Dec. 9, 1924. 1,518,152

R. H. KINGDON

AIR SEPARATOR

Filed June 18, 1923

FIG. 1

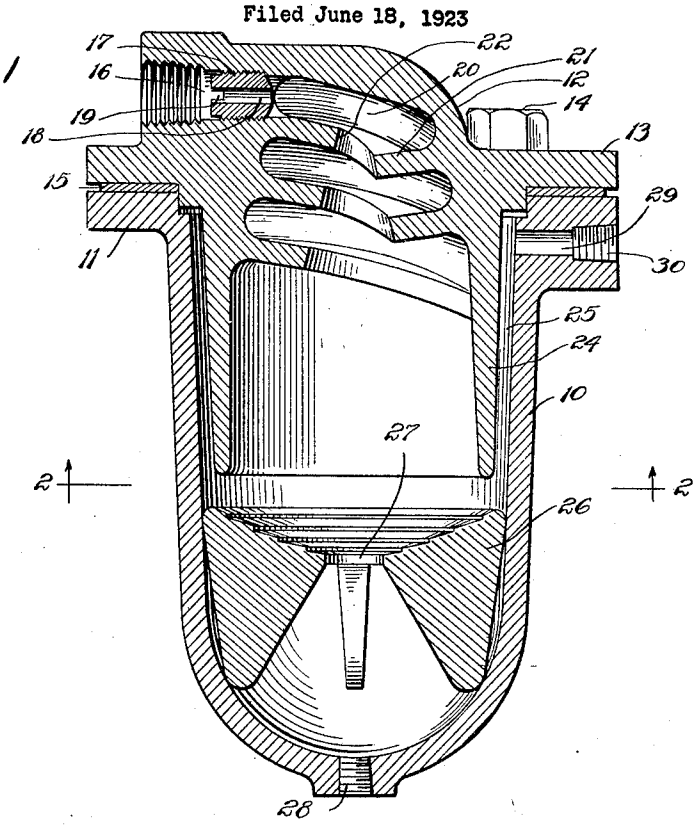
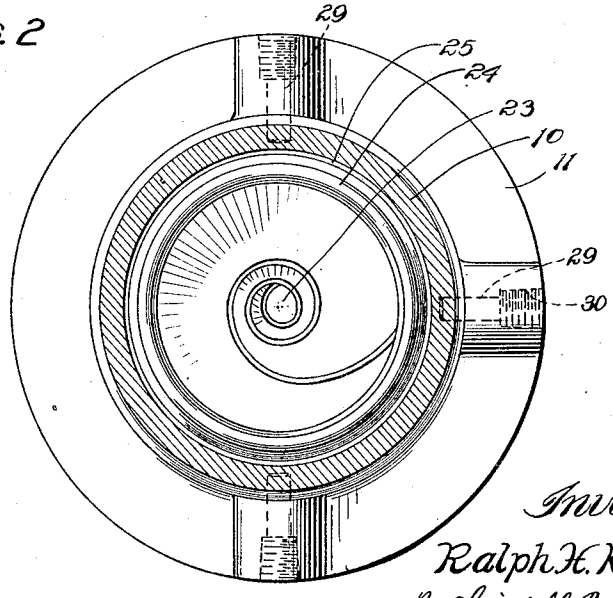


FIG. 2



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UNITED STATES PATENT OFFICE.

RALPH H. KINGDON, OF CHICAGO, ILLINOIS, ASSIGNOR TO SEARS, ROEBUCK AND CO., OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

AIR SEPARATOR.

Application filed June 18, 1923. Serial No. 645,944.

To all whom it may concern:

Be it known that I, RALPH H. KINGDON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Air Separator, of which the following is a specification.

The invention relates to an improved means for separating suspended particles of water, oil or other liquids from air, and its primary object is to provide an air separator which is particularly adapted to supply clean dry air to a pneumatic painting apparatus.

A further object is to provide an air separator of the above character which is adapted to be connected directly in the air tube or line, and of which said connection can be easily and quickly accomplished.

Another object is to provide an inexpensive air separator which is efficient in its operation, simple and sturdy in construction, and easy to manufacture.

Further objects and advantages will become apparent as the description proceeds.

In the drawings, Figure 1 is a vertical sectional view of an air separator embodying the features of my invention. Fig. 2 is a section on line 2—2 of Fig. 1.

While I have illustrated in the accompanying drawings, and will herein describe in detail the preferred embodiment of my invention, it should be understood that I do not thereby intend to limit the invention to the exact construction disclosed, but aim in the subjoined claims to cover all modifications and alternative constructions falling within the scope of the invention.

Referring to the drawings, 10 represents the bowl of the separator which is open at its upper end and is provided with a peripheral flange 11 adapted to support a head or cover 12. The cover 12 is also provided with a peripheral flange 13 which may be removably secured to the flange 11 by any suitable means, such as bolts 14. A gasket 15 is positioned between the flanges to make the connection air tight.

The cover 12 is formed on its upper side with a lateral air intake passage 16, which is enlarged and screw-threaded in its outer portion to receive and retain the end of an air tube (not shown) leading from a compressed air supply tank (not shown). The passage 16 is also screw-threaded in its inner portion to retain a jet nozzle 17 having a restricted air passage 18 extending centrally therethrough. A screw slot 19 is provided in the outer end of the nozzle 17 to facilitate its removal or insertion.

The restricted passage 18 communicates at its inner end with the upper terminal of a circuitous passage 20 which is defined by a conical spiral flange 21 of a uniform pitch formed on the interior surface of the head 12. Each turn of the flange 21 is inclined inwardly and downwardly to allow the condensate from the air to drain off quickly into the bowl 10. The edge 22 of the flange 21 uniformly recedes downwardly and outwardly, preferably at an angle of 15° from the center of the spiral, thereby forming a conical vertical opening 23 extending from the top of the passage 20 to the interior of the bowl 10. This conical opening 23 prevents the condensate on any turn of the spiral flange 21 from draining onto any of the lower turns, and provides a central flaring opening through which a portion of the whirling air may enter the bowl 10.

Air under pressure is admitted into the head 12 through the restricted passage 18, and immediately suffers a sudden expansion and drop in temperature which results in the condensation of a portion of the entrained liquids or vapors. The air leaves the passage 18 at a greatly increased velocity, and impinges violently against the opposite outer wall of the passage 20, whereby it is deflected and given a whirling motion downwardly through the passage 20 into the bowl 10. In this whirling motion, most of the condensed vapors or liquids remaining in the air are thrown out by centrifugal force.

On its under side the cover 12 is provided with a cylindrical flange 24 which extends downwardly into the bowl 10 and forms a narrow annular chamber 25 therewith. The air from the passage 20 is directed downwardly by the flange 24, and is then deflected upwardly into the annular chamber 25 by a baffle member 26 having a plurality of downwardly extending wings or vanes which rest loosely within the bowl 10. The liquids which are removed from the air are drained from the baffle member 26 through a central opening 27 into the lower end of the bowl 10 from where they may be removed through a drain port 28 closed by a suitable cock (not

shown). Dry air from the annular chamber 25 may be distributed through one or more exhaust ports 29, which are formed in the flange 11 of the bowl 10, and are screw-threaded at 30 to provide means for attaching the air lines (not shown). In the present instance I have shown three exhaust ports 29, of which any number may be used.

It will be apparent that I have provided a sturdy and simple device which may be directly connected into an air line for efficiently separating water, oil or other entrained liquids or vapors from the air.

I claim as my invention:

1. An air separator having, in combination, a head, an intake passage in said head, a jet nozzle having a restricted opening in said passage, a cylindrical flange formed on the underside of said head, a bowl secured to the underside of said head and loosely surrounding said cylindrical flange, a conical spiral passage in said head connecting said intake passage with the interior of said bowl, a baffle member in the lower end of said bowl, means for draining said bowl, and an exhaust passage communicating with the upper interior of said bowl.

2. An air separator having, in combination, a head, an inlet passage having a restricted opening in said head, a bowl secured to the underside of said head, a conical spiral passage in said head connecting the interior of said bowl with said inlet passage, means for draining said bowl, and means for exhausting air from said bowl.

3. An air separator having, in combination, a head, a bowl secured to said head, a conical spiral flange formed on the interior surface of said head, an intake passage opening into said head at the inner end of said flange, and an exhaust passage communicating with the interior of said bowl.

4. An air separator having, in combination, a closed hollow head, a conical spiral flange formed on the upper interior surface of said head, said flange being inclined inwardly and downwardly, an air intake passage having a restricted opening communicating with the interior of the head above said flange, and means for exhausting the air from said head.

5. An air separator having, in combination, a bowl, a closure for said bowl, a depending flange on said closure extending into said bowl, an air inlet passage in said closure, means in said closure for imparting a whirling motion to the incoming air, and an air exhaust passage opening from said bowl above the lower edge of said flange.

6. An air separator having, in combination, a bowl, a closure for said bowl, a depending flange in said closure extending into said bowl, an air inlet passage in said closure, means in said closure for successively effecting a sudden expansion, a sharp impact, and a whirling motion of the incoming air, and an air exhaust passage opening from said bowl.

7. An air separator having, in combination, a head, a conical spiral flange formed in said head and defining a central flaring opening, an inlet passage communicating with the upper end of said opening, a jet nozzle having a restricted opening in said inlet passage, a cylindrical flange formed on the lower side of said head below said spiral flange, a bowl secured to the lower side of said head and fitting loosely around said cylindrical flange to define a narrow annular passage therewith, and an exhaust passage communicating with the upper end of said annular passage.

In testimony whereof, I have hereunto affixed my signature.

RALPH H. KINGDON.