R. E. LANGSTON.

FILTERING APPARATUS.

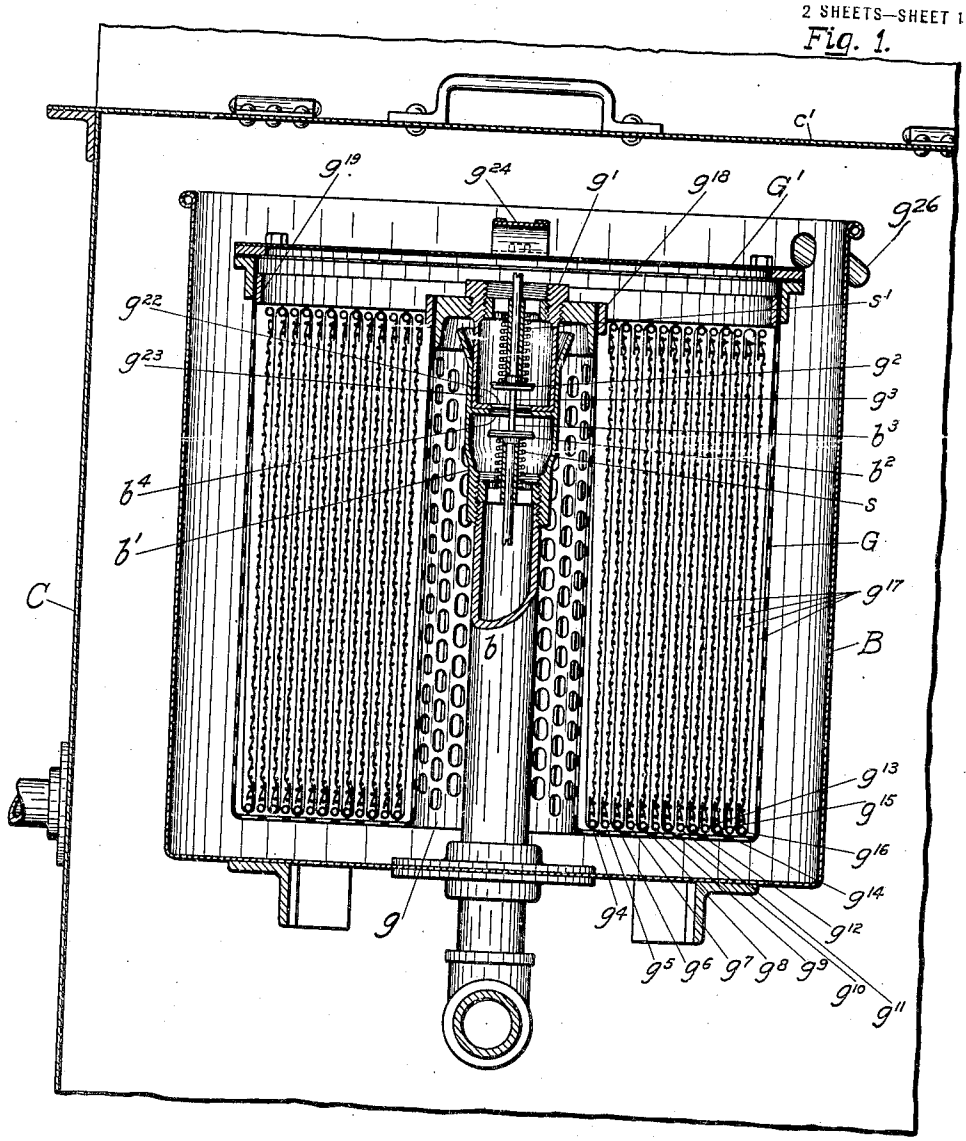
APPLICATION FILED JULY 15, 1920.

1,407,763.

Patented Feb. 28, 1922.

2 SHEETS—SHEET 1.

Fig. 1.



INVENTOR.

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Fig. 3.

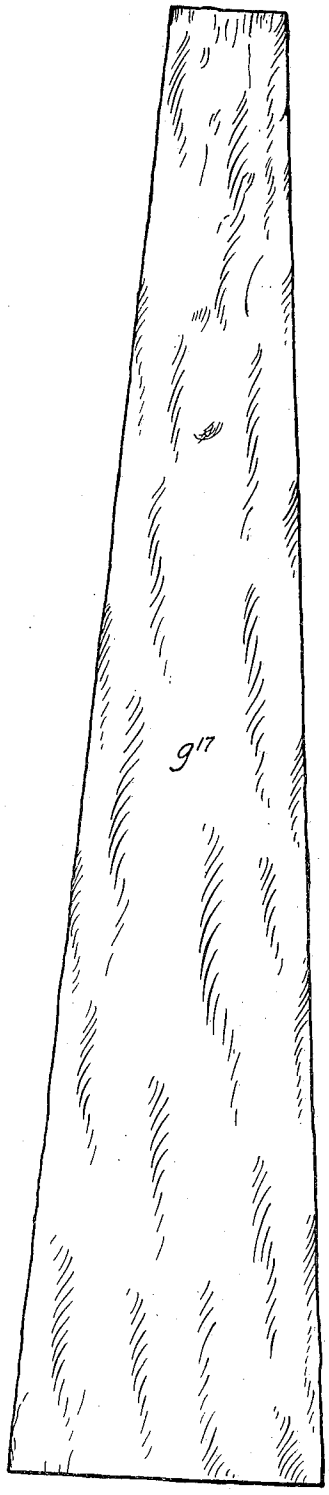
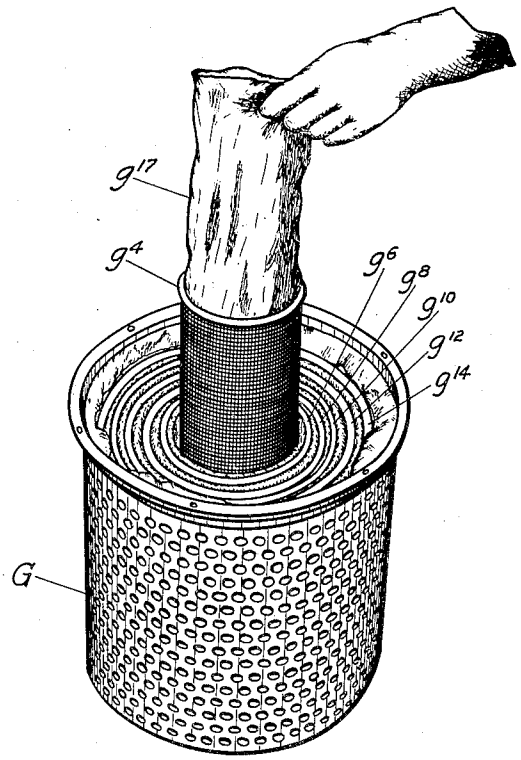


Fig. 2.



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FILTERING APPARATUS.

1,407,763. Specification of Letters Patent. Patented Feb. 28, 1922.

Application filed July 15, 1920. Serial No. 396,570.

To all whom it may concern:

Be it known that I, ROBERT E. LANGSTON, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented new and useful Improvements in Filtering Apparatus, of which the following is a specification.

My invention relates to apparatus for filtering liquids, such as oil and the like, and the object of my invention is to provide a highly efficient, simple and compact apparatus, with a filter cloth readily removable for cleaning. All the dirt is caught on the inside of the filter units and will all be on the outside of the filter cloth when it is removed from its supporting cylinders.

Liquids may be relieved of impurities, consisting of solid matter, if strained through a filtering material of sufficient density; but many straining operations in filters are rendered inefficient by the lack of uniformity of the voids of the filtering material. It is therefore desirable to avoid folds and wrinkles in the filter cloth, hence I have used a tapering, tubular cloth filtering material.

In the particular embodiment of my invention selected for illustration:—

Figure 1, is a vertical axial section of one of the filter strainer units, showing the relative position of the filter cloth and supporting cylinders, when assembled ready for use.

Fig. 2, a detail, is a perspective of a filter basket and nest of supporting cylinders, with the innermost of these cylinders raised and the filter cloth ready for the operator to begin its removal.

Fig. 3, is the tubular filter cloth.

Referring now the drawings, the filter units contained in the receptacle B, are enclosed in a leak tight casing C, with a cover c^1.

When the dirty liquid enters the filter strainer unit receptacle B, it flows upwardly through the pipe b. The pipe b, is provided with an enlarged attachment b^1, at its upper end, within which is a poppet valve b^2, with a spring s, adapted to tend to keep said valve normally seated. This valve is provided on its outer side with an axial projection b^3, which is adapted to press against a similar projection g^3, of another valve g^2, closing in the opposite direction, as hereinafter described.

The valve seat b^4, of the poppet valve b^2, is formed by an inwardly extending peripheral flange on the enlargement b^1, and the outer end of this enlargement is somewhat flared to more easily receive a hollow boss g^1, on the inner side of the core g, of a perforated or wire supporting basket G, the purpose of which will hereafter be described. This hollow boss contains a poppet valve g^2, with spring s^1, and an outwardly extending axial projection g^3, whose end is adapted to bear against the end of the projection b^3, as heretofore described. The valve seat g^{22}, of the poppet valve g^2, is formed in the cupped end g^{23}, of the hollow boss g^1. When this filter strainer apparatus is in position, as shown in Figure 1 of the drawings, both of these poppet valves are held open, and the liquid to be filtered is allowed to flow freely through the pipe b, past both valves b^2, g^2, into the chamber formed by the perforated or wire basket G, and its cover G^1.

Within this perforated or wire basket G, are a plurality of concentric screen cylinders g^4, g^5, g^6, g^7, g^8, g^9, g^{10}, g^{11}, g^{12}, g^{13}, g^{14}, g^{15} and g^{16}.

A conical tube g^{17}, of suitable filter cloth, long enough to pass downwardly over the core g, of the supporting basket, and between it and the screen cylinder g^4, and then upwardly over the outside of the cylinder g^4; thence downwardly over the outside of cylinder g^5, upwardly over the outside of cylinder g^6, and so on, turning the cloth over the outside of the next larger cylinder, in the order they come, until the cloth tube is passed upwardly between the outside of cylinder g^{16}, and the inside of the perforated or wire basket G.

The small end of the tapered tube g^{17}, is held firmly into its place by a metal band g^{18}, pressing over the tube and holding it against the outside of the basket g.

The large end of the tapered tube g^{17}, is held firmly to its place by a metal band g^{19}, pressing against the inside of the tube g^{17}, and holding it against the inside of the basket wall G. These bands together with the basket cover G^1, seal both ends of the tube and make it impossible for any liquid to pass from one side of the cloth to the other except by passing through the tapered tubular filter cloth g^{17}.

The strainer unit receptacle B, is leak-tight on the bottom and sides and is open on the top. It is large enough to contain a complete filter strainer unit and is filled to

the level of its outlet pipe g^{26}, with clean oil, which completely covers the filter strainer. The purified oil after passing from the filter strainer pours out of receptacle B, into the clean oil storage compartment formed by the casing C, and is now ready for re-use.

By this construction and arrangement of the filter strainer, the maximum area of filter medium is provided within a given space; the area of the medium is supported in a vertical position so that the slime, sediment or impurities caught from the oil tend to work downwardly therefrom, thereby making the filter medium to a great degree, self cleaning. The difference between the inside and the outside pressures on the filter cloth due to the head of the liquid above the outlet g^{26} of the receptacle B, containing the filter strainer is the same over the entire area of the cloth. The filter cloth is shaped and supported in such a manner that it is free from folds and gathers and because of these two facts is uniformly effective. The liquid is passed from the inside of the unit to the outside, whereby the dirt is all retained in the unit and not allowed to fall back into the oil again.

A filter strainer unit may be removed from its receptacle B, when its filtering action becomes sluggish and carried to any convenient place for cleaning. The removal of a filter strainer unit is accomplished by lifting it upwardly by the handle g^{24}. As the axial projection g^3, on poppet valve g^2, is lifted from its contact with the axial projection b^3, on poppet valve b^2, spring s^1, acting on poppet valve g^2, seats it against the valve seat g^{22}, and closes the valve against any back flow of the dirty oil. Spring s, acting on valve b^2, seats it upon the seat b^4, and closes this valve against any further feed of the dirty oil, while the filter unit is not in its receptacle.

The filter cloth is removed from the basket and supporting screen cylinders of the filter strainer unit to be cleaned, by pulling upwardly on the small end of the telescoped cloth tube and thus extending it. The dirt will all be found on the outside surface of the tube, where it should be for cleaning. As the telescoped cloth tube is extended it is rolled into a bundle and gathered into the hand of the operator, until the entire tube is free from its supporting cylinders and basket. It is then found rolled up in one hand of the operator with the dirt on the outside. The tube is now in its easiest possible shape for washing and the mussy conditions incidental to handling other types of dirty filter cloths are eliminated. Much less time is required to remove a dirty cloth of equal area than in any other type of filter.

The operation of the apparatus is as follows:—The liquid to be purified passes upwardly through the pipe b, passes the open valves b^2, g^2, through the hollow boss g^1, and into the open space between the top of the screen cylinders g^4, g^5, g^6, g^7, g^8, g^9, g^{10}, g^{11}, g^{12}, g^{13}, g^{14}, g^{15}, g^{16}, and the cover G^1, into the spaces between the several concentric folds of the filter cloth g^{17}, allowing the liquid to pass through the filter cloth where it deposits practically all of its remaining impurities and out through the perforated or wire basket G, into the body of cleaned liquid maintained in the receptacle B, whence it flows through the outlet pipe g^{26}, into the clean oil storage.

I claim as my invention and desire to secure by Letters Patent of the United States.

1. In an apparatus for purifying and filtering oils, a filter strainer compartment, a removable filter strainer unit therein; means for supplying oil to be treated to the unit, co-acting, self-closing valves adapted to maintain each other in open position by the weight of the unit, a tapering filter cloth tube within said unit, a plurality of concentric perforated cylinders in said unit between which the concentric folds of said tube are supported in such a manner as to cause the oil entering the unit to pass through the cloth from within the nest of cylinders outwardly, and means for keeping the filter strainer unit immersed in filtered oil.

2. In an apparatus for purifying and filtering oil, a filter strainer compartment, a removable filter strainer unit in said compartment consisting of a liquid tight cup shaped receptacle, a vertical pipe to carry the oil to be treated to the unit extending axially up into said receptacle, a valve in said pipe adapted to prevent oil flowing through and out of said pipe except when pressure is exerted from above on said valve, a perforated basket with an axial inlet pipe adapted to co-act with said vertical pipe, a valve in said inlet pipe adapted to prevent a back flow of oil except when opened by pressure from beneath, said two valves adapted to maintain each other in open position by the weight of the perforated basket, a plurality of perforated cylinders in said basket, a tapering filter cloth tube so disposed between said perforated cylinders as to allow the oil to filter therethrough from within the nest of cylinders outwardly into the receptacle, and an outlet for the filtered oil from near the top of the receptacle into the filter strainer compartment.

3. An oil filtering apparatus, consisting of a leak tight receptacle with a dirty oil supply pipe extending upwardly thereinto from below, a valve in said pipe adapted to prevent oil flowing through and out of said pipe except when pressure is exerted from above on said valve; a removable nest of filter cloth supports comprising a perforated

basket with a downwardly extending axial inlet pipe, a valve in said downwardly extending inlet pipe adapted to prevent a back flow of oil except when held open by pressure from below, said two valves adapted to maintain each other in open position by the weight of the removable nest of filter cloth supports when the same are in position for use, said two supply pipes adapted to form a continuous oil passage when said valves co-act, a plurality of concentric perforated cylinders in said basket, a tapering filter cloth tube so disposed between each two of said perforated cylinders as to allow the oil to filter therethrough from within the nest outwardly into the receptacle; and an outlet for the filtered oil from near the top of the receptacle.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT E. LANGSTON.

Witnesses:
LAWRENCE H. PARROT,
JUSTIN M. KLINGENBERGER.