means of wide passages namely an upper one 4 and a lower one 5. Each auxiliary cell comprises its own circulating motor 6 adapted to circulate the liquid body downwardly in the auxiliary cell 3 and upwardly in the cell 1, for instance by means of its helical propeller.

In Fig. 1 a single motor has been diagrammatically represented as at 6, for the sake of clarity, namely that of the cell 1a which together with the successively adjoining cells 1b, 1c, build up a group supplied with the same liquid.

Each face 2 of each cell is provided at the upper part thereof with a passage 8 forming an immersed overflow, the over-flows of two adjacent cells being in register.

The outer faces 2 of each group have their passages 8 obstructed, between 1a and 1a-1 which is placed ahead, and between 1a and 1a+1 which follows, as by a sealing partition 9 provided with a resilient cord 11 lining it on three sides thereof and jammed in a corresponding groove 12 (see Fig. 5).

The other faces 2 are provided with cord seals 13 in their grooves 12 which, thus, clear the passages 8 between the cells.

As it will be seen in Figs. 4 and 5 the central portion of the passage 8 of two adjoining side walls is covered with a straddling part 14 in the shape of an inverted U made of stainless steel for instance which firmly clamps together the adjacent side walls 2 and presses them against the sealing cords 13.

Arranged at the upper portion of the adjoining passages 8 is a joint-covering piece 15 the central portion of which, below the path of travel of the film from one cell to the next, also has a cross section in the shape of an inverted U and prevents any drop of liquid from seeping into the joint between the cells. This central portion in the shape of an inverted U may be adapted to clamp together the upper portions of the adjoining faces 2 of the cells, at the ends of said central portion outwardly of the path of travel of the film.

The top portion of the joint covering piece is made at both ends thereof, into two depending extensions 16 and 17 which cover the outer portions of the interstice 20 between two adjacent cells at the top thereof.

This joint-covering piece only is put into place above the partitions 9 with cord seal 13, which obstruct the passages between two different treating baths.

Once the assembly of the adjoining elementary cells is built up so as to constitute the machine in which a particular treatment is to be carried out, the true consolidation of the cell elements and the strong pressure of the walls 2 against the seals 11 or 13 are achieved by taut girdles arranged at various levels about the cell block in order to secure a firm clamping, in a known manner.

Above the bottom of the passage 8 and at the higher level 18 beyond which the liquid should never rise, each cell is provided, in at least one of its corners and generally in two of them as illustrated in Fig. 4, with overflow apertures 19 and 21 which communicate directly with the discharge of the liquids used up below the particular cell.

The intercommunication between the cells for the purpose of making the baths homogeneous is established by collars made of plastics for instance and secured to connecting collars such as 22, 23 and 24 arranged externally one above another in the axial plane of the assembly formed by the cell 1 and the auxiliary cell 3, said collars opening into the cell 3.

The connecting collar 22 is substantially level with the axis of the passage 4 between 1 and 3 and the connecting

collar 23, somewhat lower than the propeller 7, while 24 is located at the lowermost point.

Arranged between the levels of 23 and 24 is a vertical pipe 25 connected with the exterior through collars 26 and 27 for circulating a liquid exchanging its heat with the bath.

Fig. 1 shows the connections established between 23a and 22b, 23b and 22c through externally rising pipes 28 and 29 respectively, while 23a is connected with 22a through a rising collar 31, so that some liquid is circulated in series from 23a to 22b, then from 23c to 22c and, thence, rises back to 22a through 23. Since the liquid circulated through the various collars is tapped at different levels it tends to become homogeneous; furthermore, it flows from one cell to the next between 1a; 1b and 1c through the non-obstructed passages 8. Obviously, this example is concerned with three cells, but it could apply to any other number, as the case may be.

At the bottom, the collars 24 open into a collector 32 connected to the fresh liquid topping supply through a collar 33 or, if need be, to the discharge.

On one of the outer pipes, 31 for instance, a tap 34 is provided which makes it possible readily to tap some liquid for examination during operation, analyses, pH measurement.

The circulation of liquid at the suitable temperature for maintaining the temperature of the baths at a constant level, is achieved by connecting the collars 25 in series through the horizontal collars 35 alternately arranged between 27a and 27b, 26b and 26c etc. as illustrated in Fig. 1.

Of course, adjustments of the flow in the various connecting pipes such as 28, 29, 31, 33 or 35 may be provided, if desired, in order to better the adjustment of the various circulations.

The connecting collars that take no part in any circulation whatever will be obturated by any suitable plugs.

It will be seen that, by using a variable number of cell elements each provided with its own auxiliary cell, all identical with one another, it is possible, by their association and their mutual connection or isolation as far as the circulating liquids are concerned, to build up in quite a versatile manner any desired treating assembly, by establishing the desired recirculations between given cell elements.

The means for circulating the film, not shown because they are no part of the invention, consist of any suitable known device introduced together with its own supports through the upper portion of each cell, in the conventional manner. The cells are provided with the ordinary covering means and, if need be, with light-tight means adapted to the size of the cells.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim is:

1. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from each main cell to at least one adjoining main cell and also to flow from each auxiliary cell to at least one other auxiliary cell, said communicating means being so constructed and arranged that said propelling means may circulate said treating liquid through each of said cells, and clamping

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means adapted to firmly clamp said main cells against each other.

2. Cell unit according to claim 1, wherein at least said main cells are rectangular in horizontal cross-section with their longer faces in mutual engagement.

3. Cell unit according to claim 1, wherein said communicating means include notches cut in the central top portions of the adjacent faces of two contiguous main cells.

4. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, said communicating means consisting of notches cut in the central top portions of the adjacent faces of two contiguous main cells, sealing means between the adjacent faces of two contiguous main cells along the edges of said notches, and clamping means adapted to firmly clamp said main cells against each other.

5. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, said communicating means consisting of notches cut in the central top portion of the adjacent faces of two contiguous main cells, a cord seal housed in registering grooves cut in said adjacent faces along the edges of said notches, and clamping means adapted to firmly clamp said main cells against each other.

6. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, said communicating means consisting of notches cut in the central top portions of the adjacent faces of two contiguous main cells, provision being made for a clamping member made of a part the cross-section of which is in the shape of an inverted U straddling the central portion of both adjacent top edges to two contiguous cells in order firmly to hold said cells pressed together, and clamping means adapted to firmly clamp said main cells against each other.

7. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, at least said main cells being rectangular in horizontal cross-section with their longer faces in mutual engagement, a joint covering piece made of a part the cross-section of which is in the shape of an inverted U straddling the central portion of both adjacent top edges of two contiguous cells, said piece being formed with two extensions adapted to be flat upon the interstice between the adjacent top edges of two contiguous cells, an auxiliary

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cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, and clamping means adapted to firmly clamp said main cells against each other.

8. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, said communicating means consisting of notches cut in the central top portions of the adjacent faces of two contiguous main cells, a partition adapted to be fitted in said notches in order to isolate the treating liquid of two adjacent cells, and clamping means adapted to firmly clamp said main cells against each other.

9. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, said communicating means consisting of notches cut in the central top portions of the adjacent faces of two contiguous main cells, a partition adapted to be fitted in said notches in order to isolate the treating liquid of two adjacent cells said partition being provided with a peripheral sealing rib adapted to fit into registering grooves cut in said adjacent faces of said two contiguous main cells along the edge of said notches, and clamping means adapted to firmly clamp said main cells against each other.

10. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, additional communicating means consisting of connecting collars positioned on said auxiliary cells and connecting pipes coupled to said collars in any desired relationship from one auxiliary cell to another, and clamping means adapted to firmly clamp said main cells against each other.

11. Cell unit according to claim 10, wherein each of said auxiliary cells has one of said connecting collars positioned above said propelling means and another positioned under said propelling means.

12. Cell unit according to claim 10, wherein said connecting pipes communicate the upper collar of one cell with the lower collar of an adjacent cell.

13. Cell unit according to claim 10, wherein a tap is mounted on at least one of said connecting pipes.

14. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating there-

with at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, clamping means adapted to firmly clamp said main cells against each other, and heating means consisting of vertical pipe sections arranged in the lower portion of said auxiliary cells and connectible with a suitable source of heating fluid through connecting collars extending through the wall of said auxiliary cells.

15. Cell unit for the treatment of cinematographic films and the like, comprising a number of similar main cells adapted to contain a film treating liquid and having faces adapted to be positioned flat against a corresponding face of an adjoining similar main cell, an auxiliary cell associated with each main cell and communicating therewith at the upper and lower portions thereof, propelling means in said auxiliary cells for circulating said treating liquid, communicating means adapted to afford a passage for said liquid to flow from one main cell to another, clamping means adapted to firmly clamp said main cells against each other, and a collector communicating with the lower portion of all of the auxiliary cells of a given unit.

16. Cell unit according to claim 15, wherein said collector is connected to a suitable supply of fresh treating liquid.

17. Cell unit according to claim 15, wherein said collector is connected to a discharge duct.

18. A cell unit of the character described comprising, in combination, a plurality of consecutive contiguous main receptacle means; a plurality of auxiliary receptacle means equal in number to the number of main receptacle

means, each auxiliary receptacle means being in communication with one of said main receptacle means; means for placing contiguous main receptacle means in communication with each other; and additional means for placing contiguous main receptacle means in communication with each other in such a manner that a fluid may be circulated through each of said main and auxiliary receptacle means.

19. A cell unit of the character described comprising, in combination, a plurality of consecutive contiguous main receptacle means; a plurality of auxiliary receptacle means equal in number to the number of main receptacle means, each auxiliary receptacle means being in communication with one of said main receptacle means; means for placing contiguous main receptacle means in communication with each other; additional means for placing said auxiliary receptacle means in communication with each other in such a manner that a fluid may be circulated through each of said main and auxiliary receptacle means; and a plurality of propelling means equal in number to the number of auxiliary receptacle means are respectively arranged therewithin for circulating a fluid through each of said main and auxiliary receptacle means.

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