

Oct. 25, 1932.

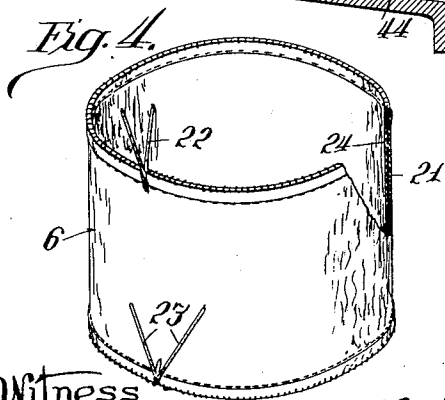
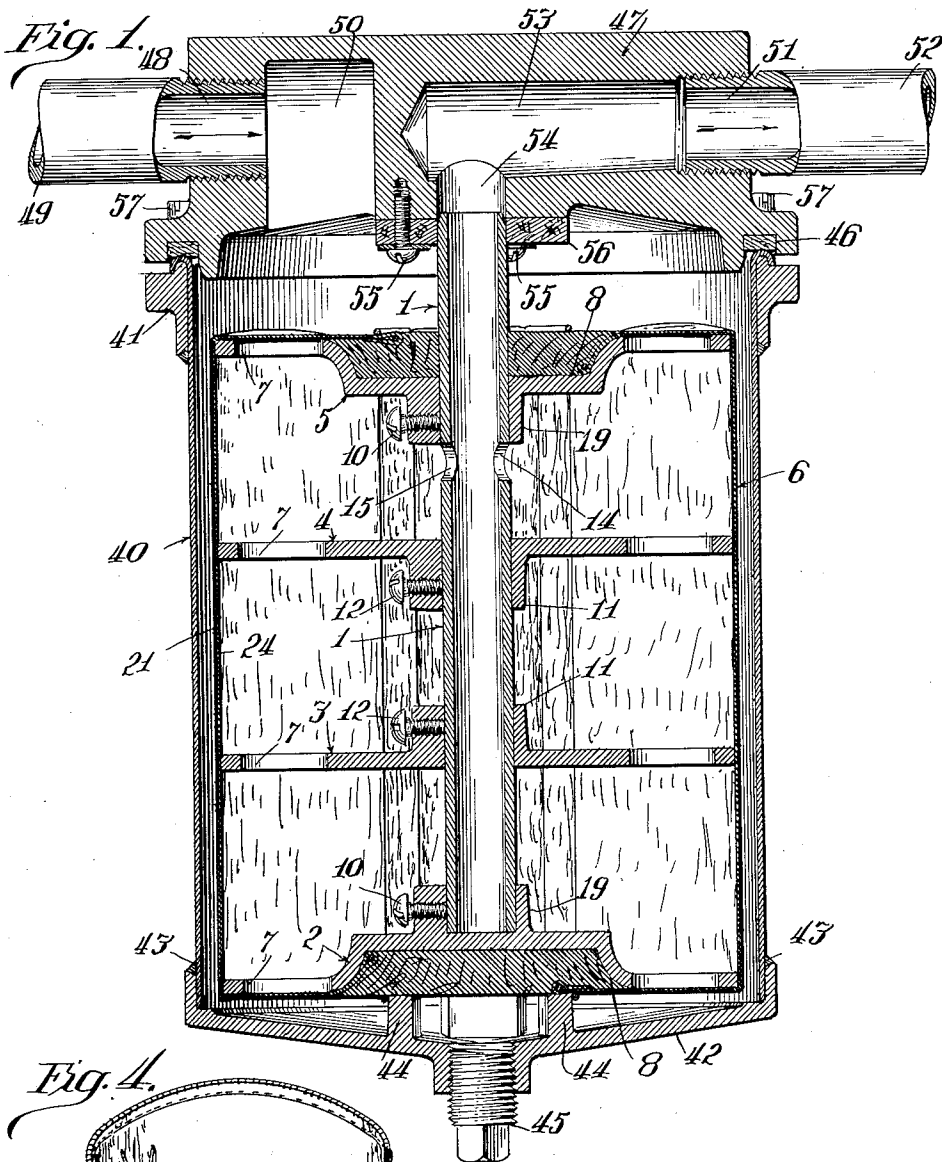
D. D. DOOLEY

1,884,615

FILTER

Filed Oct. 17, 1929

2 Sheets-Sheet 1



Witness
Milton Lenoir

Inventor
Delmar D. Dooley

By *Chas. J. Baker & Co.*
Attorneys

Oct. 25, 1932.

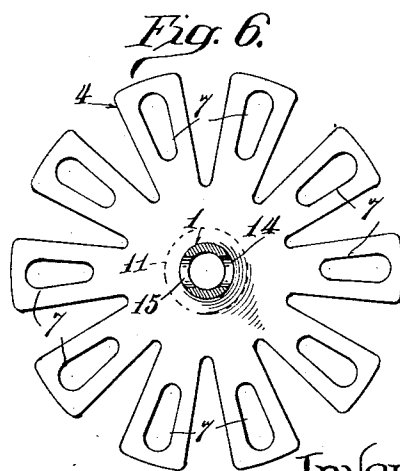
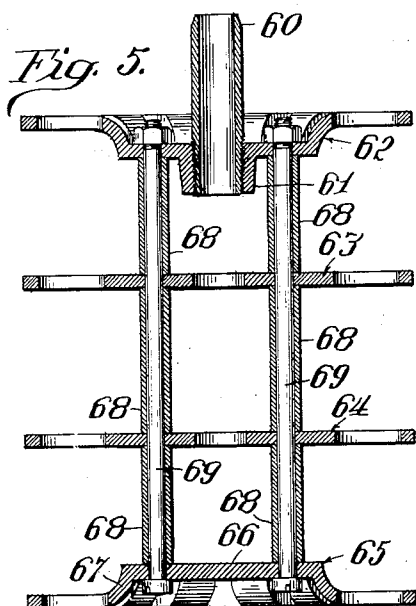
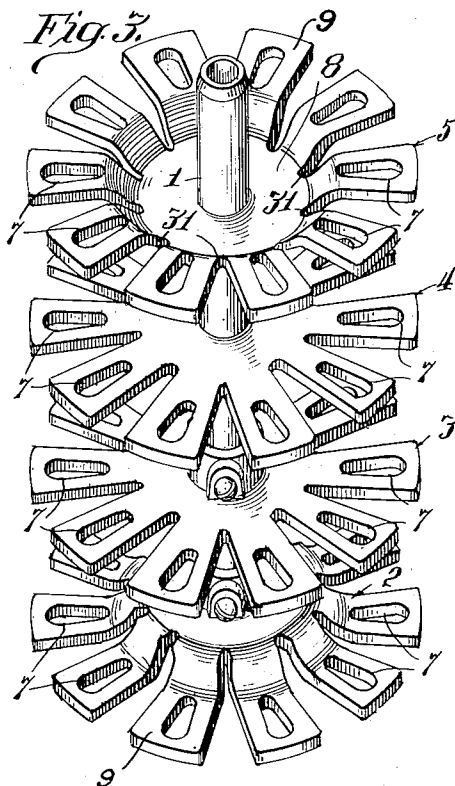
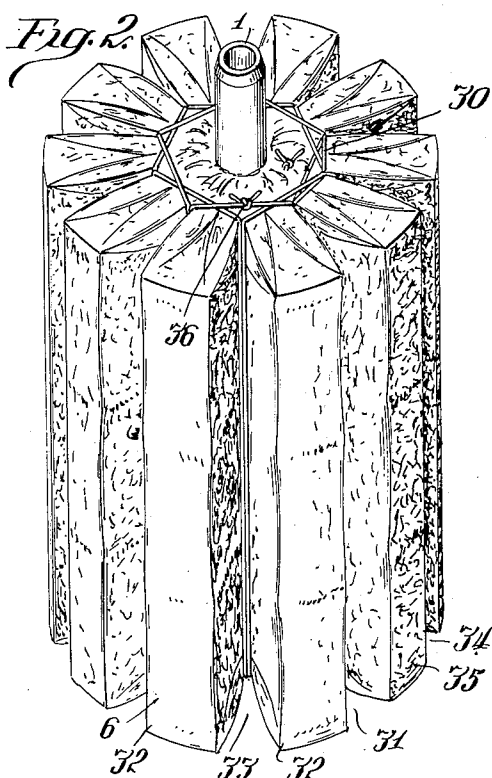
D. D. DOOLEY

1,884,615

FILTER

Filed Oct. 17, 1929

2 Sheets-Sheet 2



Witness
Milton Lenoir

Inventor.
Delmar D. Dooley

By *Howe, Jackson, Porter & Skinner*
Attorneys

UNITED STATES PATENT OFFICE

DELMAR D. DOOLEY, OF ROCK ISLAND, ILLINOIS, ASSIGNOR TO DOOLEY IMPROVEMENTS INC., OF ROCK ISLAND, ILLINOIS, A CORPORATION OF ILLINOIS

FILTER

Application filed October 17, 1929. Serial No. 400,180.

This invention relates to filters, more particularly to filters for cleaning the oil employed as fuel in an oil burner or the like.

In the operation of an oil burner employed to heat a home or other similar building, it is imperative that the oil supplied through the burner be clean and free from impurities, particularly free from solid substances. The necessity for having this fuel oil clean lies in the fact that the needle valve port and oil vapor ports of the burners are most generally rather small, and if dirty oil is sent through such a burner, it is almost certain that a particle of dirt in the oil will lodge in one of these small openings and effectively block it. Obviously an oil burner cannot function properly if its needle valve or its oil ports are blocked, and when they are blocked it is necessary to shut down the burner and clean these ports before the installation can be satisfactorily operated.

Oil burner manufacturers have heretofore recognized this condition and employed various types of oil filters in the supply line leading to the burner, those filters being designed to free the oil of any solid particles which would be apt to block the relatively small parts in the burner.

The filters heretofore employed have usually consisted of a fabric strainer, formed as a bag interposed in the oil line. This fabric necessarily is of fine mesh so that it may retain the minute solid particles entrained in the oil and prevent their entrance into the burner. Fabrics of this kind invariably shed a certain amount of lint which works its way into the burner where it blocks the small ports as effectively as the dirt filtered out of the oil. Because of this shedding of lint, the filter defeats its own purpose since it becomes the source of lint which in itself is capable of blocking the burner.

This difficulty cannot be remedied by the substitution of a fabric which will not shed lint for the fabric that will, since the former fabrics will permit minute solids to pass through them and those solids will block the burner.

The presence of lint or long nap on the fabric, particularly on the side of it adjacent

the unfiltered oil, is highly desirable since that lint is somewhat movable and catches and retains the small solids in the oil which would otherwise work their way through the fabric.

As an object of my present invention I have provided a new and improved oil filter of this type, the improvement making the filter more reliable in its operation and at the same time easier to clean and maintain.

In the preferred embodiment of my invention, I provide a spider or framework formed out of cast metal and upon which is tied a cylindrical bag through which the oil has to pass to reach the inlet port of the burner. In one embodiment of my invention this cylindrical bag is formed with an outer wall of a soft fabric such as cotton flannel and an inner wall of a harder and virtually lintless material, such as organdie. This combination effectively strains or filters the oil since the flannel filters out the solid particles from the oil and the organdie collects the lint from the flannel and prevents its entrance into the burner.

This cylindrical bag is provided with a draw string in each of its ends, those strings being tightened to draw the end of the bag over the end of the framework, the excess material being puckered or packed into a centrally located recess in the frame of the filter.

To increase the surface exposed to the oil on the outside of the bag, I have provided a plurality of slots in the framework into which the bag is drawn by a lacing string wound over the bag and framework and drawn tight to draw the bag down into the slots. This lacing also embraces the upper ends of the bag and draws them down into the recesses in the frame so that there is no likelihood of leakage of unfiltered oil into the inside of the bag through the openings in the end adjacent the puckerings.

The filter unit so constructed is encased in a suitable shielding can that is connected into the oil line in such a manner that the oil from the source of supply is fed to the outside of the bag and the oil from the inside of the bag is fed to the burner itself.

When it is necessary to clean the filter, the cover can be removed and the dirt and sediment which have been filtered out of the oil are retained in the housing and on the outside of the filter bag.

Now, to acquaint those skilled in the art with the teachings of my invention, reference is made to the accompanying drawings in which a preferred embodiment of it is shown by way of example, and in which:

Fig. 1 is a cross sectional view taken along a vertical plane through the center of a completely assembled filter,

Fig. 2 is a perspective view of the completely assembled filter unit,

Fig. 3 is a perspective view of the framework of such a unit,

Fig. 4 is a perspective view of the filter bag,

Fig. 5 is a cross sectional view taken along a vertical plane through the center of another type of framework, and

Fig. 6 is a plan view of one of the intermediate sections of the framework.

Referring to the drawings now in more detail, it will be seen that the filter comprises a central pipe 1 on which is mounted a lower end plate 2, intermediate plates 3 and 4, and an upper plate 5. These plates may well be made of cast aluminum, cast brass or any other preferred metal, and serve as a means for holding the fabric bag 6 in place around the pipe 1. As will be best seen in Figs. 3 and 6, the plates 2, 3, 4, and 5 contain a plurality of slots, their outer edges forming the plate into a plurality of radially projecting fingers which terminate upon the circumference of the plate.

These fingers are each provided with an opening 7 through which the oil admitted to the interior of the cloth bag 6 can flow freely.

The top plate 5 and the bottom plate 2 also contain a recessed central portion 8 from which the fingers or lobes 9 are radiated, those lobes being bent upward in the case of the top plate 5 and downward in the case of the lower plate 7 and outward away from the periphery of the central portions.

The tip ends of the fingers 9 are disposed in a plane which is parallel to the plane of the central portions 8. Parallelism is optional, the ends of the fingers preferably being disposed above the central portion to give a maximum longitudinal dimension of the filter surface, and to provide space within the axial confines for disposing the ends of the filter fabric.

The bottom plate 2 also contains a shoulder or collar 19 into which the lower end of the pipe 1 is abutted and held by the set screw 10. The central portion 8 of the lower plate 2 does not contain an opening within this collar 19, and the end of the pipe is therefore butted against the upper surface of this member.

The top plate 5 also contains a central collar 19 through which the pipe extends, and the recessed central portion 8 of this plate also contains a hole registering with the collar 19 so that the pipe 1 may project through both the collar and the central portion of the plate. A set screw 10 threaded into the collar engages the outside of the pipe 1 and holds the collar in place on that pipe.

Intermediate plates 3 and 4 likewise contain collars 11 into which set screws 12 are threaded to hold the plates in place upon the central pipe 1.

When properly adjusted upon the pipe 1, the plates are located so that the slots of the one plate fall in line with the slots of the other plate, and the intermediate plates are evenly spaced between the top and bottom plates.

This forms the plates into a substantially cylindrical framework in the outside surface of which are a plurality of slots which project radially inward toward the center of the framework.

The cloth bag 6 employed as a filtering medium in the filter of my invention is a cylindrical piece of fabric open at its opposite ends, and containing the draw strings 22 and 23 which may be encased in a suitable fold of hem running around the end of the bag. Preferably the bag 6 comprises an outer wall 21 of canton flannel laid with the nap outward, however, it is not necessary to use this particular material as any close woven long nap fabric may be successfully employed for this purpose. Nor is it necessary to form a hem in the ends of the fabric around the draw strings 22 and 23 particularly if the material is of rather heavy weight, as the draw strings can be threaded in and out of the material and the edge left unfinished.

If preferred this outer wall 21 may be used singly within the teachings of my invention, however, I find it decidedly advantageous to provide an inner wall 24, disposed adjacent the outer wall 21 and attached to it. In one embodiment I employ an inner wall of a tightly woven lintless fabric such as organdie, which has a mesh fine enough to prevent the lint which works loose from the outer wall 21 from passing through the inner wall 24 into the burner. This combination of materials adequately protects the burner from the entrance of dirt or lint with the oil that passes through the filter.

In assembling the filter unit, I place the framework inside of the bag 6 and draw the draw strings 22 and 23 to tightly form the ends of the bag over the end of the framework. In the upper end of the framework, the pipe projects outward through the bag and the draw string is tensioned so that the edge of the bag is tightly drawn around this pipe. In the opposite end the draw string

23 is drawn so that the edge of the bag closes or at least practically closes on itself.

Obviously this drawing together of the ends of the bag causes a puckering of the excess material immediately around the center of the filter, that material being wadded or matted into the depression formed by the central circular portion 8 of the end members 2 and 5 of the filter framework.

To complete the assembly of the filter, a lacing string 30 is wound over the bag and framework to draw the bag down into the slots in the framework. This lacing operation is performed by starting at the upper end of the assembly, passing the twine 30 down through the slot 31 and drawing the bag into this slot, doubling the twine across the bottom of the lobe 32 and upward in the slot 33 to the top surface of the filter. From the upper end of the slot 33 the twine is crossed from the top surface of the framework into the slot 34, and downward in that slot to the lower surface of the filter then back around the lobe 35 into the slot 31 and upward in that slot to the upper surface of the filter.

From this point the twine is carried forward to the second slot and down in that slot, this operation continuing until all of the slots have been filled with two loops of twine placed in opposite directions and the end of the twine brought back to the starting point where it is tied in the knot 36.

The tight lacing of the bag by the twine 30 draws the surface of the bag down into the slot and forms the bag tightly over the lobe formed by the ears or projections between adjacent slots in the framework members.

The curved surfaces of the end members 2 and 5 assist in tightly stretching the bag over these lobes since as the draw string 30 is pulled tight it tends to slide down over the curved surface of the end members and to thereby draw the bag tightly into the bottom of the grooves and tightly over the end of the lobe. This lacing of the bag on the framework also tightly presses the excess material around the central portions of the ends of the filter firmly down into the recesses in the framework, so that when the filter is completed both the upper and lower ends of the bag are substantially planar. This tight packing of the excess material around the opposite ends of the filter bag definitely prevents the ingress of any oil into the bag through the opening in the bag since that opening is tightly fastened around the pipe 1 in one end of the filter and tightly matted down against the planar surface 8 in the other end of the filter.

With the canton flannel or other preferred material in the bag laid with the nap outward, there is no possibility of small solid particles working their way through the bag

into the inside of it, since the nap on the material will arrest and retain these particles. If a short nap fabric were substituted for this canton flannel, small particles of grit might be forced through the fabric since the absence of a long nap permits these particles to become imbedded in the fabric itself.

The filter unit so constructed is assembled into a housing which comprises the can 40 around the top of which is fitted a metallic collar 41 and over the bottom of which the bottom plate 42 of the filter is fitted and suitably attached by soldering or welding as shown at 43. Within the center of this bottom plate 42 are a plurality of feet 44 upon which the filter unit rests. These feet are so spaced that they bear against the matted material in the center of the bottom surface of the filter, and the weight of the filter unit further tends to hold this fabric tightly against the bottom plate of the framework and to thereby prevent the ingress of oil through the bottom of the bag.

The bottom plate 42 is also provided with a threaded opening into which the clean-out plug 45 is threaded, that plug being removable to permit draining the filter for cleaning or other similar purposes.

The top end of the can 40 is fitted into an annular recess 46 in the top plate 47, that plate being provided with an inlet port 48 into which the pipe 49 is threaded. This pipe 49 leads from the oil supply tank and feeds oil into the chamber 50 in the filter. The chamber 50 extends down into the can 40 and on the outside of the fabric 6 of the filter unit.

The cover plate 47 is also provided with an outlet port 51 into which the pipe 52 is threaded. This pipe 52 leads to the oil burner or other device that is being fed through the filter.

Within the cover 47 is the duct 53 leading from the threaded opening 51 to the center of the cover plate and opening into the downward depending port 54 into which the upper end of the central pipe 1 of the filter unit is projected. A gasket 55 attached to the cover plate 47 by the screw 55 surrounds the upper end of the central pipe 1 and prevents leakage of oil that has not passed through the filter bag from the chamber 50 into the duct 54.

The collar 41 on the can 40 is attached to the annular gland 46 of the cover plate 47 by screw 57 which extends through suitable openings in the cover plate 47 and into threaded openings in the ring 41.

To remove the filter for cleaning, these screws 57 are released and the can 40 withdrawn from the cover plate 47. This permits the central pipe 1 to be withdrawn from its bushing opening leading into duct 54, and the filter unit may be thereby removed and cleaned as is required.

The pipe 1 is also provided with diametrically spaced holes 14 and 15 through which the oil that has filtered through the bag into the inside of the filter unit can flow into the side of the pipe 1.

5 In the embodiment shown in Figures 1, 3 and 6 the central pipe 1 extends downward through the entire frame of the filter and serves as a supporting member upon which
10 the bottom plate 2 and intermediate plates 3 and 4 are mounted. In Fig. 5 I have shown a modified framework in which the pipe 60 is threaded into collar 61 of the upper plate 62 of the frame. The intermediate plates 63
15 and 64 are perfectly flat, and the bottom plate 65 is formed as a flat central plate 66 with the curved lobes 67 radiating outward therefrom. To space the intermediate plates 63 and 64 and the bottom plate 65 away from
20 each other and from the top plate 62, in this embodiment of my invention I provide spacing cylinders 68 which are placed between adjacent plates, and through which bolts 69 are run.

25 The head of the bolt 69 engages the bottom plate 65 and the nut is threaded on over the top of the top plate 62 to draw the assembly together to thereby firmly seat the plates against the spacing members 68 and 69. The
30 framework can be constructed in this manner more cheaply than in the manner shown in the preferred embodiment of the invention, and if three or more bolts are employed the framework will be equally as rigid as the
35 frame constructed on the central pipe 1.

Having thus complied with the statutes and shown and described a preferred embodiment of my invention, what I consider new and
40 is pointed out in the appended claims.

What is claimed is:

1. In a filter, a framework comprising parallel end plates and a plurality of parallel intermediate plates each containing a plural-
45 ity of slots, a fabric bag slipped over said framework, means for fastening the bag on the framework, and means for drawing the bag into said slots to form it into a plurality of vertically disposed lobes.

50 2. In a filter a framework comprising a central pipe, a plurality of slotted discs spaced along said pipe, end plates having a central circular portion with fingers radiating therefrom in a plane substantially paral-
55 lel to the plane of the central portion, a fabric bag fitted over said framework and tied around said pipe, and a string laced over said bag to draw it down into said slots.

60 3. In a filter a central feed pipe, a pair of cupped end plates spaced apart and each having a plurality of fingers radiating from the central cup portion, a cylindrical fabric bag having a draw string in each of its ends, said
65 bag being fitted over said end plates and the draw strings tightened to draw the ends of

the bag over the outside surface of the plates, and a lacing twine wound over the bag and plates to draw the ends of the bag into the cup portion of the plates and the sides of the bag into the spaces between said fingers.

70 4. In a filter, a central feed pipe, a pair of cupped end plates spaced apart and each having a plurality of fingers radiating from the central cupped portion, a cylindrical fabric bag having a draw string in each of
75 its ends, said bag being fitted over said plates and the draw strings placed to draw the ends of the bag over the outside surfaces of the plates, and a lacing twine wound over the bag and plates to draw the ends of the bag into
80 the cupped portion of the plates and to form the sides of the bag into a plurality of vertically disposed lobes.

85 5. In a filter, a plurality of plates including end plates each having a planar central portion, a plurality of radial projections on said portions turned out of the plane of the central portion, fingers radiating from said
90 projections in a plane parallel to the plane of said central portions, a cylindrical bag fitted over said end plates, a draw string in said bag tightened to draw the end of said bag over the central portion of said plates,
95 and a lacing string disposed in the space between said fingers and drawn tight over said curved projections to draw the bag tightly over said fingers and the end of the bag tightly against the central portion of said plates.

100 6. In a filter, a pair of end plates spaced apart to define the length of the filter, a circular central portion of each plate disposed parallel to the similar portion of the other plate, curved projections of said portions extending outward from the plate and outward
105 from the end of the filter, fingers radiating from said projections in planes parallel to the planes of said circular portions, a cylindrical bag fitted over said end plates, draw strings in said bag tightened to draw the ends
110 of the bag over the central portions of said end plates, and a lacing string wound over said fingers and drawn into the space between adjacent ones of the fingers and drawn over said curved projections to draw said bag
115 tightly over said fingers and to draw the ends of the bag tightly against the central portions of said end plates.

120 7. In a filter the combination of a cylindrical shaped framework consisting of parallel plates each containing a plurality of radially disposed slots, a bag comprising concentric-
125 ally disposed inner and outer fabric members, draw strings for fastening the bag over the frame, and a lacing twine wound over said frame and through said slots to stretch the bag over the frame.

8. A filter comprising a pipe, a pair of cupped spiders attached thereto with their convex sides facing each other, said spiders
130 each having a plurality of radial slots, a fab-

ric filter member disposed over said spiders and fluted into said slots with its ends extending beyond the spider, and means for holding the ends of said member folded and wadded into the concave portions of said spiders to seal the ends of the filter.

9. A filter comprising a pipe, a pair of cupped spiders attached thereto with their convex sides facing each other said spiders each having a plurality of radial slots, a fabric filter member disposed over said spiders and fluted into said slots with its ends extending beyond the spider, and means for holding the ends of said member packed around said pipe and in the concave portions of said spiders to seal the ends of the cylinder formed by said member.

10. A filter comprising a pipe, a pair of cupped spiders attached thereto with their convex sides facing each other, said spiders each having a plurality of radial slots, a fabric filter member disposed over said spiders and fluted into said slots with its ends extending beyond the spider, and means for holding the ends of said member folded and wadded into the concave portion of the spider, and means under tension longitudinally of the pipe for holding the wadded portions therein to seal the ends of the filter.

11. A filter comprising a pipe, a pair of cupped spiders attached thereto with their convex sides facing each other, said spiders each having a plurality of radial slots, a fabric filter member disposed over said spiders and fluted into said slots with its ends extending beyond the spider, said filter member comprising an outer woven fabric member having long nap with the nap disposed on its outside surface and an inner woven fabric having no nap, both secured together as a single filter member without any space therebetween, and means for holding the ends of said filter member packed around said pipe and in the concave portions of said spiders to seal the ends of the cylinder formed by said spiders.

12. A filter comprising a pipe, a plurality of spaced apart plates secured thereto forming a substantially cylindrical framework, a fabric filter member disposed over said plates, said plates each having a plurality of radial slots and being disposed with the slots in alinement, said fabric filter member being fluted into said slots with its ends extending beyond the end plates thereof, and means for holding the ends of said filter member packed around said pipe on the outside of the said plates to seal the ends of the cylinder, said pipe having an opening therein between said plates.

13. A filter comprising a pipe, a plurality of spaced apart parallel plates attached thereto forming a cylindrical framework, said plates each having a plurality of radial slots and being disposed with the slots in aline-

ment, the end plates having recesses adjacent the pipe, a fabric filter member disposed over said plates and fluted into said slots with its ends extending beyond the end plates, said filter member comprising an inner hard short nap woven fabric and an outer canton flannel with the long nap thereof disposed on its outside surface, said two fabrics being secured together as a single filter member without any space therebetween, and means for holding the ends of the filter member packed together on the outside of the end plates adjacent said pipe to seal the ends of the cylinder formed by said plates, said pipe having a plurality of holes therein positioned between two of said plates whereby oil entering from the outside through the filter member will pass into said openings and out of said pipe.

In witness whereof, I hereunto subscribe my name this tenth day of October, 1929.

DELMAR D. DOOLEY.