

F. B. ANDERSON.

FILTER.

APPLICATION FILED JAN. 19, 1920.

1,403,369.

Patented Jan. 10, 1922.

2 SHEETS—SHEET 1.

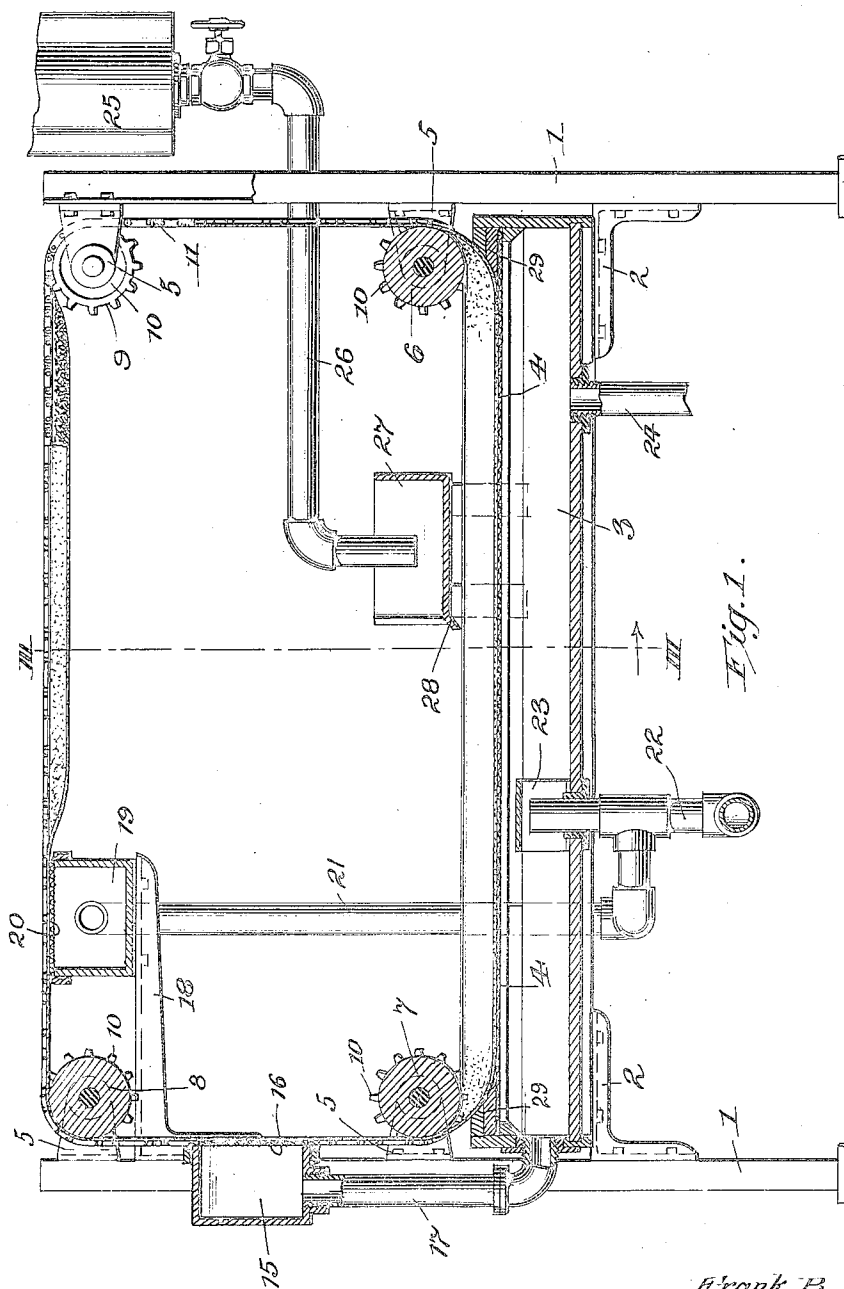


Fig. 1.

Inventor:
Frank B. Anderson,

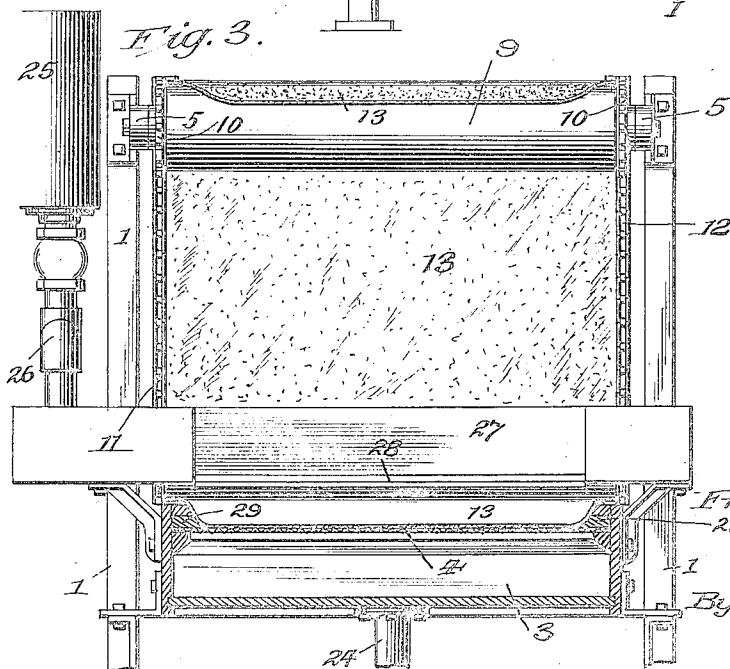
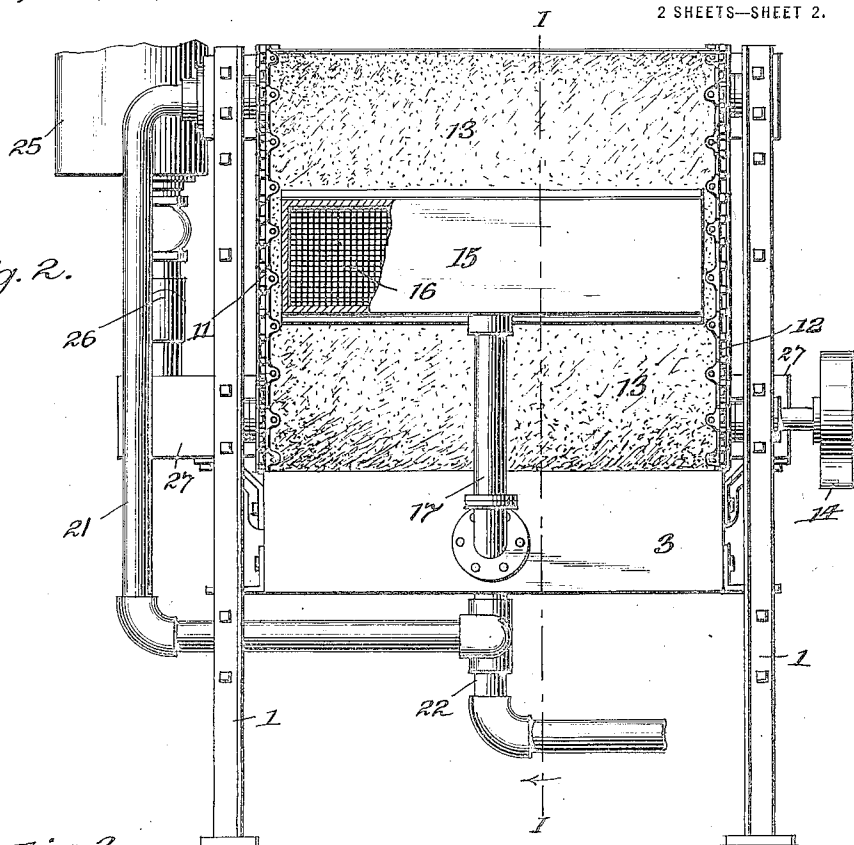
By *Dodge and Lohr*

Attorney.

FILTER.

1,403,369.

2 SHEETS—SHEET 2.



Frank B. Anderson,

By Dodge and Bond
Attorneys

UNITED STATES PATENT OFFICE.

FRANK B. ANDERSON, OF CLEVELAND, OHIO.

FILTER.

1,403,369.

Specification of Letters Patent. Patented Jan. 10, 1922.

Application filed January 19, 1920. Serial No. 352,363.

To all whom it may concern:

Be it known that I, FRANK B. ANDERSON, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Filters, of which the following is a specification.

This invention pertains to an improved filter and has reference more particularly to the provision of means operated through suction for drawing the liquid to be filtered through a filter cloth or belt and to means for removing the solid material remaining upon the belt after the filtering action.

A simple embodiment of the invention is shown in the accompanying drawings, wherein,—

Fig. 1 is a vertical longitudinal section of the apparatus taken on the line I—I of Fig. 2.

Fig. 2 an end elevation, partly broken away, and

Fig. 3 a transverse vertical sectional view taken on the line III—III of Fig. 1.

Stated in general terms, the structure may be said to comprise an endless filtering belt which is run over a suction box. the upper face, or that upon which the belt rests, being formed of a foraminous and relatively rough material which tends to move or agitate the fibers of the belt so that the skin or layer of solid material resting thereon will be broken up, and, as a consequence, the fluid more readily withdrawn through the belt.

The invention also contemplates the utilization of an auxiliary suction box and suction means for removing the solid material from the face of the belt.

Referring to the drawings, the frame of the machine may be said to comprise a plurality of upright posts or columns 1 having brackets 2 secured thereto adjacent the lower portion which form the support for a suction box 3. In the upper portion of the box there is placed a foraminous diaphragm 4, preferably formed of woven wire having a mesh of approximately $\frac{1}{4}$ ". The posts or columns 1 carry other brackets 5 which form the support for rollers 6, 7, 8 and 9, the shafts of said rollers each carrying at

its outer ends sprocket wheels 10. Endless chains 11 and 12 pass around the sprockets and attached thereto and extending from one chain to the other in an endless filtering belt or cloth 13. Motion is imparted to the chains, and, consequently to the cloth, through any one of the shafts by a power wheel 14 (Fig. 2) and the belt is designed to be moved continuously over the suction box 3. A supplemental suction box 15 is located at the uptake end of the belt, the inner face of the box being provided with a wire screen surface 16. Said box is connected by a pipe or conduit 17 with the suction box 3. Mounted upon brackets 18 beneath the upper run of the belt is a third suction box 19, which is likewise preferably formed with a foraminous surface produced from the wire screening 20, and said box or chest 19 is connected by a pipe 21 to the main suction pipe 22. The upper end of said pipe 22, as will be seen upon reference to Fig. 2, extends upwardly below the bottom of the suction box 3 and a shield 23 is placed thereover in order to prevent the liquid from passing from the belt directly into the mouth of the pipe. An outflow pipe 24 is provided for the chest 3. The material to be filtered comes from a reservoir or receptacle 25 from which leads a valved pipe 26, the mouth of which discharges into a trough 27 that extends across the width of the machine, and is provided with an open side and a downwardly extending lip 28 which flows the material evenly on to the belt.

In the treatment of oils, it has heretofore been found necessary to employ filter presses in order to secure a final extraction of the oil from the finer materials carried thereby, such as the foots, and such filter presses are expensive and difficult to keep clean and in order. The present invention, however, does away with the necessity of such filter presses and enables one to make a clean extraction of the oil from such foots and to maintain the filtering surface in such condition that it may be used continuously or until such time as it becomes worn or possibly filled up so that its efficiency drops and a new cloth becomes necessary. Such

cloth may, however, be readily placed in position and the plant therefore need be shut down but a relatively short time to effect the change.

5 In operation suction being applied to the pipe 22, the belt will be drawn down upon the foraminous supporting surface 4, the edges of the belt curving upwardly against
10 filler blocks as 29 (Fig. 3) so as to form a relatively close fit between the belt and the adjacent parts and thus effect a suction directly through the belt without leakage around the edges thereof. The oil which is
15 evenly flowed over the belt from the trough 27, spreads out over the belt and inasmuch as the suction is equal over the entire belt surface which lies upon the diaphragm 4, extraction takes place over such surface. The belt, as it moves upwardly, passes the
20 second suction box 15 where it is again subjected to suction and any oil which may remain will be withdrawn. Passing over the upper roller the belt travels to and over the suction box 19 where the solid material
25 upon the surface of the belt is withdrawn owing to the suction action and the action of the foraminous wire surface 20 upon the belt. This operation is continued so long as motion is imparted to the belt. It has
30 been found that by employing a stationary diaphragm, as 4, formed of woven wire, that the threads or fibers which go to make up the belt body, are given a relative movement and any tendency to form a skin or
35 film of the solid material on the belt which has a deterrent effect upon the filtering action, is done away with to a very large extent. Consequently, the oil or other material to be extracted will be readily drawn
40 through the belt and extracted from the foots or other solid material.

In am aware that it is not new, broadly stated, to employ a suction box or member in conjunction with a perforated surface,
45 and likewise aware that it is not new to employ a suction box, a filter belt or surface, and an interposed wire supporting element, but, so far as I am informed, such supporting surface has been moved in consonance with the filter belt and consequently
50 the breaking up action or the prevention of the forming of a film or skin upon the belt has not been effected.

It is conceivable that in so far as the suction box and the foraminous diaphragm for
55 supporting the belt are concerned that they may be employed with means for removing the solid material from the belt other than shown, and I do not, therefore, desire to
60 limit myself necessarily to the utilization of a suction box for removing the solid material from the return run of the belt.

What is claimed is:

1. In a filtering apparatus, the combination of a suction box; a perforate member

overlying the open upper side of the box, said member being rough or uneven; a belt passing over and in contact with said member; means for flowing the material to be filtered on to the belt; and means for removing the solid material left upon the belt after it is passed over the box. 70

2. In a filtering apparatus, the combination of a suction box, open at its upper side; a diaphragm formed of woven wire overlying the open upper portion of the box; a filtering surface; means for moving said surface over the diaphragm; and means for flowing the material to be filtered on to such filtering surface. 75

3. In a filtering apparatus, the combination of a suction box, open at its upper side; a wire screen secured to the upper portion of the box and forming a supporting surface for a filtering belt; said belt; means for moving said belt over the supporting surface; and means for removing the solid material from the belt as it passes beyond the suction box. 80

4. In a filtering apparatus, the combination of a suction box, open at its upper side, a wire screen surface secured over said open upper side; an endless belt; means for supporting said belt with one run lying in contact with said supporting surface; means for flowing the material to be filtered on to said run; a second suction box underlying the reverse run of the belt; a wire screen located at the upper open portion of said second suction box; and means for moving the belt. 85 90 95 100

5. In a filtering apparatus, the combination of a suction box; a wire screen surface overlying said box; an endless belt having one run thereof in contact with said wire surface; means for supporting and deflecting the belt first upwardly then rearwardly and downwardly to the suction box; a second suction box located adjacent the vertical run of the belt as it leaves the main suction box; a wire screen surface placed in the open side of said suction box and against which the belt travels; and means for removing the solid material from the belt after it passes beyond said second suction box. 105 110 115

6. In a filtering apparatus, the combination of a suction box; a wire screen surface overlying said box; an endless belt having one run thereof in contact with said wire screen surface; means for supporting and deflecting the belt first upwardly then rearwardly and downwardly to the suction box; a second suction box located adjacent the vertical run of the belt as it leaves the main suction box; a wire screen surface placed in the open side of said suction box and against which the belt travels; a third suction box located beneath the upper reverse run of the belt; and a wire screen located 120 125 130

in the outer portion of said box and against which the belt is drawn and travels.

7. In a filtering apparatus, the combination of a suction box open at one side, a foraminous diaphragm overlying the open side and presenting an uneven or undulating surface to the filtering medium contacting

said diaphragm; means for moving said filtering medium over the diaphragm; and means for flowing the material to be filtered on to such filtering medium.

In testimony whereof I have signed my name to this specification.

FRANK B. ANDERSON.