S. J. HEINRICH.

AIR MODIFIER.

APPLICATION FILED SEPT. 24, 1917.

1,255,533.

Patented Feb. 5, 1918.

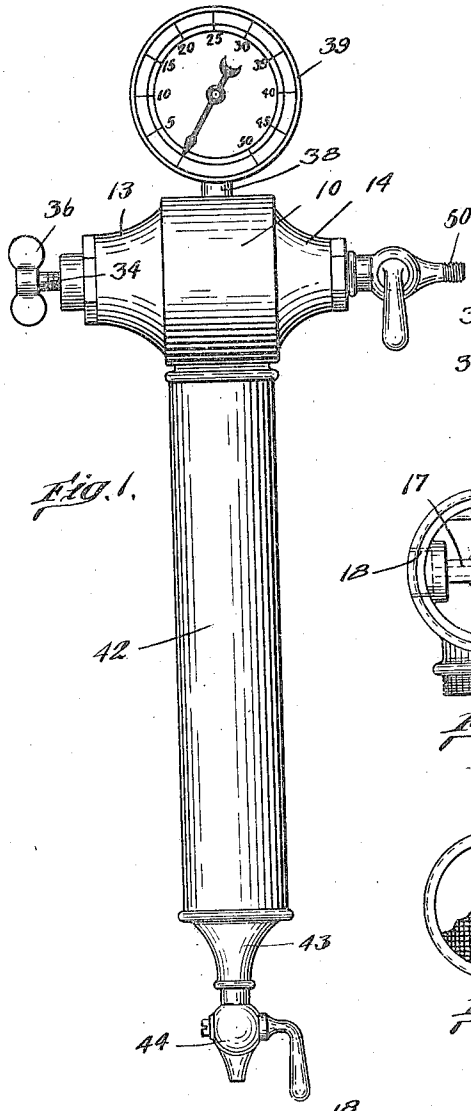


Fig. 1.

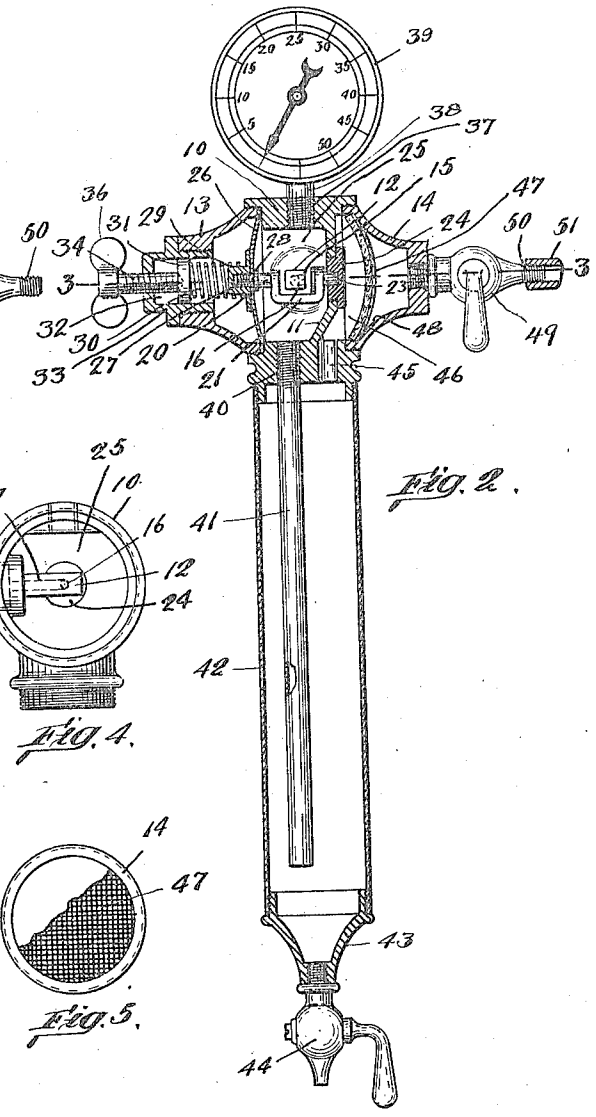


Fig. 2.

Fig. 4.

Fig. 5.

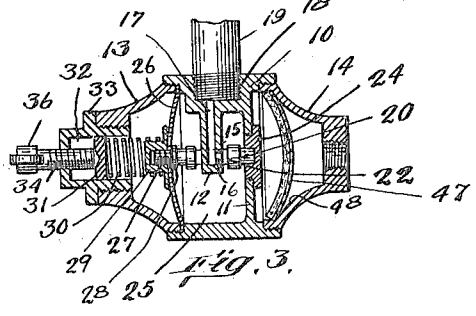


Fig. 3.

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by

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UNITED STATES PATENT OFFICE.

STEPHEN J. HEINRICH, OF NEWTON HIGHLANDS, MASSACHUSETTS.

AIR-MODIFIER.

1,255,533. Specification of Letters Patent. Patented Feb. 5, 1918.

Application filed September 24, 1917. Serial No. 193,048.

To all whom it may concern:

Be it known that I, STEPHEN J. HEINRICH, residing at Newton Highlands, in the county of Suffolk and State of Massachusetts, and a subject of the Emperor of Austria, have invented an Improvement in Air-Modifiers, of which the following is a specification.

My invention relates to apparatus employing compressed air for power purposes, and has particular reference to apparatus for filtering or cleaning said air, extracting moisture therefrom, and reducing the pressure thereof.

In the operation of certain types of apparatus using compressed air, such as air brushes for instance, the air is taken from a reservoir or air main at a comparatively high pressure, and is passed through pressure-reducing means to reduce its pressure to some lower and more convenient working pressure, and to maintain it at such lower pressure; and also is or may be passed through a suitable condensing apparatus to remove moisture therefrom at its reduced pressure; and also is or may be conducted through a filter to remove dirt and other foreign particles; and being thus pressure-controlled and modified by these separate apparatus, it is conducted to the air-consuming apparatus.

The object of my invention is the construction of an apparatus having in combination some or all of the features of the separate apparatus, that is, having a pressure-reducing or controlling means and combined therewith the moisture condenser and the filter, all arranged in a single unit, which shall have the advantage of being simple, compact, cheap of construction, and inexpensive of installation.

Figure 1 is an elevation of an air-controlling and modifying apparatus embodying my invention.

Fig. 2 is a vertical sectional view.

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 2.

Fig. 4 is an end elevation of the reducing valve body.

Fig. 5 is an end view of the filtering element.

As here shown, my invention is embodied in a unitary apparatus consisting of a body 10 having a separating partition 11, and a projection 12, and in which are secured, by means of screw threads, two caps 13 and 14. Projection 12 is provided with a plane face 15 in which is drilled a hole 16 which extends into, but not through said projection, and constitutes an orifice, for the admission of air from an air main to the apparatus. A connecting channel 17 extending longitudinally in projection 12, connects orifice 16 with a screw-threaded opening 18 in the body 10, in which is secured a pipe 19 connected to the source of compressed air.

A valve stem 20, comprising a bent portion 21, disposed around projection 12, is provided with a valve face 22 of rubber or other packing material adjacent the orifice 16, and said valve stem 20 is adapted to slide in a bearing 23 in plug 24 secured in partition 11 to guide the movement of said valve face 22 into contact with the walls of the orifice 16 to prevent the flow of air from said orifice into chamber 25 when the air pressure in said chamber, within which said valve is disposed, becomes greater than a predetermined value.

A flexible diaphragm 26 is secured to body 10 by cap 13 and forms a wall of chamber 25, and a threaded end 27 of valve stem 20 projects through the central part of said diaphragm which is secured between a flange 28 on said valve stem and a nut 29 on this threaded end 27, air leakage from chamber 26 around said threaded end being prevented by suitable packing means.

A coil spring 30, by adjusting the compression of which the valve may be set to close at varying pressure, bears on the nut 29 on diaphragm 26, and serves to exert a pressure on said diaphragm tending to maintain the air inlet valve open against the pressure of air in chamber 25, acting on diaphragm 26. The other end of coil spring 30 bears against a washer or plug 31 which is adapted to slide in a cylindrical bore 32 in a plug 33 secured in the end of cap 13. The washer 31 is provided with a conical depression in which fits the corresponding surface of an adjusting screw 34 which is threaded in plug 33 and is provided with a wheel or handle 36 by means of which the screw 34 may be rotated to vary the pressure of spring 30 against the diaphragm 26 and thus vary the pressure at which the diaphragm will act to arrest the flow of air from orifice 16.

An opening 37 leads through the top of

body 10 from chamber 25 and in this opening is secured a pipe 38 making connection with a pressure indicator or gage 39.

The various parts described above constitute a regulating valve by means of which the pressure in chamber 25 is maintained at some predetermined constant pressure lower than that in the air main connected to pipe 19.

Air opening 40 extends through the lower part of body 10 into chamber 25 and a pipe 41 is secured in this opening. Pipe 41 extends nearly to the end of a pipe 42 of considerable larger diameter which surrounds pipe 41 and which is screwed into body 10 as shown. The lower end of pipe 42 is closed by a cap 43 into which is screwed a suitable cock 44.

Pipe 42 forms a moisture separator or settling chamber in which the moisture contained in the air at its initial pressure and precipitated by the partial reduction in pressure is conducted with the air through tube 41 into the chamber formed by pipe 42 in which the upward flow of the air to the outlet of the apparatus is so slow, due to the comparatively great diameter of pipe 42, that the moisture is enabled to fall against this upward velocity and to collect in the bottom of pipe 42 over plug 43, from whence it may be expelled through valve or cock 44 by the opening of said valve.

The air with the moisture now extracted, is conducted from the top of the water extracting chamber formed by pipe 42 through opening 45 into chamber 46 of body 10 which is separated from chamber 25 by diaphragm 11. One wall of chamber 46 is formed by an air filter or strainer for extracting any dust particles not precipitated in the moisture extraction chamber and which, as here shown, consists of a screen 47 to which is secured a disk of felt or other porous material, the screen and felt forming a unitary structure which is open to the inner sides of cap 14 and held in place against the curved sides 48 thereof. Due to its structure and to the method of maintaining it in place, the strainer may be easily and quickly removed for cleaning or for the substitution of a second strainer, which may be at the same time firmly maintained in place against any forces due to the velocity and pressure of the air flowing through it, tending to displace it. Moreover the strainer has a large area as compared to the area of the air exit from the apparatus and consequently the air velocity through it is very slow, which is an aid to the efficient performance of the strainer.

A pet cock 49 is secured in cap 14, having connection with the chamber formed between the cap and the strainer, and is provided with a screw terminal 50 to which a hose or other suitable conductor 51 is attached for the purpose of conveying the air, as it passes through the strainer, and having been reduced in pressure, the moisture extracted and dust particles removed, to the air utilizing apparatus.

I claim:—

1. An air-controlling and modifying apparatus, comprising a single unitary structure including an entrance for compressed air, means for expanding said compressed air to a variable predetermined lower pressure and for maintaining said air at said lower pressure, means for collecting moisture from said air at said reduced pressure, means for filtering said pressure-reduced and moisture-extracted air to remove any solid substances contained in said air, and an air exit for said modified air.

2. An air-controlling and modifying apparatus, comprising in a single unitary structure an automatically-controlled pressure-reducing means for the air, moisture-separating means for the air, and filtering means for the extraction of solid particles from the air.

3. An air-controlling and modifying apparatus, comprising a body structure, an air nozzle disposed in a chamber in said body, means connecting said air nozzle with a source of compressed air, a flexible diaphragm secured in said body and forming a wall of the chamber therein, a valve stem secured to said flexible diaphragm having a face thereof disposed adjacent, and adapted to control, the opening of said air nozzle upon a movement of said diaphragm, whereby to regulate the flow of air from said nozzle into the chamber of said body, a cap securing said diaphragm to said body, a spring acting between said cap and said diaphragm whereby to resist a movement of said diaphragm due to the pressure of air in the chamber of which it forms a wall, pressure-adjusting means for said spring, means for extracting moisture from the expanded air and means to filter the expanded air.

4. An air-controlling and modifying apparatus including in a unitary structure, an entrance for compressed air, means for expanding said air to some lower predetermined pressure, means for maintaining the air at the lower pressure, and means for extracting foreign matter from the air.

5. An air-controlling and modifying apparatus, including in a unitary structure, an entrance for compressed air, a valve controlling the flow of air into the apparatus, means actuated by air pressure within the apparatus to govern the movements of said valve, and means for extracting foreign matter from the air.

6. An air-controlling and modifying apparatus comprising a unitary structure including an air inlet port and an air exit

port, a valve adapted to control the flow of air into the apparatus through the air inlet port, means actuated by the air pressure within the apparatus to govern the movements of said valve, and means for removing foreign matter from the air.

7. An air-controlling and modifying apparatus, including in a single unitary structure an air inlet port for compressed air, and an air exit port, means governing the flow of air in the apparatus to maintain the air in the structure at some variable predetermined lower pressure than at the entrance thereof, and means for extracting moisture from the air within the structure.

8. An air-controlling and modifying apparatus, including in a single unitary structure an entrance for compressed air and an air exit, means governing the flow of air into the apparatus to maintain the air in the structure at some variable predetermined lower pressure than at the entrance thereof, and means for removing solid particles from the air within the structure.

9. An air-controlling and modifying apparatus including a hollow body structure having an air inlet port, end caps for said body structure, one of which has an air outlet port, means governing the flow of air through said air inlet into said body structure, means for removing solid particles from the air, and means for extracting moisture from the air, said means including a downwardly extending tube, one end of which is in communication with said hollow body structure, a pipe of larger diameter compared with said tube and forming a moisture-settling chamber secured to said body structure and inclosing said tube, said tube terminating in the lower part of the moisture-settling chamber, communicating means between the top of said chamber and the air-filtering means, closing-means for said pipe forming the settling-chamber, and means for withdrawing the collected moisture from the chamber.

10. An air-controlling and modifying apparatus, including a hollow body structure having an air inlet port, end caps for said body structure, one of which has an air outlet port, means for governing the flow of air through said air inlet port into said body structure, means for extracting the moisture from the air and a filter for the air, said filter including a disk of porous material and a disk of perforated material, said two disks forming an air filtering unit, said filtering unit having a diameter somewhat greater than the internal diameter of the end cap having an outlet port, and adapted to be sprung into said end cap and maintained therein in sprung condition and through which the air is constrained to flow in passing to the outlet port.

11. An air-controlling and modifying apparatus including a hollow body structure having an air inlet port, end caps for said body structure, one of which has an air outlet port, a filter disposed in the end cap having the air outlet port, moisture-extracting means for the air, and means for governing the flow of air through the inlet port into the hollow body structure.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

STEPHEN J. HEINRICH.

Witnesses:
T. J. GREENWOOD,
H. B. DAVIS.

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