Jan. 3, 1928. 1,654,839

E. M. SCOVILLE

OIL PURIFIER

Filed Oct. 4, 1922 4 Sheets-Sheet 1

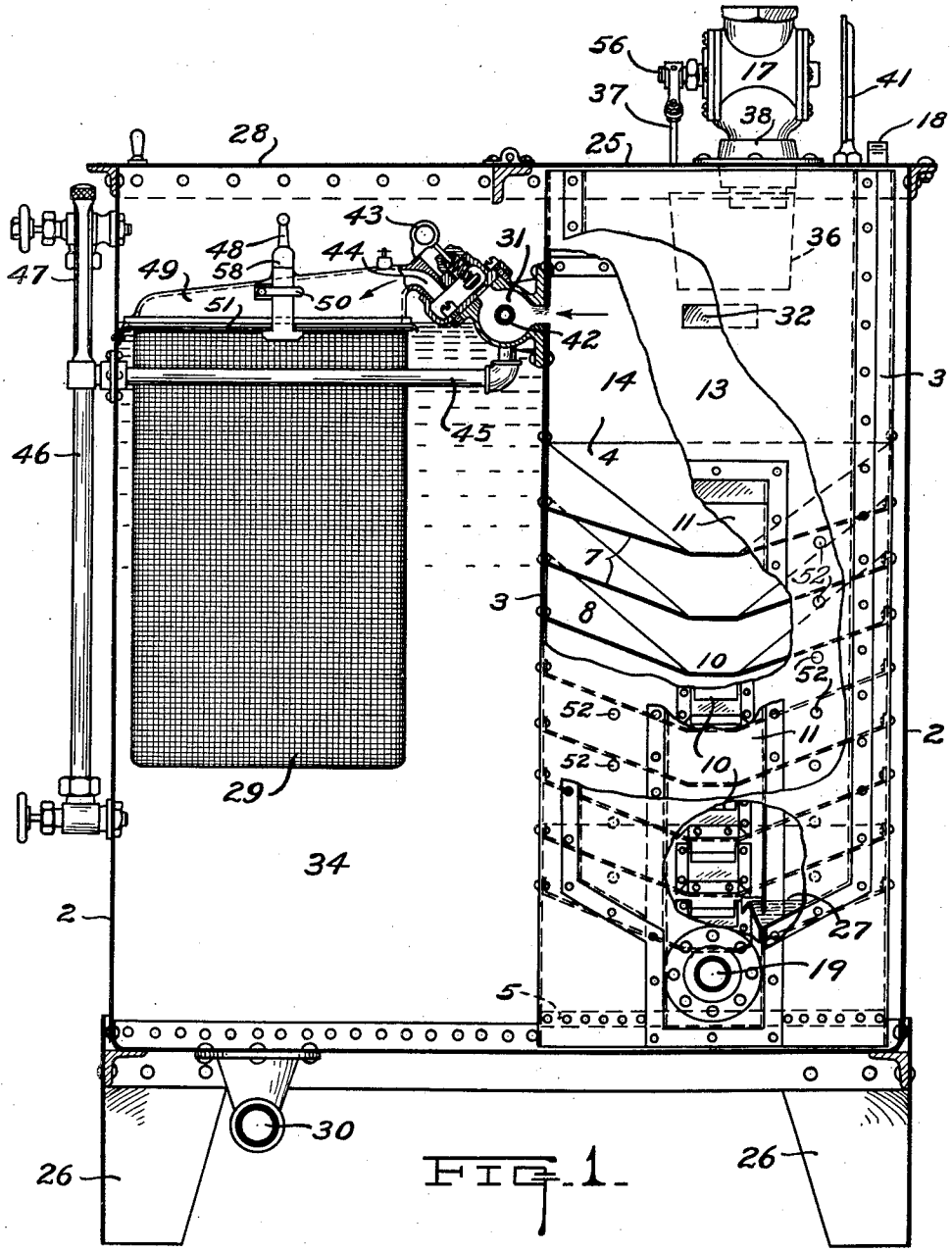


FIG. 1.

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Filed Oct. 4, 1922 4 Sheets-Sheet 2

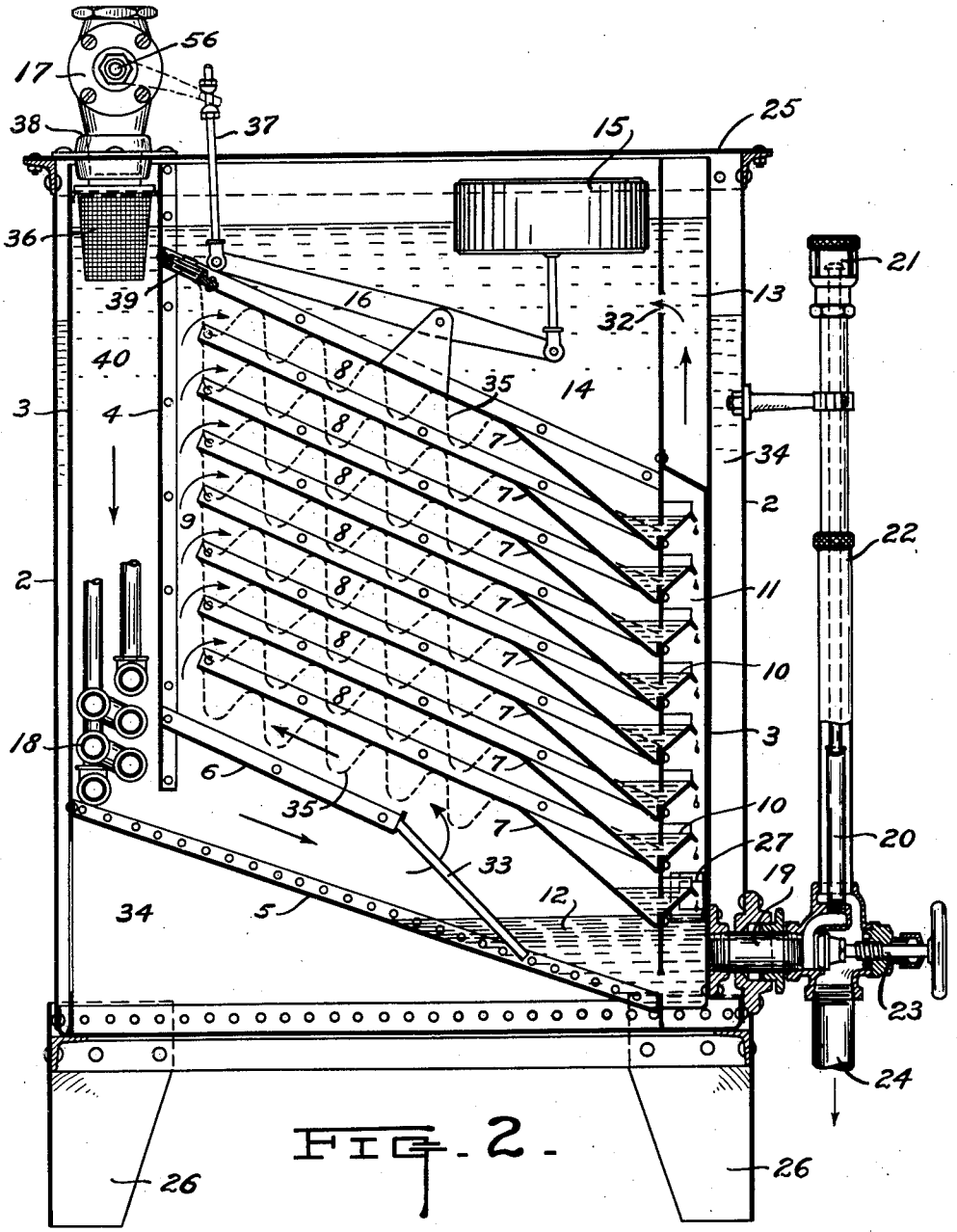


FIG. 2.

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OIL PURIFIER

Filed Oct. 4, 1922 4 Sheets-Sheet 3

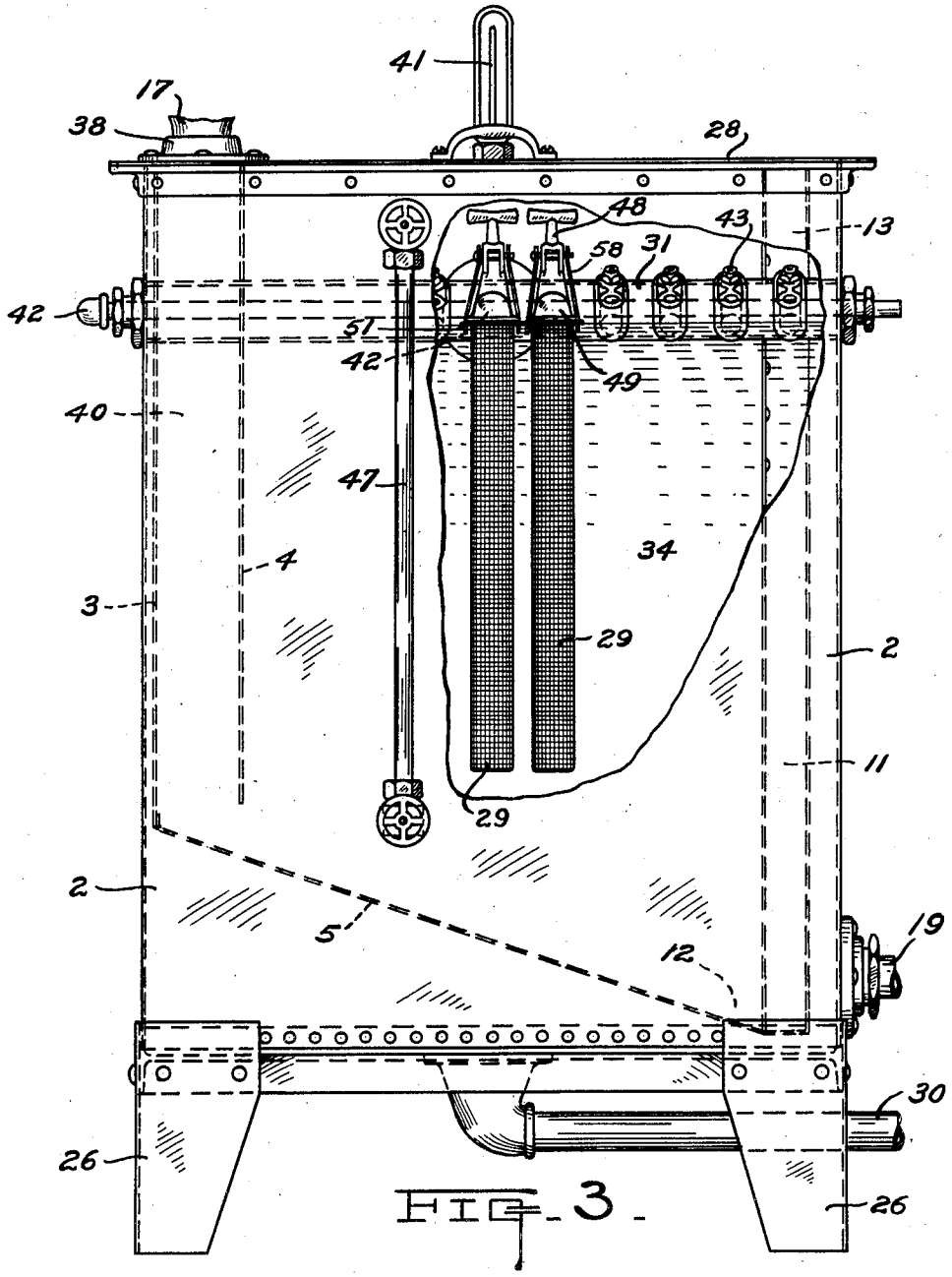


FIG. 3.

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OIL PURIFIER

Filed Oct. 4, 1922 4 Sheets-Sheet 4

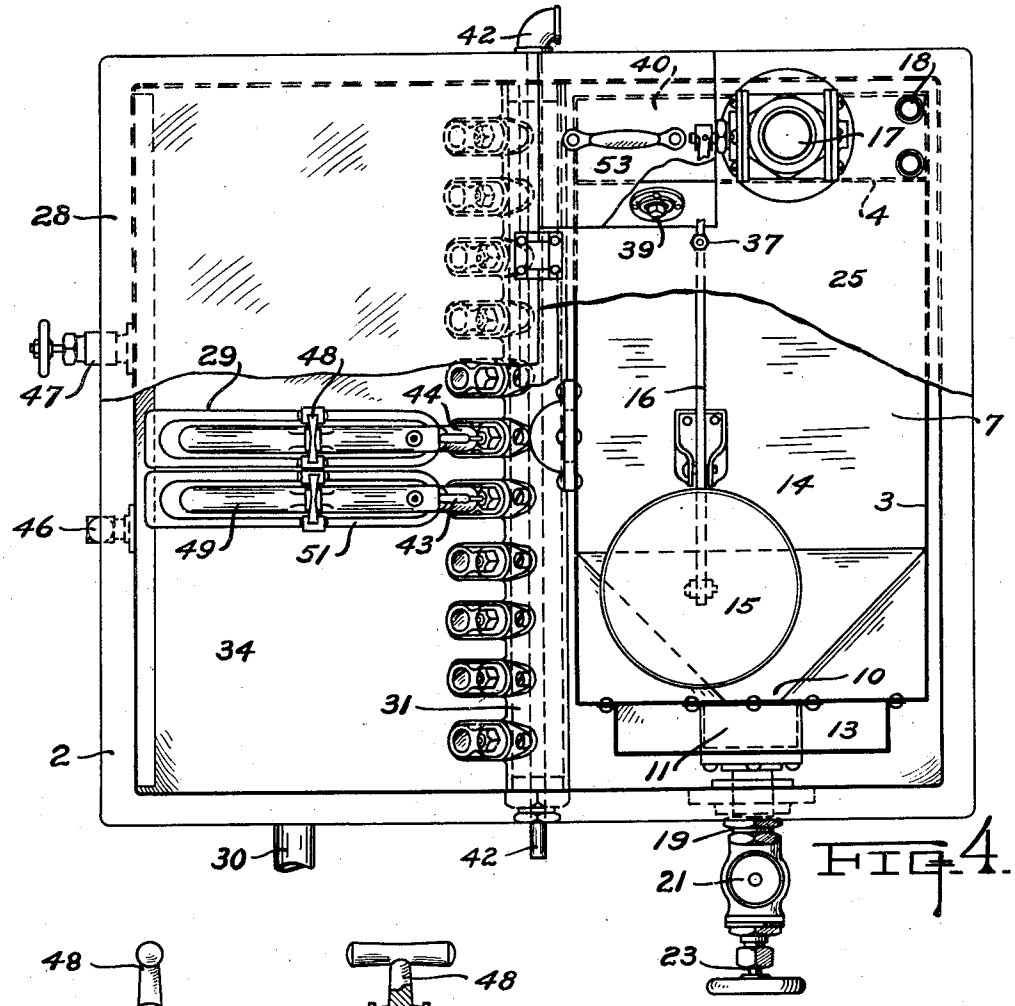


FIG. 4.

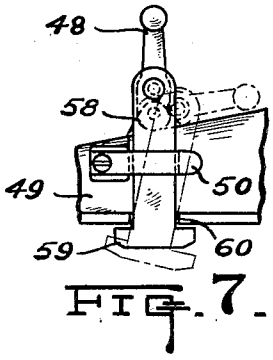


FIG. 7.

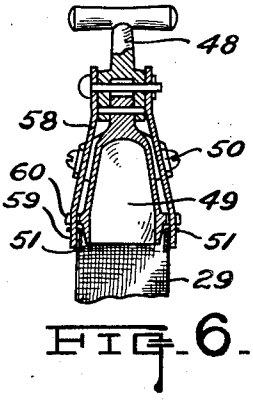


FIG. 6.

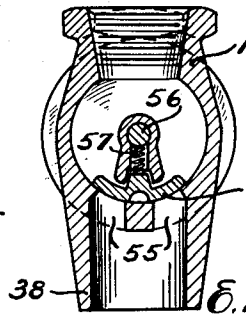


FIG. 5.

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Patented Jan. 3, 1928. 1,654,839

UNITED STATES PATENT OFFICE.

EUGENE M. SCOVILLE, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF ONE-HALF TO FLOYD L. SWANBERG, OF DANVILLE, ILLINOIS.

OIL PURIFIER.

Application filed October 4, 1922. Serial No. 592,204.

The present invention relates in general to improvements in the art of rectifying impure liquids, and relates more specifically to improvements in the construction and operation of purifying apparatus for treating oil and other liquids.

A general object of the present invention is to provide a liquid rectifier which is simple in construction and efficient in operation.

Some of the more specific objects and advantages of the present invention are as follows:—

To provide an impure liquid rectifier especially adapted for the treatment of oil, which is more efficient in general operation than prior devices of this character.

To provide a liquid purifier which is extremely simple in general construction.

To provide simple, efficient and automatically operable means for removing both foreign liquid and solids from impure oil and the like.

To provide apparatus for automatically and effectively separating liquids of different specific gravities.

To provide an improved device for automatically and effectively separating solids from liquids.

To provide an oil purifier which is rugged and strong in construction.

To provide a liquid rectifying unit which may be manufactured at minimum cost, preferably of sheet metal and with the aid of dies.

To provide an oil rectifier of attractive appearance which may be installed within conspicuous portions of power houses without marring the power house appearance.

To provide an extremely compact rectifying unit having enormous capacity for relatively small space occupied.

To provide a liquid purifier the capacity of which may be conveniently varied.

To provide a purifying device which is entirely automatic and continuous in operation.

To provide oil rectifying apparatus which is absolutely fool-proof and in which no oil can by-pass the purifying agencies.

To provide an oil cleaner all parts of which are readily accessible and removable for inspection and cleaning.

To provide a rectifying unit which may be operated and maintained at minimum cost.

To provide various improvements in the construction, operation and general assemblage of oil rectifiers, which will reduce the cost to a minimum and which will enhance to a maximum the efficiency of such devices.

Some of the novel features of filter cell construction disclosed but not specifically claimed herein, form the subject of co-pending application Serial Number 641,075, filed May 24, 1923.

A clear conception of embodiments of the various features of the invention and of the operation of rectifiers constructed in accordance therewith, may be had by referring to the drawings accompanying and forming a part of this specification, in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a longitudinal vertical sectional view through an oil purifying unit comprising gravity separating and filtering sections.

Fig. 2 is a transverse vertical section through the gravity separating section of an oil purifying unit.

Fig. 3 is an end view of an oil purifying unit, looking toward the filtering section thereof, a part of the casing having been broken away in order to more clearly disclose internal structure of the unit.

Fig. 4 is a part sectional top view of an oil purifying unit comprising gravity separating and filtering sections.

Fig. 5 is an enlarged central vertical section through the impure oil inlet valve.

Fig. 6 is a fragmentary enlarged vertical section through an improved filter cell.

Fig. 7 is a fragmentary enlarged side elevation of an improved filter cell.

The improved oil purifying unit which has been illustrated somewhat diagrammatically in Figs. 1, 2, 3 and 4 of the drawings, comprises generally a gravity separating section and a filtering section, both of which are housed within a common main casing 2. The gravity separating section is located in a special casing 3 which is removably disposed within the main casing 2, and is adapted to initially receive and treat the impure oil and to deliver the relatively purer oil to the filtering section wherein the oil is finally purified prior to its delivery from the unit. The main

casing 2 is supported by legs 26 and is provided with a top plate 25 and covers 28, 53 for permitting ready access to the filtering chamber and cleaning of the gravity separating chamber, respectively. The condition of the oil within the unit is notable from the exterior of the casing 2, by virtue of the gages 46, 47 and the thermometer 41. The impure oil is delivered to the unit through a double ported inlet valve 17 having a slip joint connection 38 with the casing cover 25, while the purified oil is discharged through a final discharge pipe 30 associated with the bottom of the main casing 2 below the filtering chamber 34.

The gravity separating section of the unit which is segregated from the filtering section by the casing 3, consists generally of a plurality of superposed separating chambers 8 each having an inclined bottom 7 and a water trap or seal 10 adjacent to the lowest portion of the bottom, passages for conducting the entering impure oil toward the chambers 8 in parallel, and other passages for delivering the relatively purer oil to the filtering section of the unit. One end of the secondary casing 3 is provided with a transverse upright partition 4 which forms a downwardly directed inlet chamber 40 extending from the inlet valve 17 to the inclined bottom 5 of the casing 3. The impure oil admitted to the inlet chamber 40 is delivered from the inlet valve 17 to a strainer 36 located in the upper end of the chamber 40. The oil passing through the chamber 40 may be heated by means of a heating coil 18 located in the lower portion of the chamber 40. A transverse inclined partition 6 located above the inclined bottom 5 of the casing 3 and extending downwardly from the wall 4, forms a downwardly directed inclined passage for delivering the entering oil toward a main water basin 12 located at the lowest portion of the separator casing 3. The water basin 12 forms a trap at the lower extremity of the casing 3 and communicates with an impurities discharge pipe 19 which penetrates a side wall of the main casing 2 through a stuffing box. A vertical sludge and water discharge pipe 20 has its lower end communicating directly with the discharge pipe 19 and has an upper open end located within a transparent overflow chamber 21. The transparent chamber 21 is supported by a relatively larger pipe 22 which surrounds the pipe 20 and the lower extremity of which communicates directly with the final impurities discharge pipe 24. The pipes 20, 22 are adjustable in length to vary the position of the chamber 21. A valve 23 serves to provide direct communication between the discharge pipe 19 and the final discharge pipe 24 when desired.

The inclined bottom 7 of the lowermost separating chamber 8 cooperates with the partition 6 to form an upwardly directed inclined conducting passage leading from the water basin 12 to a vertical common oil inlet passage 9 which communicates directly with the upper open ends of all of the separating chambers 8. The partition 6 is preferably formed as a pocket the lowest portion of which is connected directly with the water basin 12 by means of one or more inclined pipes 33. The superposed inclined separating chambers 8 may be provided with perforated zigzag baffles 35 as indicated, and are completely segregated from each other at the sides so that liquid cannot flow directly from one of the chambers 8 to another. The water seals 10 adjacent to the lowest portions of the superposed chambers 8, have overflow weirs located in a common vertical discharge chamber 11 the lower end of which terminates in the main water seal 12. Each of the chambers 8 is also provided with a plurality of oil discharge openings 52 located laterally of and above the water seal 10 and communicating directly with a bifurcated vertical chamber 13 the bifurcations of which extend downwardly along the opposite sides of the chamber 11, see Figs. 1, 2 and 4. The lower extremities of the bifurcations of the chamber 13 communicate laterally with the lower portion of the vertical discharge chamber 11 at points directly above the seal 12, through water traps or seals 27, the chambers 11, 13 being otherwise completely segregated. The upper portion of the vertical chamber 13 communicates with a float chamber 14 formed in the upper portion of the casing 3, through one or more openings 32 of suitable capacity. A float 15 is secured to one end of a float lever 16 fulcrumed in the chamber 14, the opposite end of the lever 16 being connected to the actuating shaft 56 of the inlet valve 17 by means of adjustable connections 37. The inlet valve 17 is of the double ported oscillatory type comprising a valve seat 54 adapted to control ports 55 and urged against its cylindrical seat by means of compression springs 57. The seating portion 54 of the valve 17 is movable by means of the rotary actuating shaft 56. The vertical common supply passage 9 of the separating chambers 8 is accessible from the chamber 14 and through the cover 53 to permit cleaning of the chambers 8 with the aid of a hose or the like, by virtue of a removable plug 39.

The filtering section of the unit which is located laterally adjacent to the gravity separating section and within the casing 2, consists generally of a variable plurality of filtering units or cells 29 vertically disposed within the pure oil collecting chamber 34. Each of the filtering cells 29 comprises a filter bag having an upper open end detachably associated with an elongated filter support 49

one end of which is adapted to rest directly upon an angle iron secured to an upper side wall of the main casing 2, and the opposite end of which is provided with an oil inlet 44 adapted to be slipped into an opening in the oil supply header 31. The oil supply header 31 is secured to and extends transversely across one side of the separator casing 3, and has direct communication with the separator float chamber 14. The interior of the header 31 may be provided with a heating coil or tube 42 and the header is provided with a series of definitely spaced upwardly directed oil discharge openings each of which is provided with a spring pressed control valve 43. The control valves 43 have stems provided with lateral projections engageable with abutments on the filter supports 49 to hold the valves 43 open when the filter cells 29 are in place. The header 31 is connected with the gage 46 by means of a pipe 45 shown in Fig. 1, the pipe 45 being positioned so as to avoid interference with the filter cells 29. The filter cells 29 are freely vertically removable from the chamber 34 when the cover 28 is opened, and when a cell 29 is thus removed, the corresponding valve 43 automatically closes to prevent direct escape of oil from the header 31 to the chamber 34.

The improved mechanism for detachably connecting each filter bag to its support 49 is shown in detail in Figs. 6 and 7 and comprises a clamping and releasing lever 48 having its lower end pivotally connected with the top of the support, and a pair of depending plates 58 the upper ends of which are pivotally attached to a medial portion of the lever 48 and the lower ends of which have lateral projections 59. The plates 58 are urged against the inclined adjacent walls of the support 49 by means of leaf springs 50 and extend through notches 60 formed in a lower horizontal flange of the support 49. The lower projections 59 of the plates 58 are adapted to engage clamping strips 51 which clamp the upper edge of the filter bag against the lower surfaces of the support 49. When the filter bag is clamped in normal position, the lever 48 and plates 58 are in vertical alinement as shown in full line position in Fig. 7. When the lever 48 is thrown over to the dot and dash line position as indicated in Fig. 7, the projections 59 of the plates 58 release the clamping strips 51 being simultaneously spread apart by the walls of the support 49 and lowered to permit free removal of the filter bag.

During normal operation of the unit, impure oil is delivered in a continuous stream to the inlet chamber 40 past the strainer 36. As the oil passes downwardly through the chamber 40 it is heated by the coil 18 and advances in highly fluent condition toward the main water basin 12 located at the lowermost portion of the gravity separator. The inclined bottom 5 of the casing 3 automatically conducts any relatively heavy impurities which may settle thereon, toward and into the water basin 12. At the lower extremity of the inclined partition 6, the direction of flow of the oil is reversed and the oil travels upwardly past the lower baffle 35 and toward the vertical distributing passage 9. In passing upwardly over the partition 6, some of the water and solid impurities of the entering oil are deposited upon the inclined partition 6 and are conducted directly into the water basin 12 through the pipes 33. The oil passing upwardly through the conduit or passage 9 is delivered in parallel into the upper open ends of the superposed relatively shallow separator chambers 8. In passing downwardly through the chambers 8, the oil flows at relatively low velocity and engages the baffles 35 the streams being successively deflected toward the inclined bottoms 7 and depositing thereon heavier liquid and solid particles. The heavier substances which thus settle upon the inclined chamber bottoms 7 are urged by gravity toward and into the water seals 10 at the lower portions of the chambers 8. When the oil has passed completely through the chambers 8, it is relatively purer than when entering these chambers, and is delivered in parallel from the chambers 8 through the discharge openings 52 located above the seals 10 of the respective chambers 8, directly into the bifurcations of the vertical discharge chamber 13, as indicated in Fig. 1. The sludge and heavier impurities delivered into the water seals 10 are automatically and continuously delivered over the discharge weirs of the seals 10 into the collecting chamber 11 which is segregated from the chamber 13, and drop by gravity into the main water basin 12. Any heavier impurities deposited in the bifurcations of the chamber 13 are likewise automatically delivered past the water seals 27 to the chamber 11 and basin 12. From the basin 12, the impurities which are in relatively fluent condition, are automatically forced by the hydrostatic head acting upon the basin 12, through the discharge pipes 19, 20 and through the transparent overflow chamber 21 into the final discharge pipes 22, 24. By proper adjustment of the height of the open top of the tube or pipe 20, the overflow of sludge and water may be readily regulated to maintain a desirable depth of liquid in the basin 12 and to produce a continuous and automatic overflow of sludge. The relatively purer oil discharged from the separator chambers 8 through the openings 52 and into the vertical chamber 13, flows upwardly within the chamber 13 and through the opening 32 into the float chamber 14. Any heavier impurities deposited upon the inclined bottom of the float chamber 14 are automatically conducted past the water seal

at the lower portion of this chamber and are delivered to the collecting chamber 11 and basin 12. In the float chamber 14, the oil automatically establishes a definite level by acting upon the float 15 which functions through the lever 16 and adjustable connections 37 to control the position of the impure oil inlet valve 17. If the quantity of oil entering the chamber 14 is too great, the valve 17 is automatically adjusted to decrease the supply and vice versa. The adjustable valve operating connections 37 permit sensitive adjustment of the relation between the float 15 and the valve 17, in order to maintain a desirable level of oil in the chamber 14.

From the float chamber 14, the relatively purified oil passes directly into the header 31 wherein it may be heated by steam admitted to the pipe 42, and from which it is delivered past the valves 43 into the upper ends of the filter cells 29. As the oil gravitates through the filtering bags, the residual solid impurities are automatically removed and the finally purified oil is delivered into the pure oil collecting chamber 34 from which it may be withdrawn in any convenient manner either intermittently or continuously through the discharge pipe 30. The level of the pure oil in the collecting chamber 34 will rise to the tops of the filter bags but will not reach that of the oil in the chamber 14. It will thus be noted that the oil delivered to the unit in either a continuous or intermittent stream, is automatically and effectively freed from both solid and heavier liquid impurities by the combined and successive action of the gravity separator and filtering units.

The condition of operation of the unit is readily notable from the exterior of the unit by virtue of the gages 46, 47, the thermometer 41 and the covers 28, 53. The gage 46 indicates the level of the oil in the chamber 14, while the gage 47 indicates the quantity of oil in the pure oil chamber 34. If the levels of oil in these chambers is not as desired to maintain most efficient operation, proper adjustment may be readily effected. The telescopic connections in the discharge pipes 20, 22 permit convenient adjustment to effect proper automatic discharge of the impurities. The valve 23 permits drainage of the gravity separator for cleaning which may be effected by passing cleaning water or other liquid through the cover 53 and through the opening normally closed by the pipe plug 39. The chamber 34 may be readily drained through the discharge 30 and the filter cells 29 are conveniently vertically removable by opening the cover 28. Any one or more of the filter cells 29 may be removed without interrupting normal operation of the unit. The various liquid seals 10, 12, 27 effectively prevent escape of the relatively light oil to the final discharge, while permitting free delivery of the heavier impurities.

Practically all of the casings, partitions and other elements of the unit may be readily constructed of sheet metal with the aid of dies. The chamber bottoms 7 are identical in structure and the capacity of the separating section may be readily varied by closing off or removing one or more of the chambers 8 or by providing more plates 7. The plates 7 and water seal casings are interchangeable and may be joined to the adjacent supporting walls either by riveting or by welding. The entire unit is extremely simple and rugged in construction and affords a neat general appearance. The various elements are also readily accessible for inspection and cleaning without danger of undesirable deposition of oil upon the exterior of the unit. The unit is automatically and effectively operable at minimum cost and is fool proof and sanitary in every respect.

It should be understood that it is not desired to limit the invention to the exact details of construction and operation herein shown and described for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:—

1. In combination, a plurality of superposed relatively shallow inclined settling chambers, means forming a large confined space below said chambers, means for initially conducting impure oil into said space and for heating said oil, means for conducting the heated oil from said space through said chambers in parallel, means forming a relatively pure oil receptacle above said chambers, a conduit connecting said chambers with said receptacle, said receptacle being sealed from said space, and means operable by the level of pure oil in said receptacle for controlling the admission of impure oil though said initial conducting means.

2. In combination, a plurality of superposed relatively shallow settling chambers, means for delivering impure oil upwardly and in parallel through said chambers, means forming a relatively pure oil discharge chamber above and receiving oil from said settling chambers, and a float operable by variations in the level of the pure oil in said discharge chamber to control the admission of impure oil to said delivery means in advance of the lower of said chambers.

3. In combination, a plurality of superposed relatively shallow inclined parallel settling chambers, means forming a relatively large inclined settling chamber below and parallel to said shallow chambers, a water sealed impurities discharge at the lower end of each of said chambers, the seals of said shallow chambers being connected to the seal

of said large chamber, means for conducting impure oil downwardly through and along the water in said large chamber, means for conducting said oil in parallel through said shallow chambers, and a restricted discharge for relatively pure oil from each of said shallow chambers.

4. In combination, a plurality of superposed relatively shallow inclined settling chambers, means for conducting impure oil in parallel through said chambers, a plurality of perforated baffle walls substantially spanning each of said chambers, and means for automatically removing accumulated impurities from said chambers.

5. In combination, a plurality of superposed relatively shallow inclined settling chambers, means forming a water seal and an open sludge discharge at the lower end of each of said chambers for automatically delivering accumulated impurities, means for conducting impure oil through said chambers, and a plurality of perforated baffle walls substantially spanning each of said chambers.

6. In combination, a plurality of superposed relatively shallow inclined settling chambers, means forming a water sealed sludge discharge at the lower end of each of said chambers, means for conducting independent streams of impure oil through said chambers and over the water seals therein, and a plurality of perforated baffle walls substantially spanning each of said chambers.

7. In combination, a plurality of superposed relatively shallow inclined settling chambers, means for heating and for conducting impure oil in parallel through said chambers, and a plurality of substantially vertical perforated baffle walls substantially spanning each of said chambers.

8. In combination, a plurality of superposed relatively shallow inclined settling chambers, means for heating and for conducting impure oil in parallel through said chambers, a plurality of perforated baffle walls substantially spanning each of said chambers, means forming a receptacle for receiving relatively pure oil from said chambers, and means operable by variations of oil level in said receptacle to control the admission of impure oil to said conducting means.

9. In combination, a plurality of superposed relatively shallow inclined settling chambers, means for conducting impure oil in parallel through said chambers, means forming a receptacle above said chambers for receiving relatively pure oil in parallel from said chambers, and a float operable by variations of the level of oil in said receptacle to control the admission of oil to said conducting means in advance of the lower of said chambers.

10. In combination, a plurality of superposed relatively shallow inclined settling chambers, means forming large upper and lower chambers above and below said shallow chambers, means for simultaneously heating and conducting impure oil downwardly into said lower chamber, means for delivering oil in parallel from said lower chamber into corresponding ends of said shallow chambers, means for delivering oil from the opposite ends of said shallow chambers into said upper chamber, and means located in advance of the lower of said chambers and operable by variations of the oil level in said upper chamber to control the flow of oil through said conducting means.

11. In combination, a plurality of superposed relatively shallow inclined settling chambers, means forming a large upper and lower chamber above and below said shallow chambers, means for simultaneously heating and conducting impure oil downwardly into and along said lower chamber, means for delivering oil in parallel from said lower chamber into corresponding ends of said shallow chambers, a plurality of perforated walls substantially spanning each of said shallow chambers, means for delivering oil from the opposite ends of said shallow chambers into said large upper chamber, and a float operable by variations of the oil level in said upper chamber to control the flow of oil through said conducting means.

12. In combination, a plurality of superposed relatively shallow inclined settling chambers each having a water trap at the bottom thereof, common means for conducting impure oil in parallel to all of said chambers, a plurality of perforated baffle walls substantially spanning each of said chambers, and a pair of segregated passages common to all of said chambers for delivering relatively purer oil and impurities from said chambers in parallel.

13. In combination, a casing, means forming a plurality of settling chambers within said casing, means for conducting impure oil to said chambers, a common passage with said casing for conducting relatively purer oil from all of said chambers, a common passage within said casing and segregated from said oil conducting passage for delivering impurities from said chambers, and a water trap between said passages for permitting escape of settled impurities from the former to the latter while preventing escape of purified oil.

14. In combination, a plurality of superposed settling chambers each having a water trap for delivering impurities therefrom, a common collecting chamber above said settling chambers adapted to receive relatively pure oil from said chambers, said collecting chamber being sealed from the inlet to said settling chambers and having a water trap

for delivering settled impurities therefrom, a common water basin adapted to receive impurities from said settling and said collecting chambers, and means for effecting direct delivery of liquid from said basin below the normal water level.

15. In combination, a plurality of superposed settling chambers each having a water trap at the lowest portion thereof, a common collecting chamber above the upper of said settling chambers adapted to receive relatively pure oil from all of said settling chambers, said collecting chamber being sealed from the inlet to said settling chambers and having a water trap for delivering settled impurities therefrom, a common water basin adapted to receive impurities from said settling and said collecting chambers, a discharge riser extending above the upper of said seals for automatically delivering impurities from said basin, and means for effecting direct downward discharge of impurities from said basin.

16. In combination, a plurality of superposed settling chambers, a common collecting chamber above said settling chambers, each of said chambers having a water trap at the lowest portion thereof, a common water basin adapted to receive impurities from all of said water traps, and means for effecting delivery of impurities from said water basin below the normal level of water therein.

17. In combination, a casing having parallel transverse partitions forming a plurality of superposed relatively shallow inclined settling chambers and a relatively large inclined collecting chamber below said settling chambers, means for conducting oil in parallel upwardly through said settling chambers from said collecting chamber, and a plurality of perforated substantially vertical baffles in each of said settling chambers.

18. In combination, a plurality of superposed inclined settling chambers, a common collecting chamber above said settling chambers adapted to receive relatively pure oil from all of said settling chambers, each of said chambers having a water trap at the lowest portion thereof, a common water basin adapted to receive impurities from all of said water traps, and a discharge riser communicating with said water basin below the normal water level and extending above the upper of said water traps.

19. In combination, a plurality of superposed settling chambers each having a water trap for delivering impurities therefrom, a common collecting chamber above said settling chamber adapted to receive relatively pure oil from all of said settling chambers, said collecting chamber being sealed from the inlet to said settling chambers and having a water trap for delivering settled impurities therefrom, and a common water basin adapted to receive impurities from said settling and said collecting chambers.

20. In combination, a plurality of superposed settling chambers each having a water trap for delivering impurities therefrom, a common delivery chamber above said settling chambers for receiving relatively pure oil from all of said settling chambers, said delivery chamber being sealed from the inlet to said settling chambers and having a water trap for delivering settled impurities therefrom, a collecting chamber adapted to receive oil from said delivery chamber and having a water trap for delivering settled impurities, and a common water trap for receiving impurities from said settling chamber traps, from said delivery chamber trap and from said collecting chamber trap.

21. In combination, a casing having an inclined bottom and a series of transverse partitions parallel to said bottom, said partitions forming a plurality of superposed relatively shallow inclined settling chambers and a relatively large collecting chamber between said bottom and the lower of said settling chambers, a vertical partition providing a conduit within said casing for conducting impure oil downwardly into said collecting chamber, and means for conducting oil in parallel from said collecting chamber upwardly through said settling chambers.

22. In combination, a plurality of settling chambers, a valve for admitting impure oil to said chambers, a discharge collecting chamber receiving relatively purer oil from said settling chambers, and a float located in advance of said chambers and operable by the oil in said discharge chamber to control the operation of said admission valve.

23. In combination, a plurality of superposed settling chambers, a double ported valve for admitting impure oil to said chambers, a discharge collecting chamber located above and receiving relatively purer oil from all of said settling chambers, and a float operable by variations in the level of oil in said discharge chamber to control the operation of said admission valve.

24. In combination, means forming oil supply and discharge reservoirs the former of which normally contains oil at a higher level than the latter, a header communicating with said supply reservoir and having a plurality of flow control valves therein, a plurality of outward flow filter cells located within said discharge reservoir and detachably associated with said header, said cells being formed to open said valves to effect delivery of oil from said supply reservoir to said discharge reservoir through the interior of said cells when operatively connected to said header, and means for heating the oil as it passes through said header.

25. In combination, means forming oil supply and discharge reservoirs the former

of which normally contains oil at a higher level than the latter, a header communicating with said supply reservoir and having a plurality of flow control valves therein, and a plurality of outward flow filter cells located within said discharge reservoir and detachably associated with said header, said cells being formed to open said valves to effect delivery of oil from said supply reservoir to said discharge reservoir through the interior of said cells when operatively connected to said header.

In testimony whereof, the signature of the inventor is affixed hereto.

EUGENE M. SCOVILLE.