J. H. PACKER.

OIL FILTER.

APPLICATION FILED MAY 4, 1917.

1,257,384.

Patented Feb. 26, 1918.

2 SHEETS—SHEET 1.

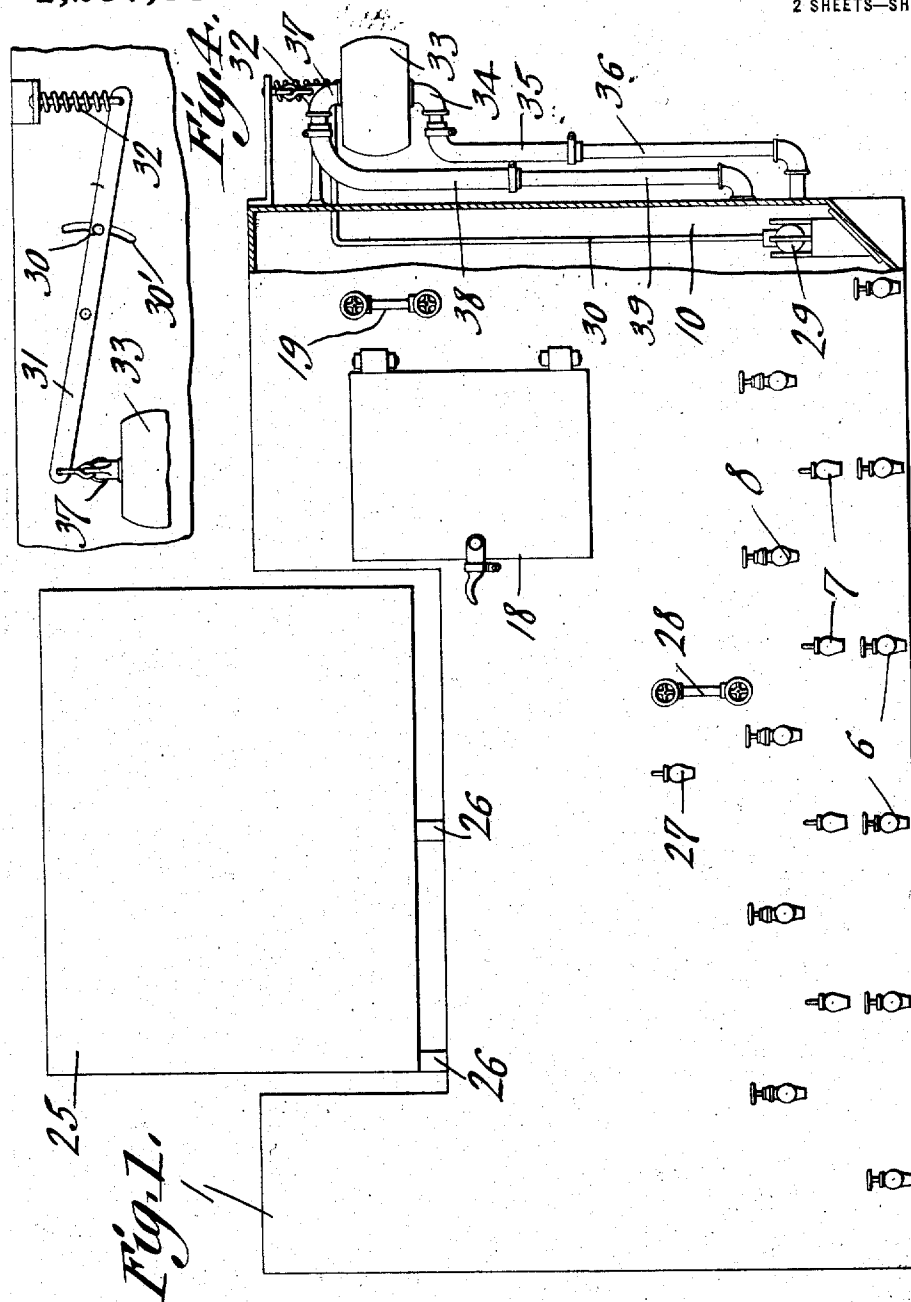

Fig. 4.

Fig. 1.

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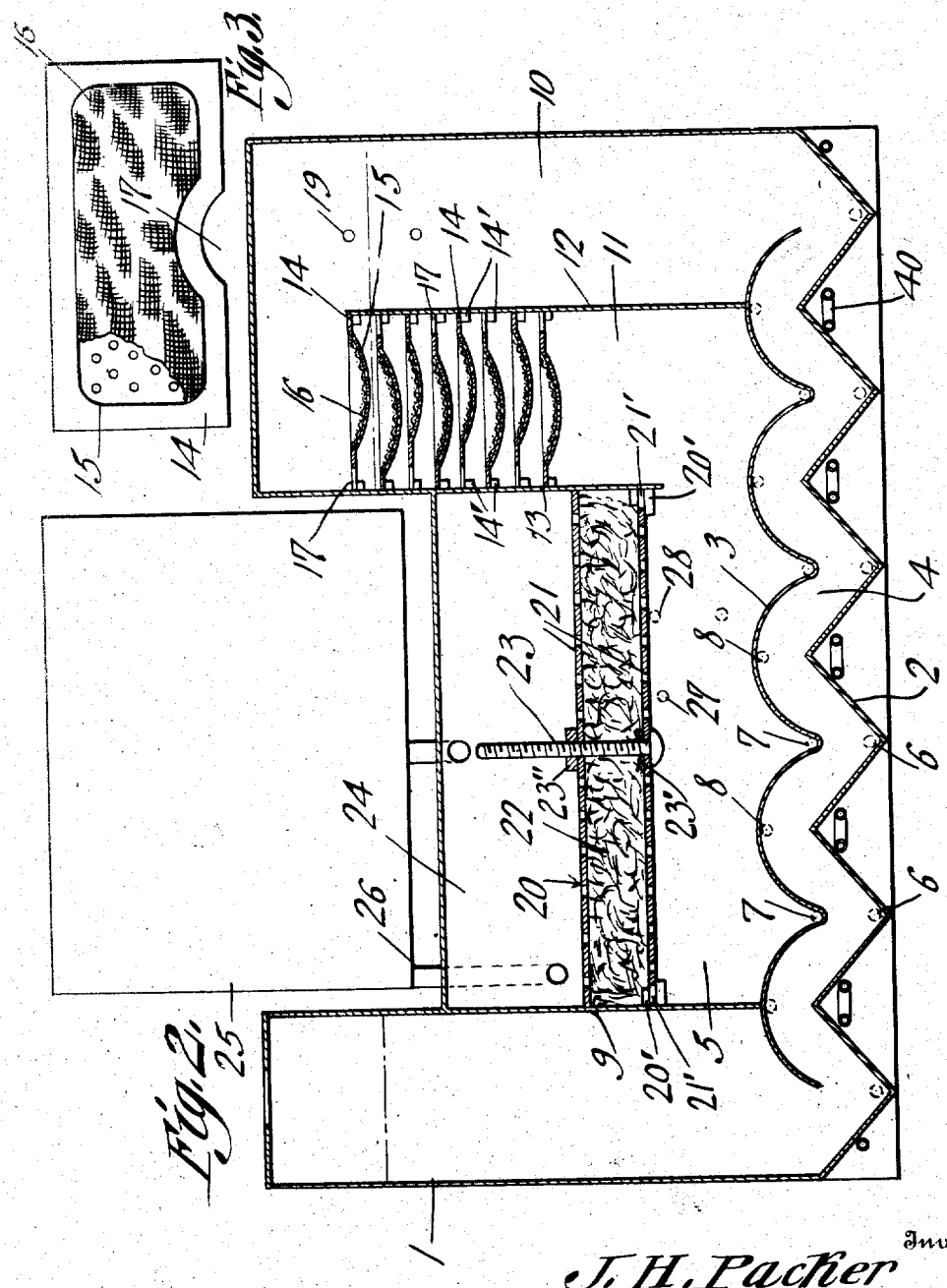

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OIL-FILTER.

1,257,384. Specification of Letters Patent. Patented Feb. 26, 1918.

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To all whom it may concern:

Be it known that I, JOHN H. PACKER, a citizen of the United States, residing at Liberty, in the county of Clay and State of Missouri, have invented a new and useful Oil-Filter, of which the following is a specification.

The present invention appertains to filters, and aims to provide a novel and improved device of that character designed especially for filtering oil, although useful for filtering various other liquids.

It is the object of the invention to provide a filter for separating oil or other lighter liquid from water or other heavier liquid, and for removing from the oil, sediment, precipitates and other extraneous particles, and for the foregoing and other purposes, the present filter has novel and improved features of construction to enhance the utility and efficiency thereof.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a front view of the filter, portions being broken away.

Fig. 2 is a vertical longitudinal section looking rearwardly.

Fig. 3 is a plan view of one of the removable filter shelves or plates.

Fig. 4 is a detail view showing the valve operating lever.

The filter embodies a suitable casing, constructed of sheet metal or other material, and provided at one end with a vertical chamber 1 for receiving the dirty oil. The casing is provided with a zig-zagged bottom 2 extending from one end to the other and providing transverse pockets, and a false bottom or longitudinal partition 3 of cycloidal form is provided in the casing above the bottom 2, the arched portions of the false bottom 3 being disposed above the ridges of the bottom 2, thereby providing a zig-zagged passage 4 between the bottom 2 and false bottom 3 extending from one end of the casing to the other. The ends of the false bottom 3 terminate short of the ends of the casing, whereby the passage 4 communicates at one end with the lower end of the chamber 1. The front wall of the casing has the draw off cocks 6, 7 and 8. The cocks 6 communicate with the lower portions of the pockets of the bottom 2 at one end thereof, the cocks 7 communicate with the lower portions of the pockets formed by the false bottom 3 at one end thereof, and the draw off cocks 8 communicate with the upper portions of the chambers provided underneath the arched portions of the false bottom 3. There is a chamber 5 within the casing above the false bottom 3 which is separated from the chamber 1 by a vertical partition 9, and the casing is provided at that end opposite the chamber 1 with a vertical chamber 10 whose lower end communicates with the respective end of the passage 4. The casing has another vertical chamber 11 for filtering the oil, next to the chamber 10, and separated therefrom by a vertical partition 12, the lower end of which extends to the false bottom 3, the same as does the partition 9. The chamber 11 has a partition 13 at that side opposite to the partition 12, and the lower end of the chamber 11 communicates with the chamber 5, while the upper ends of the chambers 10 and 11 are in communication over the upper end of the partition 12.

Disposed within the filtering chamber 11 are means for filtering the oil, and for this purpose, horizontal shelves or plates 14 are disposed within the chamber 11 in superposed spaced relation, and can be seated upon cleats 14′ secured to the partitions 12 and 13, to render said shelves removable. These shelves are provided with depressions 15 provided with apertures throughout, and sheets 16 of porous material are disposed upon the shelves 14 and within their depressions 15. Each shelf is provided at one side edge with a recess or opening 17 for the overflow of oil, and the overflow openings 17 of the successive shelves are in staggered relation, whereby to provide for the zig-zag overflow of oil from one shelf to the other. The front wall has a door 18 in front of the shelves 14, and when the door is swung open, said shelves can be removed and replaced for cleaning them from time to time.

A glass gage 19 is carried by the front wall of the casing and communicates with the chamber 10 to indicate the level of water in said chamber when said level ap-

proaches the upper edge or end of the partition 12.

A filtering member is provided above the chamber 5, and said filtering member 20 embodies a pair of apertured plates or diaphragms 21 fitting between the partitions 9 and 13, and a suitable fibrous filtering material 22 disposed therebetween, the lower plate being removably held between lugs 20′ carried by the partitions 9 and 13. A bolt 23 is secured to the lower plate 21 by means of a cotter pin 23′ or otherwise and a nut 23″ threaded upon the bolt bears on the upper plate to clamp the material 22. A chamber 24 is provided within the casing between the partitions 9 and 13 above the filtering member 20, and the filtered oil can be run from the chamber 24 to a storage tank 25 by way of a suitable connection 26 between them. The lower plate 20 has notches 21′ whereby when it is turned to a certain position it can move upwardly to remove the filtering member 20.

A draw off cock 27 is carried by the front wall of the casing in communication with the upper portion of the chamber 5 immediately below the filtering member 20, and a glass gage 28 is also carried by said wall of the casing in communication with the chamber 5 to indicate the level of oil therein.

As a means for preventing the excessive accumulation of water in the chamber 10, and to prevent the water from overflowing the partition 12 into the chamber 11, there is provided a drain valve 29 of any suitable character at the lower end of the chamber 10, from which a valve stem 30 extends upwardly within said chamber and out through a slot 30′, said stem when raised opening the valve 29 so that the water can drain out. The upper end of the stem 30 is pivoted to one arm of a lever 31 fulcrumed to the corresponding end of the casing, and a spring 32 is disposed between said arm of the lever and the casing for depressing said arm of the lever and stem 30 to normally close the valve 29 when the water level is below a predetermined point in the chamber 10. Hung from the other arm of the lever 31 is a hollow balancing chamber 33 which has an elbow or connection 34 extending from its bottom and connected by a hose or flexible tube 35 with a pipe 36 connected to the corresponding end of the casing and communicating with the lower portion of the chamber 10. An elbow or connection 37 connected to the top of the balancing chamber 33 is connected by a hose or flexible tube 38 with a pipe or nipple 39 connected to said end of the casing and communicating with the chamber 10 at a level slightly above the point where pipe 36 is attached to the casing.

In operation, the dirty oil is poured or run into the chamber 1, and from the lower end of this chamber flows in a zig-zag path through the passage 4 into the lower end of the chamber 10, the oil rising to the surface of the water in the latter chamber and overflowing over the partition 12 into the chamber 11. The water and other heavier liquids will settle into the pockets of the bottom 2 as well as the sediment and precipitates, and the water, sediment and other matter of greater specific gravity than the oil can be drawn off through the draw off cocks 6, while those substances lighter than the oil can be drawn off through the draw off cocks 8 at the upper portions of the upper pockets formed by the zig-zagged passage 4. The oil which overflows into the filtering chamber 11 will be caught and held in the depressions 15 of the shelves 14, and will filter slowly through the sheets 16 of filtering material, whereby the foreign particles will be held within said depressions. When the uppermost depression is filled with oil, the oil can overflow through the respective opening 17 into the depression of the next lowermost shelf, and so on downward, there being a sufficient number of shelves in order to prevent the oil from overflowing all of them under working conditions. The oil is thus filtered through the successive shelves, and said shelves can be removed by opening the door 18, for cleaning out the foreign matter. The oil flows from the lower portion of the chamber 11 into the chamber 5, and any sediment or precipitates within the chamber 5 will accumulate in the pockets formed by the false bottom 3 and can be drawn off through the draw off cocks 7. From the chamber 5, the oil filters upwardly through the filtering member 20, which will prevent any foreign particles from passing upwardly with the oil into the filtered oil chamber 24. From the chamber 24, the oil can be run into the storage tank 25 of any suitable character.

Should the water level rise above a desired or predetermined point within the chamber 10, the valve 29 will be opened automatically to drain out the surplus water. It will be noted that the water and oil will circulate upwardly through the pipe 36, hose 35, balancing chamber 33, hose 38 and pipe 39, whereby the level of the water in the chamber 33 and accompanying parts will be the same as in the chamber 10, the oil in the upper portion of the chamber 33 and hose 38 being lighter than when displaced by the water due to the rise of the water level. Consequently, when the oil is displaced by the upward movement of the water level, the increased weight imposed on the outer arm of the lever 31 will overcome the tension of the spring 32, thereby swinging said lever to raise the valve stem 30 and open the valve 29. When the water level lowers a sufficient amount, so as to lower the water level

in the balancing chamber 33, the spring 32 will again exert itself to depress the stem 30 to close the valve 29 and raise the balancing chamber 33. This mechanism therefore serves to regulate the level of the water in the chamber 10 to avoid the overflow of water into the chamber 11 which would be objectionable. The adjustment of the balancing chamber 33 and spring 32 is such that the spring will ordinarily overcome the weight of the chamber 33 and accompanying part when the water level is below a predetermined point in the chamber 10, but when the water level rises above said point, the water in displacing the oil within the chamber 33 will increase the weight sufficiently to overcome the tension of the spring 32.

A steam coil 40 can be disposed below the bottom 2 for supplying heat if desired.

Having thus described the invention, what is claimed as new is:—

1. A filter having a zig-zagged passage and chambers extending upwardly and communicating with the ends of said passage, said passage providing pockets, and means for drawing off matter collecting in said pockets.

2. A filter embodying a casing having a bottom and a false bottom thereabove providing a zig-zagged passage, said bottoms providing pockets, means for drawing out matter accumulating in said pockets, the casing having an oil chamber above the false bottom and a chamber extending upwardly from one end of said passage, and filtering means between said chambers over which liquid in the second mentioned chamber overflows to pass through the first mentioned chamber.

3. A filter embodying a casing having a zig-zagged bottom and a false bottom thereabove providing a zig-zagged passage, said bottoms providing pockets, means for drawing off matter collecting in said pockets, the casing having a chamber above said false bottom, a second chamber above the first mentioned chamber, a chamber extending upwardly from one end of said passage, and a filtering chamber communicating with the upper portion of the third mentioned chamber, and communicating at its lower end with the first mentioned chamber, a filtering member between the first and second mentioned chambers through which the liquid filters upwardly, and filtering means within the fourth mentioned chamber onto which the liquid overflows from the third mentioned chamber.

4. A filter having a chamber, means into which a lighter liquid overflows from said chamber, a drain valve for said chamber for draining the heavier liquid therefrom, a balancing chamber through which the liquid will flow simultaneously with the aforesaid chamber, and an operative connection between said balancing chamber and valve operable for opening and closing the valve as the level of the heavier liquid rises and lowers within the first mentioned chamber.

5. A filter having a chamber, means into which a lighter liquid overflows from said chamber, a drain valve for said chamber for draining a heavier liquid therefrom, a lever connected to said valve, a balancing chamber connected to said lever, means flexibly connecting said balancing chamber with the first mentioned chamber for the circulation of the liquids through the balancing chamber, and means for normally swinging the lever to close the valve when the level of the heavier liquid is below a predetermined point in the first mentioned chamber.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN H. PACKER.

Witnesses:

JOHN L. DOUGHERTY,
J. H. TARRANTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."