G. MOORE.

FILTER FILM FORMING APPARATUS.

APPLICATION FILED MAY 17, 1917.

1,287,074.

Patented Dec. 10, 1918.

Fig. 1.

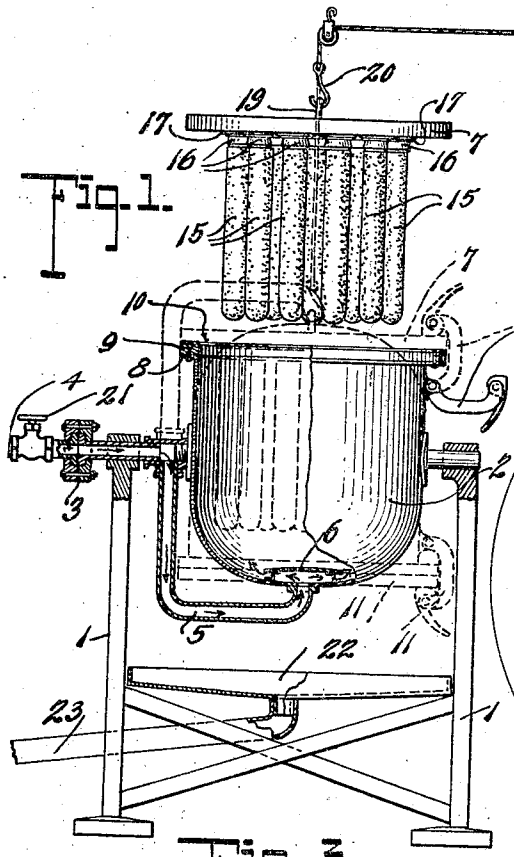


Fig. 2.

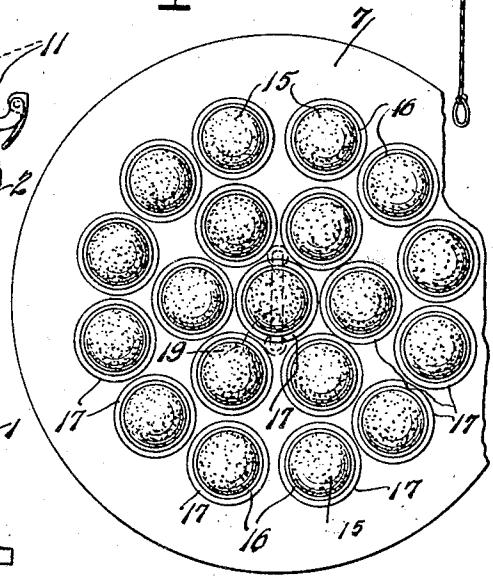


Fig. 3.

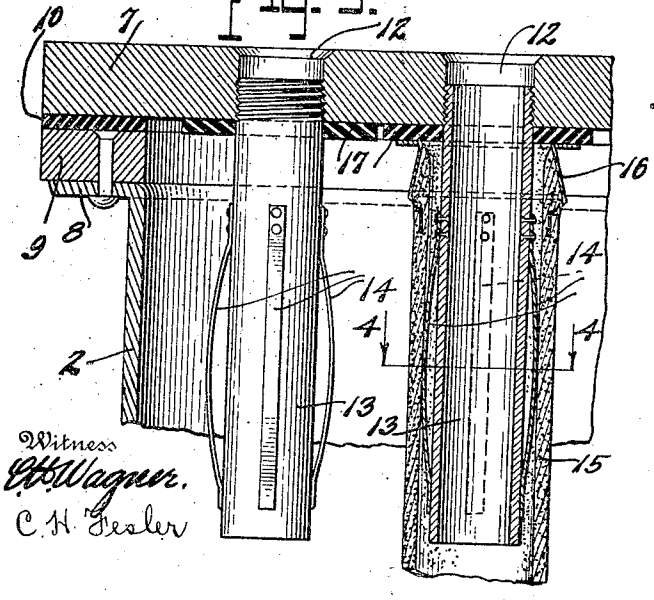
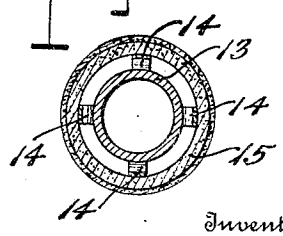


Fig. 4.



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FILTER-FILM-FORMING APPARATUS.

1,287,074. Specification of Letters Patent. Patented Dec. 10, 1918.

Application filed May 17, 1917. Serial No. 169,367.

To all whom it may concern:

Be it known that I, GEORGE MOORE, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented certain new and useful Improvements in Filter-Film-Forming Apparatus; 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.

This invention relates to improvements in apparatus for the preparation of filters of the type adapted for the filtration of drinking water, and especially to such filters as are employed for family use.

The primary object in view is the facilitating of the rapid and easy handling of filters during the supplying of filter films to supporting frames.

With this and further objects in view, as will in part hereinafter become apparent and in part be stated, the invention comprises certain novel constructions, combinations and arrangements of parts as subsequently specified and claimed.

In the accompanying drawing,—

Figure 1 is a view in side elevation of an apparatus embodying the features of the present invention, parts being broken away and seen in section for facility of disclosure, the container top with its cluster of films being shown in full lines in its detached and elevated positions and in dotted lines in its lowered and attached position, while the receptacle is shown in full lines in its upright position and in dotted lines in its inverted position.

Fig. 2 is an inverted plan view of the top or cover plate of the container with its cluster of filters thereon.

Fig. 3 is an enlarged, detail, fragmentary vertical section through a part of the container with its top or cover plate in its closed position.

Fig. 4 is a horizontal section taken on the plane indicated by line 4—4 of Fig. 3, and looking downward.

Referring to the drawing by numerals, 1 indicates a supporting framework or stand on which is pivotally mounted a receptacle 2 arranged to swing vertically from an upright position, as seen in full lines in Fig. 1, to an inverted position as seen in dotted lines therein. One of the journals of the receptacle 2 is tubular and in communication through an ordinary union 3 with a supply pipe 4. A tubular journal communicates with a pipe 5 which extends to the bottom of the receptacle 2 and discharges upwardly therein against a spreader 6 arranged to distribute the inflowing liquid and prevent localization of movement or erosive action of current incident to the influx of liquid.

A top or cover plate 7 is provided for the receptacle 2, and since the receptacle is substantially cylindrical in form, said plate is preferably approximately in the form of a disk. The upper edge of the receptacle 2 may be finished in various ways, one desirable formation of such edge being provided by forming an outstanding flange 8 of the material of the receptacle and securing thereto an annulus 9. A rubber gasket 10 rests on the annulus 9 for making a non-leaking joint with the top or cover plate 7 when the cover is in place resting on the gasket 10. A series of clamps 11 is provided for securing the cover plate in place on the receptacle, three or more of such clamps being provided as preferred. Each of these clamps consists of a clevis-like member pivoted to the side walls of the receptacle at its lower end and having a cam pivoted at its upper or free end in position for engaging the upper surface of the cover plate 7 when the cover plate is in place on the receptacle, whereby said cover plate is adapted to be wedged down tight against the gasket 10 by the action of the cams of the clamps. As best seen in Fig. 3, the cover plate 7 is formed with a number of apertures 12, 12, into each of which is threaded a tube 13. To each tube 13 are fixed friction springs 14, 14. Each spring 14 is bowed outward from its tube 13 between its ends so that the series of springs 14 present a body which is susceptible of being compressed readily, and which at the same time affords a sufficient resistance to compression for providing the desired friction as hereinafter mentioned.

In the course of forming filter films frames for sustaining such films are employed, and the said frames may assume various embodiments, one such embodiment consisting of the ordinary filter candle 15, such as found on the market to-day. This candle is a burnt clay tube closed at one end and open at the other, the open end being surrounded by an attaching ferrule 16, preferably of metal. The clay candle 15 is suf-

ficiently porous for being comparatively easily penetrated by water and is used commercially for filtering purposes. Many objections have arisen to the use of such candles themselves as filters. These candles are objectionable as filters themselves because in many instances germs are present in the pores of the candle at the time they are acquired by the user and even if no germs happen to be in the pores of the candle it has been repeatedly demonstrated that after short usage germs lodge in such pores and there germinate until the candle is sufficiently charged with germs for allowing the germs to escape from the inner surface of the candle with the inflowing filtrate.

I, therefore, employ the candles merely as frames on which to build filter films adapted to resist the approach of germs. The art of thus building filter films is the subject matter of my previous invention as set forth in my co-pending application filed July 15, 1915, Serial No. 40,116. The interior space or bore of the filter candle 15 is sufficiently restricted to cause the springs 14 to be compressed when a candle is slipped longitudinally over one of the tubes 13, so that said springs will sustain the candle in position and cause the tube and springs to act as a filter film frame carrier. Surrounding each tube 13 at its upper end, that is, the end engaging the cover plate 7, is a gasket 17 against which the outstanding flange of the ferrule 16 of the respective candle 15 is placed when the candle is applied to the tube 13. As will later become apparent, the pressure subsequently exerted on the candle is in a direction for pressing the candle against the gasket 17, whereby a non-leaking joint is produced.

In operation, the receptacle 2 being in the position seen in full lines in Fig. 1 is supplied with a pulp consisting of powdered barytes and water or other appropriate filter film forming material. Candles 15 are then applied to all of the tubes 13 of the cover plate 7, while the cover plate is in the elevated position seen in full lines in Fig. 1. Thereupon the cover plate is lowered as by feeding out the cable 18, which cable is employed for elevating and sustaining the cover plate 7 when the latter is not in position on the receptacle. The said cover plate is provided with an eye 19 engaged by a hook 20 fixed to cable 18 for facilitating connection and disconnection of the candle to and from the cover plate. On being lowered into the receptacle closing position, the cover plate is clamped in such position by the several clamps 11 as indicated in dotted lines in Fig. 1. Water is then turned on by opening the valve 21 and is supplied under such head of pressure as will cause the liquid contents of receptacle 2 to pass through the several candles 15, whereby the solids in suspension will be deposited on the surfaces of the candles in the form of relatively thin films, as indicated in Fig. 4. In the course of the formation of these films, the liquid passing through the candles 15 passes into the tubes 13 and up through the apertures 12. This discharging liquid flows over the top of the receptacle and drains off of the same into any appropriate draining pan, such as seen at 22, and discharges off through a pipe 23. It is the usual practice, when the cover plate 7 has been clamped in place on the receptacle 2, to detach the hook 20 so that the receptacle is in condition to be revolved when desired. As soon as the filter films have been built on the candles 15 as just described, the supply of water is cut off by turning off the valve 21, and the receptacle 2 is inverted so that it assumes the dotted line position seen in Fig. 1. The object and purpose of this inversion is to discharge the liquid contents of the several filter candles 15 for preventing injury to the film coatings on such candles by a backward flowing of the liquid through the candles as the candles are being removed from the receptacle. As soon as the liquid has been discharged from the candles by this inversion of the receptacle 2, the receptacle is pivoted to its upright position again. The operation of swinging the receptacle 2 vertically to and from an inverted position is usually accomplished manually. As soon as the receptacle 2 is returned to its upright position, the hook 20 is caused to engage the eye 19 and the cable 18 is hauled in for elevating the cover plate 7 with the parts carried thereby. The cable 18 is usually operated manually, but may be otherwise operated as desired, and when the cover plate 7 has been sufficiently elevated the free end portion of the cable is secured in any appropriate manner for retaining the cover plate in its elevated position until the coated candles may be removed and new ones applied. For the saving of space, the elevation of the cover plate 7 in Fig. 1, has been shown as very low, but it is preferable to raise the cover plate a distance sufficient for enabling the coated candles to be removed and the new candles to be applied without any liability of contact with or interference by the receptacle. When the coated candles are to be removed, the operator grasps the ferrule 16 as the coatings are still moist and liable to be injured if grasped by the fingers of the operator. Other provisions for handling these coated candles are also made by me as, for example, the rendering of the lower end of each candle impervious to moisture for preventing the coating of such end, so that the non-coated end may be grasped by the operator for withdrawing the candles.

What I claim is:—

1. In filter film forming apparatus, the

combination of a pivotally mounted container, and means therein for removably receiving a filter film frame designed to receive a filter film, and means for supplying liquid to the container under pressure sufficient for building a film on such frame.

2. In filter film forming apparatus, the combination of a pivotally mounted container having means for removably carrying filter film frames, and means for delivering liquid to the container under pressure.

3. In filter film forming apparatus, the combination of a pivotally mounted container having means for removably carrying filter film frames, and means for delivering liquid to the container under pressure, the container having a discharge opening communicating with each filter film frame carrier so as to communicate with the interior of each filter film frame when mounted on the carriers.

4. In filter film forming apparatus, the combination of a container journaled to rotate vertically, means for supplying liquid under pressure to the container, the container being provided with a discharge opening at its upper portion and a filter film frame carrier sustained by the container substantially at the point of the discharge opening in position for removably receiving a filter film frame and for sustaining the same in communication with such discharge opening.

5. In filter film forming apparatus, the combination of a container journaled to rotate vertically, and having a removable cover, the cover being formed with a discharge opening, a filter film frame carrier engaging the cover substantially at the point of the discharge opening and adapted to detachably carry a filter film frame in communication with said discharge opening, and means for supplying liquid under pressure to the container.

6. In filter film forming apparatus, the combination of a container journaled to rotate vertically, and having a removable cover, the cover being formed with a plurality of discharge openings, a filter film frame carrier engaging the cover substantially at each of the openings in position for removably receiving a filter film frame communicating with the respective opening, and means for supplying liquid to the container under pressure.

7. In filter film forming apparatus, the combination of a pivotally mounted container having a removable portion, the removable portion being formed with a discharge opening, means for detachably securing a filtering candle to the removable portion in communication with the discharge opening, and in position to prevent discharge from the container through said opening except through the walls of the candle, and means for delivering liquid to the container under pressure.

8. In filter film forming apparatus, the combination of a pivotally mounted container having a removable portion, the removable portion being formed with an aperture, a tubular support substantially surrounding the aperture and extending therefrom into the container and adapted to detachably receive a filter candle in position for preventing discharge of liquid from the container through said aperture except through the walls of the candle, and means for supplying liquid to the container under pressure.

9. In filter film forming apparatus, the combination of a pivotally mounted container having a removable portion, the removable portion being formed with an aperture, a tubular support substantially surrounding the aperture and extending therefrom into the container and adapted to detachably receive a filter candle in position for preventing discharge of liquid from the container through said aperture except through the walls of the candle, the candle support having a spring portion adapted to frictionally engage the candle, and means for supplying liquid to the container under pressure.

10. In filter film forming apparatus, the combination of a pivotally mounted container having a removable portion, the removable portion being formed with an aperture, a tubular support substantially surrounding the aperture and extending therefrom into the container and adapted to detachably receive a filter candle in position for preventing discharge of liquid from the container through said aperture except through the walls of the candle, the candle support having a spring portion adapted to frictionally engage the interior of the candle, and means for supplying liquid to the container under pressure.

11. In filter film forming apparatus, the combination of a pivotally mounted container having a removable portion, the removable portion being formed with an aperture, a tubular support substantially surrounding the aperture and extending therefrom into the container and adapted to detachably receive a filter candle in position for preventing discharge of liquid from the container through said aperture except through the walls of the candle, the candle support having a plurality of springs adapted to frictionally engage the candle, and means for supplying liquid to the container under pressure.

12. In filter film forming apparatus, the combination of a container journaled to rotate vertically and adapted during the operation of forming filter films to remain upright, a removable cover for said container

having a plurality of discharge openings, a frictional support for filter candles at each discharge opening, a gasket surrounding each support and disposed against the inner face of the cover and adapted to receive the open end of a filter candle mounted on the respective support for forming a substantially leak-tight joint for preventing discharge from the container except through the walls of the several candles, and means for delivering liquid under pressure to the container, the container being adapted to be revolved to an inverted position after a filter film forming operation for discharging the contents of the candles, and the cover being adapted to be removed thereafter for enabling withdrawal of the candles with their filter films from the candle supports.

13. In filter film forming apparatus, the combination of a movably mounted container, means therein for removably receiving a filter film frame designed to receive a filter film, and means for supplying liquid to the container under pressure sufficient for building a film on such frame.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE MOORE.

Witnesses:
C. H. FESLER,
EDGAR M. KITCHIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."