(No Model.)

W. A. MORRISON.

AUTOMATIC LIQUID SEPARATOR.

No. 368,544. Patented Aug. 16, 1887.

Fig. 1.

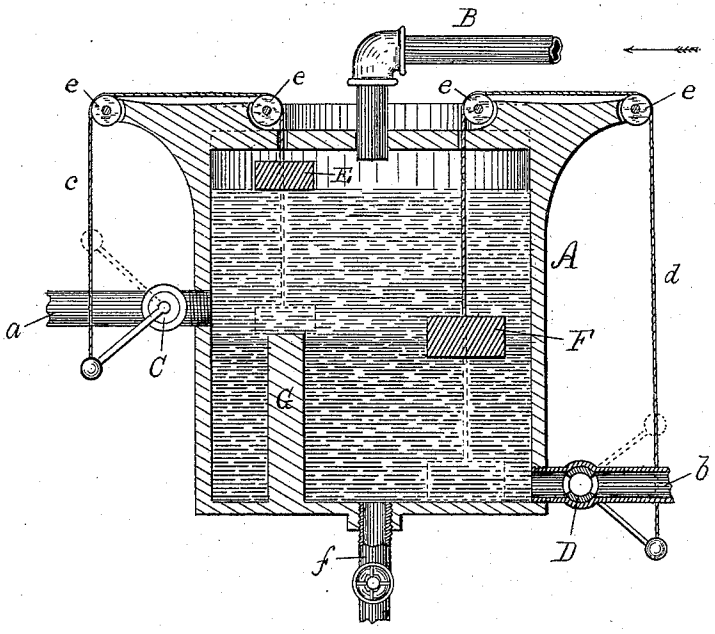
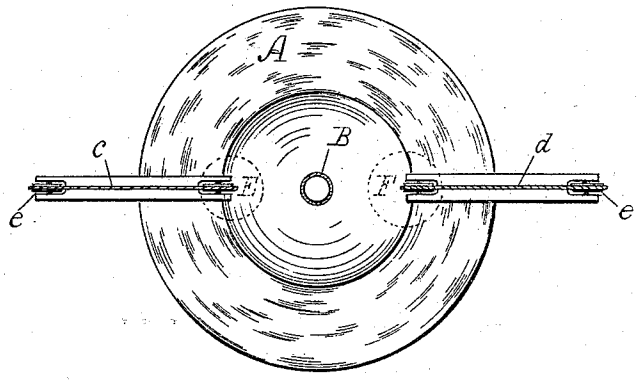


Fig. 2.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC LIQUID-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 368,544, dated August 16, 1887.

Application filed December 27, 1886. Serial No. 222,619. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. MORRISON, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Automatic Liquid-Separators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus which is to be employed in the separation of fluids which differ in specific gravity, such liquids entering the apparatus in a commingled state, whence they are discharged separately into proper vessels or receivers.

The apparatus embodying my invention consists of a closed vessel which is provided with a common supply-inlet pipe and with individual discharge-pipes for the fluids separated therein to escape and pass away to storage-receptacles. The peculiar and novel feature comprises two or more floats, each of which differs from the other, but is of the same specific gravity as the fluid by which it is to be actuated. Such floats control valves located in the discharge-pipes, the said valves and their respective floats being so arranged that intercommingling of the fluids when in the act of being discharged is entirely prevented. Thus two or more liquids differing in specific gravity may easily and readily be separated automatically and continuously.

The drawings accompanying this specification represent, in Figure 1, a sectional elevation of an automatic fluid-separator embodying my invention. Fig. 2 is a top view.

In the accompanying drawings, A represents a closed receptacle or temporary storage-vessel disposed in any convenient locality and connected by a pipe, B, with the source of supply, whence the fluids to be separated are derived in a commingled state. This supply-pipe B may be connected with the exhaust of an engine or the condense-water pipe from a steam-supply pipe or drum where the separation of oil from the condense-water is desired, or it may be employed in manufactories of all kinds where liquids are in process of being distilled, refined, or manufactured—such as beer, alcohol, oils—or in any instance in which it is desired to separate from each other fluids varying in specific gravity.

The separator or vessel in which the liquids to be separated are temporarily stored may be of any desired shape, preferably circular, as shown, and furnished with two discharge-pipes, *a b*, each of which is controlled by valves C D, placed in them and actuated by the floats E F. These valves and floats are connected by flexible wires or bands *c d*, which run over pulleys or anti-friction rolls *e e*, in order to render the apparatus more sensitive and easily operated.

It will be seen that the relative distances vertically which the floats are apart may be varied and adjusted with regard to the respective pipes which they control, in order that the valves may be operated to open or close simultaneously, dependent upon the relative proportions of the commingled fluids, that the latter may escape at the proper intervals of time. Thus the distances of the pipes and the floats apart can be altered at will, and in case the lighter fluid was proportionately small the distance between the floats would be diminished vertically.

Upon the bottom of the separating-vessel A is located a post, G, which is to support and upon which the upper float, E, rests when the vessel A is emptied of its contents. Furthermore, a pipe, *f*, with a valve, is employed, through which refuse matter is conveyed when it is desired to wash out or cleanse the vessel.

The operation of this automatic liquid-separator is as follows, presuming the parts are relatively disposed, as shown in the dotted lines in Fig. 1—that is, with the vessel A empty and with the floats E F in their normal positions, the latter resting upon the bottom of said vessel, while the former is supported upon the top of the post G and with the valves C D closed.

When, as in the present instance, two liquids are to be separated, the intercommingled fluids are emptied by means of the supply-pipe B into the vessel A. The floats are at once raised, the particles with the least specific gravity tending upward to collect and actuate the upper float, E, while the heavier ones set-

tle and raise the lower float, F, and the valves C D are at once fully opened, and free discharge of the two fluids now begins, the liquid of the least specific gravity escaping through the pipe *a*, the other and heavier passing out by way of the pipe *b*.

I have so arranged the floats with respect to their co-operating-valves that the latter shall be fully open when the floats are in their extreme upper position. Therefore it will be seen that the discharge of the heavier fluid is controlled by the valve D and float F, and it is not permitted to rise above the top of post G and cannot reach the discharge-orifice of the pipe *a*.

If the supply through the main pipe B is intermittent, as the two liquids instantly separate and flow off independently of each other through the pipes, the floats commence to drop until the valves again close, in which position they remain until a further supply is admitted; but when the supply of the commingled fluids is continuous the floats are kept uplifted, and the valves being open the liquids now separated pass off without interruption to their respective storage-reservoirs, where they are collected. Thus it will be seen that the apparatus is entirely automatic, simple in construction, and can readily be adapted to any two fluids or to several fluids which differ from one another in specific gravity.

I claim—

1. In a receptacle adapted to receive and temporarily store two or more fluids of different specific gravity, two or more floats each of which conforms in specific gravity with the fluid which supports it, and the discharge of which is controlled thereby, substantially as herein stated.

2. In apparatus for the separation of fluids, the combination, with the vessel and two or more floats contained therein, each of a different specific gravity, of the valves actuated by said floats, and the discharge-pipes, the distance of the floats vertically apart varying with the ratio in quantity of the fluids, substantially as herein stated.

3. The receptacle A, provided with the supply-pipe B, discharge-pipes *a b*, and the post G, in combination with the gravity-floats E F and valves C D, actuated by the latter through the admission of fluids which differ in specific gravity, as and for the purposes herein specified.

4. The receptacle A, with the post G, supply-pipe B, and discharge-pipes *a b*, furnished with the valves C D, in combination with gravity-floats E F, connected by the flexible bands *c d*, operating with the anti-friction rolls *e e* to control the valves, substantially as herein stated.

In testimony whereof I affix my signature in presence of two witnesses.

Witnesses: WM. A. MORRISON.

H. E. LODGE,

LEMUEL STANWOOD.