Nov. 22, 1927.

1,649,834

F. B. LOMAX

SIRUP MAKER

Filed July 12, 1926

3 Sheets-Sheet 1

Fig. 1.

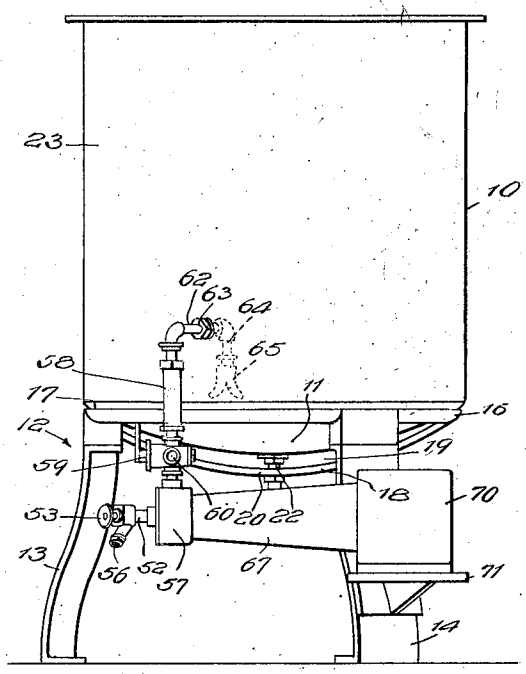
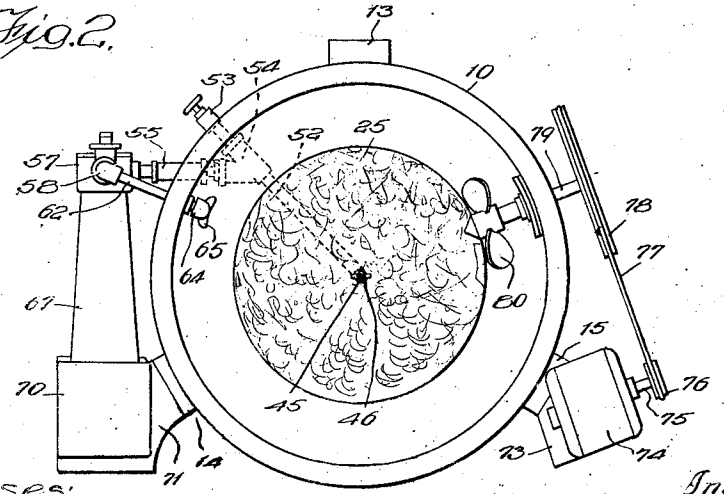


Fig. 2.



Witnesses:
William R. Kilroy
Harry R. L. White.

Inventor:
Frank B. Lomax
By Brown Bottcher Dienner
Attys

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F. B. LOMAX

SIRUP MAKER

Filed July 12, 1926 3 Sheets-Sheet 2

Fig. 3.

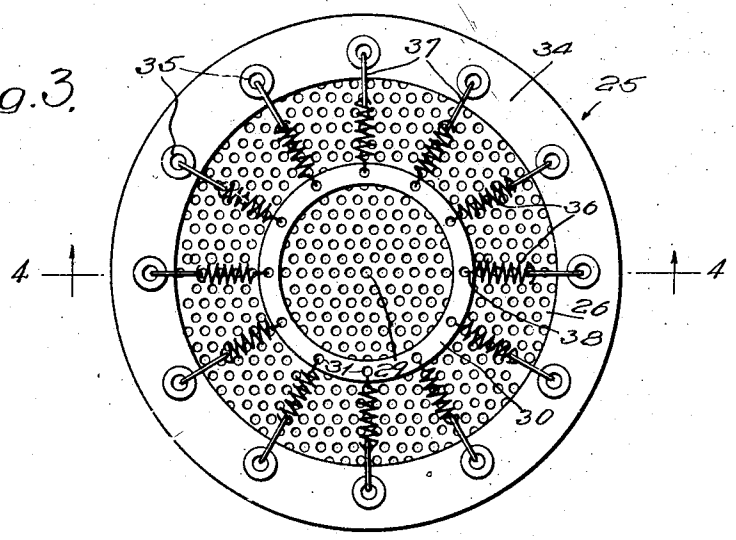


Fig. 4.

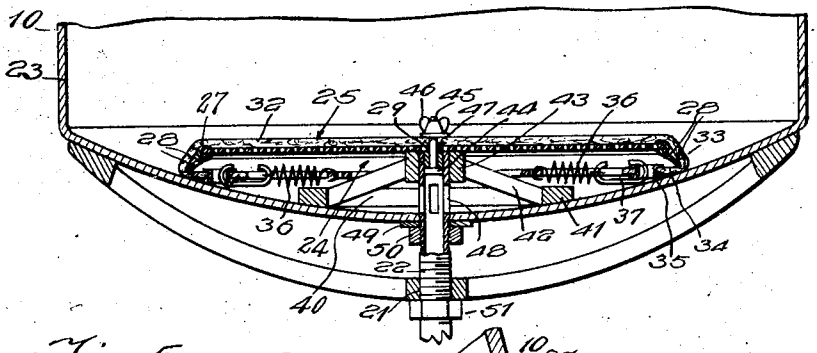
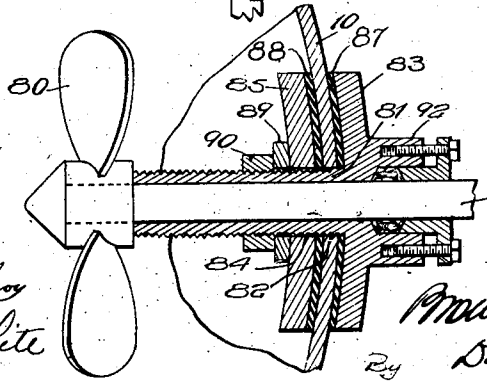


Fig. 5.



Witnesses:
William R. Kilroy
Harry R. L. Abbe

Inventor:
Frank B. Lomax
By Brown Brueren & Dienner
Attys

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F. B. LOMAX

SIRUP MAKER

Filed July 12, 1926 3 Sheets-Sheet 3

Fig. 6.

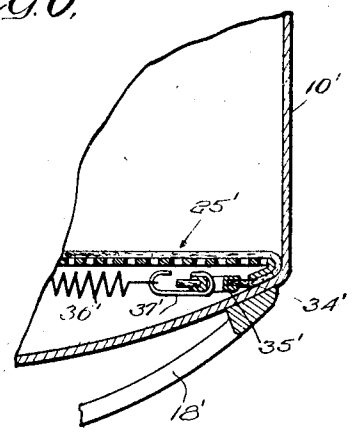
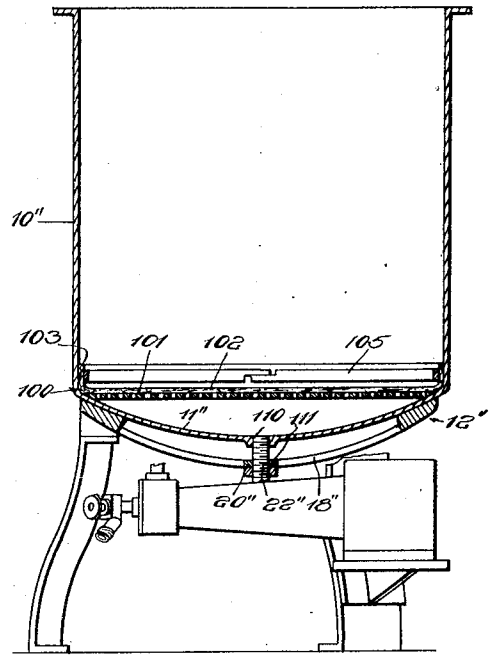


Fig. 7.



Witnesses:
William P. Kilroy
Harry R. K. White

Inventor:
Frank B. Lomax,
By Brown, Critchlow & Flannery
Attys

Patented Nov. 22, 1927. 1,649,834

UNITED STATES PATENT OFFICE.

FRANK B. LOMAX, OF CHICAGO, ILLINOIS.

SIRUP MAKER.

Application filed July 12, 1926. Serial No. 121,788.

The present invention in general pertains to filters and more particularly to apparatus for making filtered solutions.

More specifically I contemplate the provision of an improved sirup maker such as that disclosed in my Patent 1,565,661, issued December 15, 1925.

In practice I find that there is considerable demand for a relatively simple and inexpensive filter and sirup maker. To meet this demand I have, after considerable experimentation, developed the machine to be disclosed herein. This machine, although of a much cheaper construction than that disclosed in my co-pending patent applications, Serial Nos. 629,807 and 106,323 filed April 4, 1923 and May 3, 1926, respectively, is adapted to form and filter a comparatively great amount of solution in a minimum of time.

My present invention employs a novel filtering barrier which is of a relatively simple and inexpensive construction. This barrier comprises a perforated metallic mounting plate and a filtering pad or felt resiliently secured to the said plate. The resilient means for fastening the pad to the plate may consist of a plurality of springs which serve to at all times fasten the felt to the perforated plate in proper alignment therewith.

I have tried to fasten a filter pad or felt to the rigid mounting plate by means of a string or cord, but find that this is not practical since the pad cannot, with facility, be properly aligned with the plate when string is utilized as the fastening medium. Also, the use of string requires a relatively great period of time to replace worn out or deteriorated felt pads.

In the filtering barrier construction of my present invention, the felt pad may be properly aligned and secured to the perforated plate with facility. The spring arrangement enables the ready removal of the pad for the purpose of replacement.

Another feature of my present invention pertains to the manner in which I mount the filtering barrier in the container. The barrier of my present machine is drawn into tight contact with the bottom of the container by means of a tubular element which serves to fasten the container to its support and also serves as an outlet for the container.

A further feature of my invention pertains to the provision of a relatively small path of circulation for the filtered liquid being impelled by the suction pump. I have accomplished this by extending the return tube through an aperture in the wall of the container immediately over the barrier; the tube being adapted to project liquid onto the top of the barrier.

A still further feature of my invention has to do with the novel manner in which I arranged the pump with respect to the return tube. In other words, the tube is positioned directly in alignment with the discharge orifice of the pump which is preferably actuated by a conventional motor. Both the pump and its motor are mounted upon a bracket fastened to one of the legs of my machine. This arrangement permits of the ready assembly of the parts with a minimum of labor and time.

Other objects and advantages of my invention will more fully appear from the following detailed description taken in connection with the accompanying drawings which illustrate several embodiments thereof, and in which;

Figure 1 is a side elevation of my novel machine;

Figure 2 is a plan view of the machine illustrated in Figure 1;

Figure 3 is an enlarged plan view of the filtering barrier;

Figure 4 is a sectional view taken on substantially the line 4—4 of Figure 3 illustrating the novel manner in which I secure the barrier to the bottom of the container;

Figure 5 is a sectional view illustrating the mounting for the agitator shaft;

Figure 6 is a fragmentary sectional view similar to Fig. 4 illustrating a modification of my invention; and

Figure 7 is an elevation partly in section of another form of the present invention.

Referring now to the drawings in detail in which like reference numerals designate similar parts throughout the several views, 10 denotes a tank or container which may be made of any suitable metallic material. I preferably coat the tank with enamel for sanitary purposes. The tank 10 is provided with a curved shaped bottom 11 and is adapted to rest upon a support 12 preferably made of iron. The support 12 includes three legs, 13, 14 and 15, which are equidistantly spaced from each other. The legs are interconnected by a circular ring or top portion 16, beveled at the inside as indicated at 17,

to accommodate the convexly depressed bottom 11 of the tank. Formed integral with the ring portion 16 are a plurality of spiders 18 curved downwardly. The spiders are spaced from the bottom 11 as indicated at 19 and are provided with a substantially central hub portion 20 equipped with an opening 21 through which extends a discharge or outlet pipe 22.

The container 10 is divided into an upper compartment 23 and a lower compartment 24 through the medium of a diaphragm, partition or filtering element 25. The filtering barrier 25 comprises a perforated metallic plate 26 preferably of Monel metal. The plate 26 is of a circular construction and has secured to its rim or edge an annular flange 27. The flange 27 is preferably provided with a plurality of apertures or holes 28. This annular flange 27 may be secured to the edge of the annular plate 26 in any suitable manner, for example, by spinning this flange on the edge of the plate. I have illustrated the flange as being spun on the plate 26 (Figure 4). The plate 26 is provided with a substantially central aperture or hole 29. Positioned below the hole 29 and in axial alignment therewith is a ring or annular element 30 provided with a plurality of apertures 31. Positioned on top of the plate 26 is a filtering element or felt pad 32 which is of a substantially larger diameter than the plate 26. This pad 32 has an annular portion 33 bent over the flange 27 of the plate. Also this felt 32 has an annular portion 34 bent under the flange 27 as shown in Figure 4. The annular portion 34 is provided with a plurality of eye-lets 35 preferably twelve in number. Each eye-let 35 is connected to the hole 31 in the ring 30 by means of a spring 36. Each spring 36 includes a hook 37 adapted to engage the eye-let 35 and a hook 38 adapted to fit in the hole 31 of the ring 30. Obviously, by unhooking the springs from the turned-back edge or portion 34 of the felt pad, the pad may be removed with facility from the plate.

Furthermore, the springs 36 extend radially from the ring 30 and are adapted to properly align the felt with respect to the plate. By using the springs it is a comparatively simple task to either detach or attach a felt pad to the plate 26. Of course, it is to be understood that although I have disclosed felt as being the preferred form of filtering material that any other analogous filtering material may be used in place of the felt pad.

As is evident from Figure 4, the barrier 25 is adapted to be positioned in the lower part of the container 10 to divide the same into the two compartments 23 and 24. The barrier 25 rests upon the bottom 11 of the tank 10 with its portion 34 in engagement with the inner wall of the tank. It should be noted that the flange 28 extends obliquely from the plane of the plate 26 and that the edge of the flange 28 constitutes a guide over which the felt is pulled by the springs 36.

Positioned in the space 24 or rather the compartment 24 below the filtering barrier 25 is an annular member 40 comprising an annular ring 41, a plurality of spiders 42, and a central hub portion 43. The hub portion 43 is secured to the upper end of the discharge pipe 22, as shown in Figure 2. Connected to this upper end of the pipe 22 is a bolt 44 having a threaded shank 45 extending up through the opening 29 in the plate 26 and through a similar aperture in the felt pad 32. The filtering barrier 25 is tightly fastened to the bottom of the container by means of a wing nut 46 threaded on the tank 45. I preferably dispose a washer 47 intermediate the wing nut 46 and the felt pad 32 of the filtering barrier 25. By removing the washer 47 and the wing nut 46 the filtering barrier may be removed with facility from the container. It should also be noted that the periphery of the filtering barrier abuts the bottom of the container and that the central portion of the filter 25 is tightly clamped to the hub portion 43 by means of the bolt 44 and the wing nut 46.

The pipe 22 is provided with a plurality of openings 48 which communicate with the lower compartment 24. Also, surrounding the pipe 22 in the space 19 between the bottom of the tank 10 and spiders 18 is an arcuate shaped washer 49 adapted to accommodate itself to the curved surface of the bottom 11 of the tank. Threaded on the pipe 22 is a nut 50 for locking the pipe against upward displacement.

Also threaded on the lower end of the pipe 22 is a nut 51 which abuts the hub 20 of the support or stand. Connected to the pipe 22 is a radially extending pipe 52 (Figure 2). The pipe 52 is disposed in a plane at right angles to that of the vertical pipe 22. The end of the pipe 52, as shown in Figure 2, is provided with a valve 53 by means of which the contents below the filtering barrier may be withdrawn from the machine. The pipe 52 is provided with a T 54 intermediate its end to which is connected a pipe 55. The pipe 55 is in turn connected to a gear pump 57 adapted to suck liquid through the filtering barrier 25. The discharge orifice from the gear pump 57 is connected to a vertically extending tube 58 disposed alongside of the wall of the tank 10. The tube 58 has connected in it intermediate its ends a valve 59 which may be operated to close off the upper portion of the tube from the pump. It should be noted that both the valves 53 and 59 are equipped with drain faucets or spigots 56 and 60, respectively. By operating the valve 53 liq-

uid may be withdrawn from the tank before it reaches the pump 57. On the other hand, by operating the valve 59 liquid may be withdrawn through the spigot 60 before the same is returned to the tank, but after it has passed through the pump 57.

The upper end of the tube 58 is equipped with a laterally extending pipe 62 which projects through an opening 63 in the wall of the tank 10. The end of the pipe 62 inside of the container 10 is connected to a downtake pipe 64 having a nozzle 65 connected to its lower end. The nozzle 65, is preferably of a forked construction, and in reality constitutes two nozzles. This nozzle 65 is adapted to project liquid onto the top of the barrier for the purpose of sweeping the same clean of any solid matter.

The nozzle construction 65 in reality serves as an agitator for preventing any solute such as sugar from caking on the filtering barrier 25. The purpose of this nozzle construction may be more fully understood by referring to my copending patent application, Serial No. 106,323, filed May 3, 1926.

The pump 57 is connected to a motor 70 by means of an extension 67 formed integral with the motor 70. The operating mechanism of the pump 57 is connected to the shaft of the motor inside of this extension 67 by the means of any suitable clutch or coupling (not shown), which does not constitute, per se, any part of the present invention. The motor 70 is mounted on a bracket 71 fastened to the side of the leg 14. This arrangement permits of a relatively small circulatory path over which the filtrate has to travel. Also, this arrangement permits the assembly of the gear and pipe units with a minimum of labor and time.

Referring to Figure 2, the leg 15 of the support 12 has fastened thereto a bracket 73 upon which is mounted a motor 74. The shaft 75 of the motor 74 has mounted thereon and secured thereto a pulley 76 which is connected to a relatively large pulley 78 by means of a belt 77. The pulley 78 is fastened to a shaft 79 which extends through the wall of the tank 10 and has secured to its end inside of the tank an agitator 80. The shaft 79 extends through a sleeve 81 formed integral with a plate 83. The plate 83 is disposed on the outside of the tank 10 and the sleeve 81 extends inwardly through an opening 82 in the wall of the tank and through an opening 84 in a plate 85. Each of the plates 83 and 85 are curved in shape so as to enable them to accommodate themselves to the arcuate shape of the tank wall. Positioned between the wall of the tank and the plate 83 is a rubber packing 87 and positioned intermediate the wall of the tank and the plate 85 is a rubber packing 88. The end of the sleeve 81 inside of the tank 10 is threaded and has pulled thereon a washer 89 preferably of an arcuate shape so as to enable it to properly abut the plate 85. Threaded on this end of the sleeve 81 is a nut 90 which is adapted to draw the two plates 83 and 85 toward each other and into tight engagement with the wall of the tank. Secured to the shaft 79 outside of the tank 10 and intermediate the plate 83 and the pulley 78 is a stuffing box designated generally by the reference character 92 which may be of any conventional construction.

By making the plates arcuate in shape, I find that they are prevented from being rotated by the revolving shaft 79 when the agitator 80 is in operation. The plates 83 and 85 may be made of suitable castings and are relatively simple and inexpensive to manufacture. These plates cooperate together to form a seal around the shaft 79 and constitute an ideal support for the shaft 79.

The operation of my present sirup maker is briefly as follows:

The solute to be dissolved which may be sugar is first placed in the container 10 upon the barrier 25. Then the solvent or liquid is placed on top of the sugar. To stir this mass of solid matter and liquid the agitator 80 is set into operation by turning on the motor 74. The agitator 80 serves to prevent the sugar or solute from caking on the filtering barrier as already pointed out and discussed in my co-pending patent application Serial No. 106,323, filed May 3, 1926.

Thereafter, the motor 70 is turned on to actuate the suction pump 57 which withdraws liquid from below the barrier and circulates it back into the top of the tank through the nozzle 65. This pump 57 is adapted to create a partial vacuum below the filtering barrier 25 to augment the dissolving and filtering action. The liquid filtrate discharged from the nozzle 65 is projected across the top of the filtering barrier 25. This projected jet of liquid serves to aid the agitator 80 in preventing solid matter from caking on the filtering barrier.

In the operation of my suction solution forming apparatus I have found that the pressure difference created by the pump tends to compress the felt filter. This is a highly desirable feature, inasmuch, as it greatly improves the filtering qualities of the felt. In fact, I find that such a felt when compressed is for most purposes as good a filter as filter paper.

It should also be observed that I have utilized a single barrier both as a filtering medium and as a support for the solute thus providing a very economical construction adapted to be easily assembled.

When all the sugar or solute has been dissolved in the liquid, the valve 59 may be actuated and the liquid may be withdrawn from the container through the means of the

faucet 60. To completely drain the tank 10 the nozzle 56 is inserted in the pipe-line 52. The filtering barrier 25, as previously pointed out, may be removed with facility from the tank 10 by unscrewing the wing-nut 46.

Also in order to completely drain the tank after the sirup is made, the filter should be as flat as practical. That is to say, by making the filter flat rather than curved in cross section it is possible to withdraw all of the liquid from the tank after the sirup is made by means of the suction device. This arrangement also enables the use of a relatively heavy felt filter since the liquid is sucked therethrough rather than permitted to gravitate.

On the other hand, if a concave or convex filter is employed a thin porous filtering medium must be used so that the filtrate can percolate or seep therethrough freely, for obviously, once the partial vacuum in my apparatus is broken, the suction device loses its force and some liquid will be left on the curved surface of the filtering barrier. In other words, once the vacuum is broken, this liquid will have to gravitate or seep through the barrier and if the filter was not highly porous it would require the elapse of a long period of time before all of the liquid would be drained from the tank.

In Figure 6 I have illustrated another method of positioning the filtering barrier. It will be observed that this arrangement is substantially like that shown in Fig. 4 with the exception that the filtering barrier 25' extends clear to the wall of the tank. Since all of the parts in this modification are substantially identical to those shown in Figure 4 I have applied the same reference characters thereto, with the exception that these numerals are primed in order to prevent confusion of the numbers.

The advantage of this construction resides in the fact that the annular ring-like space between the barrier and the inner wall of the tank is eliminated thus facilitating the drainage of the liquid from the tank when the vacuum is broken. In practice I found that in draining the tank after the sirup was made, some liquid remained in the aforesaid intermediate annular pocket when the vacuum was broken. In order to solve this difficulty I devised the arrangement illustrated in Figure 6 which eliminates the annular pocket and thus enables all of the liquid to be expeditiously drained from the tank.

In Figure 7 I have illustrated another type of mounting for the filtering barrier. The tank 10'' and its stand are identical to that shown in Fig. 1 with the exception of the fastening between the tank and the stand which will be described hereinafter.

The tank 10'' is provided with an arcuate shaped bottom 11'' adapted to rest on the stand 12''. Resting on the bottom of the tank is a filtering barrier 100 comprising a Monel metal foraminated plate 101, and a filtering element or felt 102. The plate abuts the peripheral portion of the bottom 11''. The felt 102 has a peripheral edge 103 which extends upwardly along the inner periphery of the wall of the tank. Disposed on top of the felt is a clamping element 105 which may take the form of a piston ring or the like adapted when in its expanded position to urge the edge 103 into tight engagement with the wall of the tank.

The spiders 18'' of the stand are spaced from the bottom and are provided with the central hub portion 111 thru which extends the discharge or outlet pipe 22''. This pipe is threaded into an opening 110 in the bottom 11'' and is held in position by means of a nut 20''.

The operation of the two modifications of my invention, illustrated as Figures 6 and 7 is believed to be obvious from the description of the form of the invention shown in Fig. 1.

Now I desire it understood that although I have illustrated and described in detail the preferred embodiments of my invention, the invention is not to be limited thereby but only in so far as claimed by the scope and spirit of the appended claims.

I claim:

1. A filter comprising a foraminous plate, a layer of filtering material disposed on a side thereof, and resilient means disposed on the other side of said plate and connected to an edge of said layer to secure said layer of filtering material to said plate.

2. A filter comprising a foraminous plate, a layer of pliable filtering material disposed on said plate and having its edge turned over the rim of the plate onto the underside of the plate, and a plurality of resilient elements extending across said underside of the plate and connected to the turned back portion of the layer for fastening said layer to said plate.

3. A filter comprising a perforated metallic plate, a metallic ring disposed substantially centrally of said plate, a layer of felt positioned on top of said plate and having its edge turned back over the rim of the plate onto the underside of the plate, and a plurality of substantially radial springs for connecting said turned back edge of the felt to said central ring to tightly secure said layer of felt to the top of the plate.

4. A filter comprising a foraminous plate, a layer of filtering material disposed on a side thereof, a metallic element disposed on the other side of said plate and resilient means associated with said element for connecting an edge of said layer of filtering material to said element to secure said layer of filtering material to said plate.

5. A filter comprising a foraminous plate, a layer of filtering material disposed on one side thereof, an element positioned on the other side of said plate, and resilient means including a plurality of radially disposed springs for connecting an edge of said layer to said element to secure said layer to said spring.

6. A filter comprising a foraminous plate and a layer of filtering material resiliently secured thereto.

7. A filter comprising a foraminous plate, a layer of filtering material associated therewith, and a plurality of radially disposed springs for securing the said filtering material to the said plate adapted to be readily detached to permit removal of the layer from the plate.

8. A filter comprising a circular perforated plate, a circular layer of filtering material of larger diameter than said plate positioned on one side of the plate, a plurality of eye-lets formed in the peripheral edge of the layer, said peripheral edge being bent over the rim of the plate with said eye-lets positioned on the underside of said plate, and resilient means for inter-connecting said eye-lets on the underside of said plate to secure the filter layer thereto.

9. A filter comprising a foraminous plate, and a layer of filtering material resiliently secured thereto through the means of eye-lets formed in the peripheral portion of said layer of filtering material.

10. A filter comprising a circular foraminous plate, a layer of filtering material positioned on top of said plate and having a peripheral portion turned back over the rim of said plate, eye-lets formed in the said peripheral portion, and resilient means associated with said underside of the plate for interconnecting said eye-lets and to secure said layer to said plate.

11. A filtering barrier comprising a foraminous plate, a layer of filtering material disposed on one side thereof, said plate having integral therewith an annular flange portion extending laterally therefrom, the edge of the said filtering material being bent over the edge of the plate and over said flange portion, and resilient means disposed on the other side of said plate substantially in the space defined by the said flange portion and connected to an edge of the said layer to secure same to said plate.

In witness whereof, I hereunto subscribed my name this 10 day of July, 1926.

FRANK B. LOMAX.