Oct. 2, 1928. 1,686,066

H. E. BOYRIE

SEPARATOR

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Fig. 1.

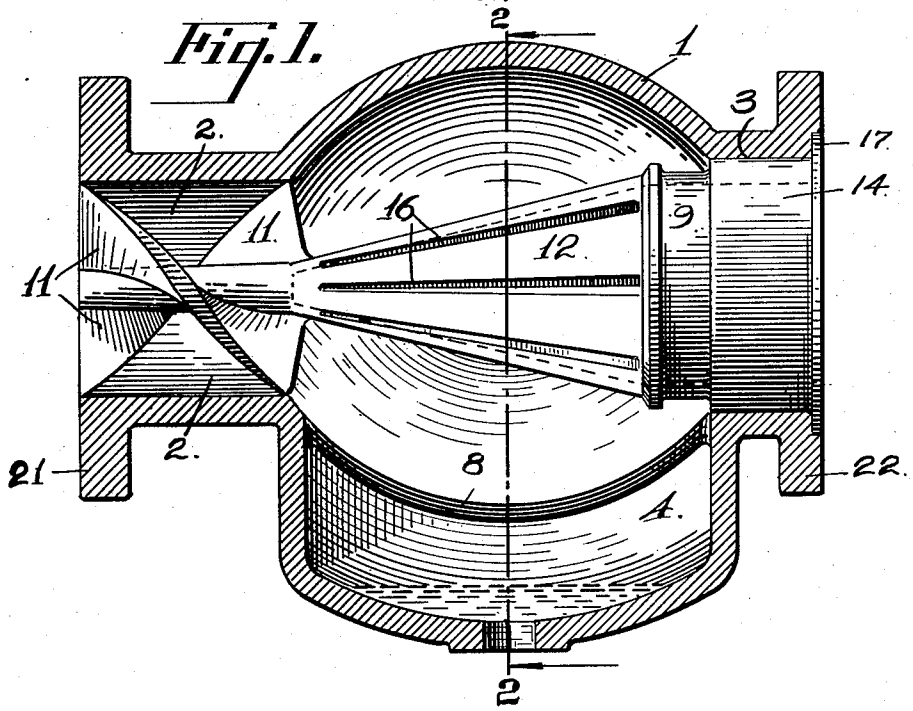
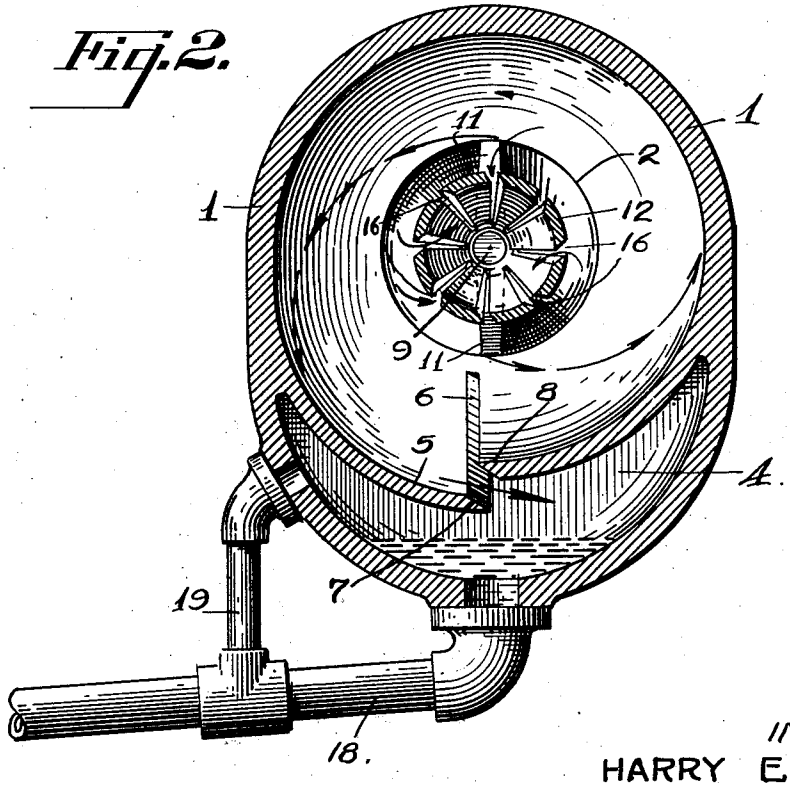


Fig. 2.



INVENTOR.
HARRY E. BOYRIE.
BY Arthur L. Slee.
ATTY.

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UNITED STATES PATENT OFFICE.

HARRY E. BOYRIE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BLAW-KNOX COMPANY, OF BLAWNOX, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

SEPARATOR.

Application filed January 16, 1926. Serial No. 81,728.

My invention relates to improvements in separators for separating liquid and gaseous fluids wherein a gyrating motion is imparted to a stream of fluid passing through the separator to cause entrained liquid particles to be separated from the gaseous fluid by centrifugal force and the gaseous portion delivered in a dry condition.

The primary object of my invention is to provide an improved separator for separating entrained liquid from a gaseous fluid.

Another object is to provide a separator of the character described adapted to increase the efficiency with which entrained liquid may be separated from a stream of gaseous fluid whereby a substantially complete separation can be effected without materially retarding the flow of fluid.

A still further object is to provide as a new article of manufacture, a separator of new and improved construction adapted to facilitate the construction, assembling and installation of the separator.

I accomplish these and other objects by means of the improved device disclosed in the drawings forming a part of the present specification wherein like characters of reference are used to designate similar parts throughout said specification and drawings and in which,

Fig. 1 is a longitudinal vertical section of my improved separator.

Fig. 2 is a transverse section taken upon the line 2—2 of Fig. 1 in the direction indicated.

Referring to the drawings the numeral 1 is used to designate in general a separator having an intake passage 2 and an outlet passage 3. The chamber 1 is preferably made substantially spherical in shape and of a diameter slightly larger than the intake and outlet passages.

Below the chamber 1 is formed a liquid receiving chamber 4 arranged to receive liquid separated from a stream of gaseous fluid passing through the separator chamber 1 in a manner hereinafter more fully explained. The chamber 1 is separated from the liquid receiving chamber 4 by means of the lower wall portion 5 of the separator chamber, said lower wall having a slot 6 formed in the bottom thereof and extending longitudinally across substantially the full length of the wall portion forming a partition between the chambers 1 and 4. The edges of the wall along the slot 6 are offset and oppositely beveled as at 7 and 8, the beveled portion being arranged to slightly overlap as best shown in Fig. 2 of the drawings.

A member designated in general by the numeral 9 is mounted within the intake and outlet passages 2 and 3, said member consisting of a helical baffle 11 arranged to be positioned within the intake passage 2 and a conical hood 12 extending from said baffle longitudinally, through the separator chamber 1 to a sleeve 14 slidably fitted into the outlet passage 3, the small end of the hood being connected to the baffle 11 and the large end of the hood being connected to the sleeve 14 to form a single integral element adapted to be inserted into the chamber 1 through the passage 3. A plurality of slots 16 are formed within the hood 12 to permit the passage of fluid from the chamber 1 into the hood and thence outwardly through the outlet passage 3. A flange 17 is formed upon the outer end of the sleeve portion 14, said flange being arranged to be received within an annular recess formed upon the outer surface of the outlet portion of the separator whereby the member 9 may be accurately positioned within the separator chamber 1.

The liquid receiving chamber 4 is tapped to receive a drain connection 18 adapted to be connected to a suitable trap, not shown, whereby liquid separated from the fluid may be removed. A vent 19 is connected between the chamber 4 and the drain connection 18 to relieve pressure from within said drain without causing an agitation of the liquid within the bottom of the chamber 4 such as might cause particles of such liquid to be again entrained in the fluid passing through the separator.

The intake and outlet ports 2 and 3 are preferably provided with flanges 21 and 22 whereby the separator may be connected between adjacent sections of a conduit or the like or in other suitable position.

In operation, the gaseous fluid from which particles of liquid are to be separated, enters the chamber 1 through the inlet 2, the helical baffle positioned within the intake passage causing gyrating motion to be imparted to the steam flowing therepast. As the fluid enters the chamber 1, this gyrating motion causes any particles of liquid present to be

carried outwardly by centrifugal force and deposited upon the sides of the chamber 1, the liquid thus deposited flowing downwardly through the slot 6 and into the chamber 4. At the same time the dry fluid from which the entrained liquid has been thus separated enters the hood 12 through the slots 16 and is delivered through the outlet 3.

The conical shape of the hood 12 permits dry fluid to be taken only from the very center of the inlet opening at the moment the fluid enters the chamber. As the fluid passes through the chamber 1, the centrifugal force will cause the liquid to be separated completely from a gradually increasing area around the center so that the area of the hood may be increased and the fluid be permitted to enter the hood through a gradually increased area toward the outlet end of the chamber 1.

The beveled edges 7 and 8 of the wall portion 5 are disposed in such manner that the gyrating current of fluid passing through the chamber 1 will cause the moisture to be swept directly into the chamber 4, the helical baffle 11 being arranged to direct the current downwardly against the offset edges immediately upon entering the chamber. The slight overwrapping prevents the liquid from being again picked up and carried on with the moving fluid. The slots 16 are inclined at an angle opposite to the direction in which the flowing steam gyrates, thereby causing any particles of liquid to be carried outwardly past and away from said slots, thus increasing the efficiency with which the liquid is separated from the gaseous fluid.

The liquid collected in the chamber 4 is drained off through the connection 18 into a suitable trap, not shown, operating in the well known manner requiring no particular description herein.

The device is particularly useful in separating particles of water from steam passing from a boiler or the like, and separating liquid oil and the like from the gaseous products during the rectifying and distillation of oils and the like. The device is subject to use in various other connections obvious to persons skilled in the art. The specific construction illustrated and described is subject to modification in numerous ways as to the specific details of form and construction and I desire to avail myself of all modifications which may fall within the scope of the appended claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is,

1. As an article of manufacture, a separator comprising a separator chamber having inlet and outlet ports; a liquid receiving chamber formed below the separator chamber and communicating therewith through a slot formed in the bottom of said separator chamber; a member mounted within the separator chamber and extending between the inlet and outlet ports, said member being provided with a helical baffle disposed within the inlet port and arranged to impart a rotating movement to a fluid stream moving therepast whereby entrained liquid will be deposited by centrifugal force against the walls of the chamber and drained through the slot into the liquid receiving chamber, said member being also provided with a hood formed integrally therewith and extending across the chamber and connected to the outlet port and having slots through which the dry fluid may pass to said outlet.

2. As an article of manufacture, a separator comprising a separator chamber having inlet and outlet ports; a liquid receiving chamber formed below the separator chamber and communicating therewith through a slot formed in the bottom of said separator chamber; a member mounted within the separator chamber and extending between the inlet and outlet ports, said member being provided with a helical baffle disposed within the inlet port and arranged to impart a rotating movement to a fluid stream moving therepast whereby entrained liquid will be deposited by centrifugal force against the walls of the chamber and drained through the slot into the liquid receiving chamber, said member being also provided with a hood formed integrally therewith and extending across the chamber and connected to the outlet port and having slots through which the dry fluid may pass to said outlet; and means for positioning said member within the chamber.

3. As an article of manufacture, a separator comprising a separator chamber having inlet and outlet ports; a liquid receiving chamber formed below the separator chamber and communicating therewith through a slot formed in the bottom of said separator chamber; a member mounted within the separator chamber and extending between the inlet and outlet ports, said member being provided with a helical baffle disposed within the inlet port and arranged to impart a rotating movement to a fluid stream moving therepast whereby entrained liquid will be deposited by centrifugal force against the walls of the chamber and drained through the slot into the liquid receiving chamber, said member being also provided with a hood formed integrally therewith and extending across the chamber and connected to the outlet port and having slots through which the dry fluid may pass to said outlet; and a flange mounted upon one end of the member and arranged to engage one end of the chamber to position the member within said chamber.

4. As a new article of manufacture, a

separator comprising a separator chamber having an inlet and outlet ports; a liquid receiving chamber formed below the separator chamber and communicating therewith through a slot formed in the bottom of said separator chamber; a member mounted within the separator chamber and arranged to be inserted through the outlet port to extend between the inlet and outlet ports, said member being provided with a helical baffle disposed within the inlet port and arranged to impart a rotating movement to a fluid stream moving therepast whereby entrained liquid will be moved outwardly by centrifugal force and deposited upon the sides of the chamber and drained through the slot into the liquid receiving chamber, said member being also provided with a conical hood formed integrally therewith and extending across the separator chamber and diverging from the baffle to the outlet port, said hood having a plurality of slots through which dry fluid may pass to said outlet.

5. As a new article of manufacture, a separator comprising a separator chamber having inlet and outlet ports; a liquid receiving chamber formed below the separator chamber and communicating therewith through a slot formed in the bottom of said separator chamber; a member mounted within the separator chamber and arranged to be inserted through the outlet port to extend between the inlet and outlet ports, said member being provided with a helical baffle disposed within the inlet port and arranged to impart a rotating movement to a fluid stream moving therepast whereby entrained liquid will be moved outwardly by centrifugal force and deposited upon the sides of the chamber and drained through the slot into the liquid receiving chamber, said member being also provided with a conical hood formed integrally therewith and extending across the separator chamber and diverging from the baffle to the outlet port, said hood having a plurality of longitudinally disposed slots through which dry fluid may enter at gradually increasing distance from the center of the chamber and pass said outlet.

6. As a new article of manufacture, a separator comprising a separator chamber having inlet and outlet ports; a liquid receiving chamber formed below the separator chamber and communicating therewith through a slot formed in the bottom of said separator chamber; a member mounted within the separator chamber and extending between the inlet and outlet ports, said member being provided with a helical baffle disposed within the inlet port and arranged to impart a rotating movement to a fluid stream moving therepast whereby entrained liquid will be moved outwardly by centrifugal force and deposited upon the sides of the chamber and drained through the slot into the liquid receiving chamber, said member being also provided with a conical hood extending across the separator chamber and diverging from the baffle to the outlet port, said hood having a plurality of longitudinally disposed slots formed at an angle inclined oppositely to the direction of movement of the rotating fluid whereby dry fluid may pass into the hood and to the outlet without carrying entrained liquid therewith.

7. As a new article of manufacture, a separator comprising a separator chamber having inlet and outlet ports; a liquid receiving chamber formed below the separator chamber and communicating therewith through a slot formed in the bottom of said separator chamber; a member mounted within the separator chamber and extending between the inlet and outlet ports, said member being provided with a helical baffle disposed within the inlet port and arranged to impart a rotating movement to a fluid stream moving therepast whereby entrained liquid will be moved outwardly by centrifugal force and deposited upon the sides of the chamber and drained through the slot into the liquid receiving chamber, said member being also provided with a conical hood extending across the separator chamber and diverging from the baffle to the outlet port, said hood having a plurality of longitudinally disposed slots formed at an angle inclined oppositely to the direction of movement of the rotating fluid whereby dry fluid may pass into the hood and to the outlet without carrying entrained liquid therewith; and means for positioning said member within the chamber.

In witness whereof I hereunto set my signature.

HARRY E. BOYRIE.