

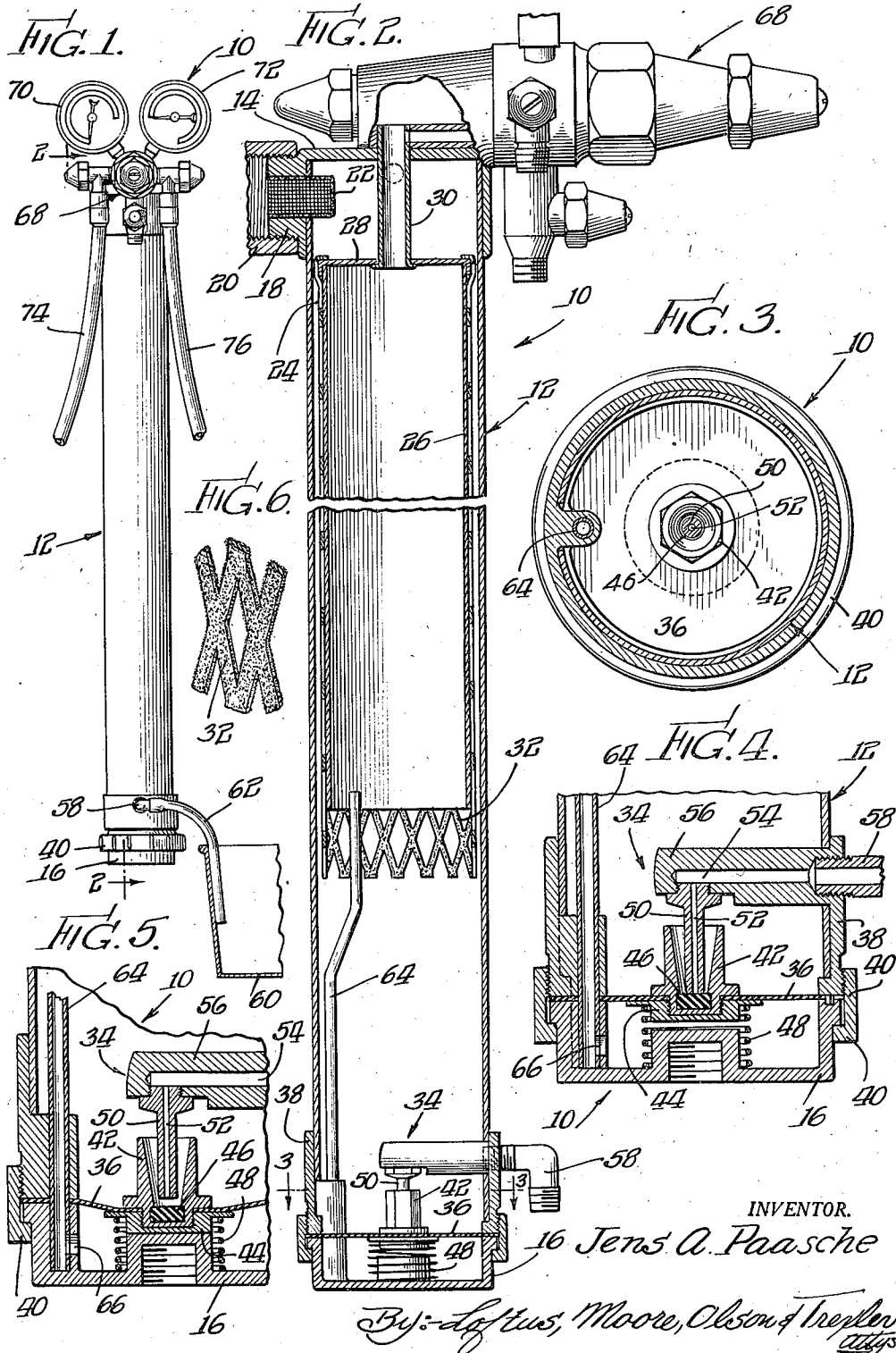
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AIR-CONDITIONER

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AIR CONDITIONER

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3 Claims. (Cl. 183—1)

This invention relates to air-conditioners and more particularly to devices for cleaning and removing substantially all moisture from air before it is delivered under pressure to air operated devices such as sprayers and the like.

In the use of air-brushes and the like, whereby paint or similar material is atomized for purposes of application to a work surface, compressed air is directed against a stream of paint or the like discharged from a restricted orifice. Also in using air-drills, air-hammers, air-rubbing machines, et cetera, compressed air is used as an impelling medium. It is of the utmost importance that air so used must be free from foreign matter such as dust particles and the like and must also be free of moisture. It is one of the primary objects of the present invention to provide a device whereby foreign matter and moisture may be thoroughly removed from air under pressure.

More specifically the invention contemplates a receptacle into which air under pressure may be directed and brought into contact with surfaces for which moisture has an affinity, and the moisture so collected may be withdrawn at the bottom of the receptacle and the moisture-free air under pressure discharged from the top of the container.

Still more specifically the invention contemplates a device as set forth above wherein moisture separated from the air and collected at the bottom of a receptacle may be automatically withdrawn from the receptacle.

The present invention also contemplates improved, novel means within the aforesaid receptacle which will expedite the removal of moisture from air under pressure directed into said receptacle.

The foregoing and other objects and advantages will be more apparent from the following detailed description when considered in connection with the accompanying drawing, wherein—

Fig. 1 is a side elevational view of a device which is representative of one embodiment of the invention;

Fig. 2 is an enlarged sectional view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged transverse sectional view taken substantially along the line 3—3 of Fig. 2;

Fig. 4 is a central vertical sectional view of the lower extremity of the air receiving receptacle to more clearly illustrate the structural characteristics of the diaphragm operated valve therein, said valve being shown in closed position;

Fig. 5 is a fragmentary sectional view similar to Fig. 4 disclosing the diaphragm displaced downwardly so as to open the aforesaid valve; and

Fig. 6 is a fragmentary perspective view of the perforated cylinder detached from the receptacle.

Referring now to the drawing more in detail wherein like numerals have been employed to designate similar parts throughout the various

figures, it will be seen that one embodiment of the invention resides in a conditioner or separator designated generally by the numeral 10. This device 10 comprises a cylindrical receptacle 12 having a cap 14 covering the upper portion thereof and a cap or closure 16 for closing the lower extremity thereof. The cap 14 is provided with a nipple 18 adapted to receive an air conducting conduit or pipe 20. A suitable screen 22 positioned within a central aperture of the nipple 18 serves to prevent foreign particles from being introduced within the upper extremity of the cylinder or housing 12 when air under pressure is directed by the conduit 20 into said housing.

Air under pressure introduced within the upper extremity of the cylindrical housing 12 passes downwardly through a restricted annular area 24 which is presented between the inner surface of the housing 12 and the outer surface of a cylindrical member 26. This cylindrical member or skirt 26 depends from the margin of a closure disc 28 which in turn is centrally secured to the lower extremity of a conduit 30. The upper extremity of the conduit 30 is secured within the cap 14. The housing 12 and skirt 26 are preferably metallic to expedite the condensation of moisture which may be present within the air passing downwardly through the annular area or passage 24.

Particular attention is directed to the novel perforated shell 32. This shell 32 may be fabricated from expanded metal bent into cylindrical form. I prefer to coat the expanded metal shell 32 with wool flock indicated by the stippling in the drawing. This wool flock materially increases the external area of the member 32, thereby increasing the volume of accumulated water. When the device 32 is provided with a metal surface free from the wool flock, the volume of accumulated water is materially less due to the reduction in surface area in contact with the moisture laden air. It will be noted that the perforated member 32 extends substantially throughout the annular area 24 and depends a considerable distance below said annular area. Water which condenses or separates out within the receptacle 12 ultimately accumulates at the bottom of said receptacle.

At the bottom of the receptacle is a valve device designated generally by the numeral 34. This valve device serves to control the withdrawal of accumulated water when the level of the column of water in the receptacle 12 reaches a given point. In Figs. 2 and 4 the valve device 34 is shown in its closed position. This valve device includes a flexible diaphragm 36 which is clamped in position along its periphery between a sleeve 38 and the closure 16 by a threaded collar 40. The central portion of the diaphragm 36 is apertured to receive a cup 42 which is clamped to

the diaphragm by an internally threaded cap 44. A valve seat 46 of suitable flexible material such as rubber is mounted in the bottom of the cup 42, and a coiled spring 48 interposed between the cap 44 and the closure 16 serves to continuously urge the valve seat 46 upwardly into engagement with the lower extremity of a valve member 50. This valve member 50 is provided with an elongated aperture 52 which communicates at its upper extremity with a passage 54 provided within a member 56 projecting inwardly from and formed integral with the sleeve 38. The valve member 50 makes a threaded connection with and depends from the member or projection 56, as clearly shown in Figs. 4 and 5. A coupling 58 is secured in communicating relation with the passage 54, as clearly illustrated in Figs. 2 and 4.

The weight of the water accumulated within the receptacle 12 will not be sufficient to flex the diaphragm 36 downwardly until this weight is sufficient to overcome the action of the coiled spring 48. When this amount of water has accumulated the diaphragm 36 moves downwardly to the position shown in Fig. 5, thereby establishing communication between the area within the receptacle 12 and the discharge coupling 58. Thus, when the diaphragm 36 occupies the position shown in Fig. 5, the resilient valve seat 46 is shifted from the lower extremity of the member 50, thereby permitting the flow of water through the passages 52 and 54 into the discharge coupling 58. In practice, it is found convenient to direct the water from the coupling 58 into a suitable receptacle 60 through a conduit 62, as illustrated in Fig. 1. In this connection it will be noted that the central portion of the closure 16 is embossed and internally threaded for the purpose of receiving a complementary threaded rod (not shown) to support the separator in any desired position.

In order to maintain equal pressure conditions on opposite sides of the diaphragm 36, a vent is provided in the form of a tube 64 which extends upwardly from the bottom of the receptacle to a point which would be well above the maximum height or level to which the accumulated water would rise in the receptacle. The lower extremity of this tube 64 communicates through an aperture 66 with the area beneath the diaphragm 36. In this way air pressure conditions on opposite sides of the diaphragm are equalized. If some venting means were not provided, the pressure of the air rather than the pressure of the water within the receptacle would open the valve device 34.

From the foregoing it will be apparent that the air under pressure which ultimately passes upwardly through the interior of the cylindrical member 26 is substantially free of moisture and passes outwardly through the conduit 30 into an air regulator device designated generally by the numeral 68. For a clear understanding of the present invention, a detailed description of the air regulator device 68 is not essential. It will suffice to say that this device 68 has associated therewith suitable pressure gauges 70 and 72, one serving to indicate the intake pressure and the other serving to indicate the pressure of the air in outlet conduits 74 and 76.

Air conditioning devices constructed in accordance with the teachings of the present invention have proved very successful in the field under most severe operating conditions. In fact, by employing the device disclosed herein very nearly one hundred per cent of the moisture has been re-

moved from air before delivery to air-operated devices such as air-tools and the like. The increase in air-contacting area provided by the perforated cylinder coated with wool flock or granules materially enhances the separation of moisture from the air stream. The automatic control of the fluid level in the bottom of the cylindrical receptacle materially contributes to the efficient functioning of the device. This control valve mechanism is of extremely simple construction and is positive in operation. In fact, the device forming the subject matter of the present invention is composed of a minimum number of constituent elements, is relatively simple in construction and is capable of being produced by the practice of conventional machine shop methods. It will also be apparent from the foregoing that the conditioner or separator disclosed herein is not only of simple and durable construction but is capable of being economically manufactured.

Obviously the invention is not limited to the specific details of construction disclosed herein but is capable of other modifications and changes without departing from the spirit and scope of the appended claims.

The invention is hereby claimed as follows:

1. A conditioner for an aeriform substance under pressure including a vertical cylindrical metal receptacle, inlet and outlet means arranged adjacent the upper portion of said receptacle, a vertical cylindrical metal baffle member arranged within said receptacle so as to be interposed between said inlet and said outlet means and to provide a narrow elongated passage within said receptacle for said aeriform substance, and an expanded metal mesh cylindrical member arranged within said elongated passage in spaced relation to the outer walls thereof, said metal mesh member being coated with wool flock to expedite the separation of moisture from said aeriform substance in said narrow passage.

2. A conditioner for accommodating an aeriform substance under pressure including a vertical cylindrical receptacle, inlet and outlet means positioned at the upper portion of said receptacle, cylindrical means within the receptacle cooperating within the inner periphery thereof to provide an elongated annular passage through which the aeriform substance under pressure from said inlet means may be directed downwardly within the receptacle, and a sheet material member of cylindrical shape arranged within said elongated annular passage adjacent the outer surface of said cylindrical means, said sheet material member being of perforated expanded metal coated with a finely divided fibrous material to expedite the separation of moisture from the aeriform substance moving downwardly within said annular passage.

3. A conditioner for an aeriform substance under pressure, including in combination a vertical cylindrical metal receptacle, inlet and outlet means adjacent the upper portion of said receptacle, a vertical cylindrical metal baffle member arranged within said receptacle interposed between said inlet and outlet means, forming a narrow elongated passage with said receptacle, and an expanded metal mesh cylindrical member of single thickness arranged within said elongated passage in spaced relation with a wall thereof to expedite the agglomeration of moisture from the aeriform substance passing through said elongated passage.

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