

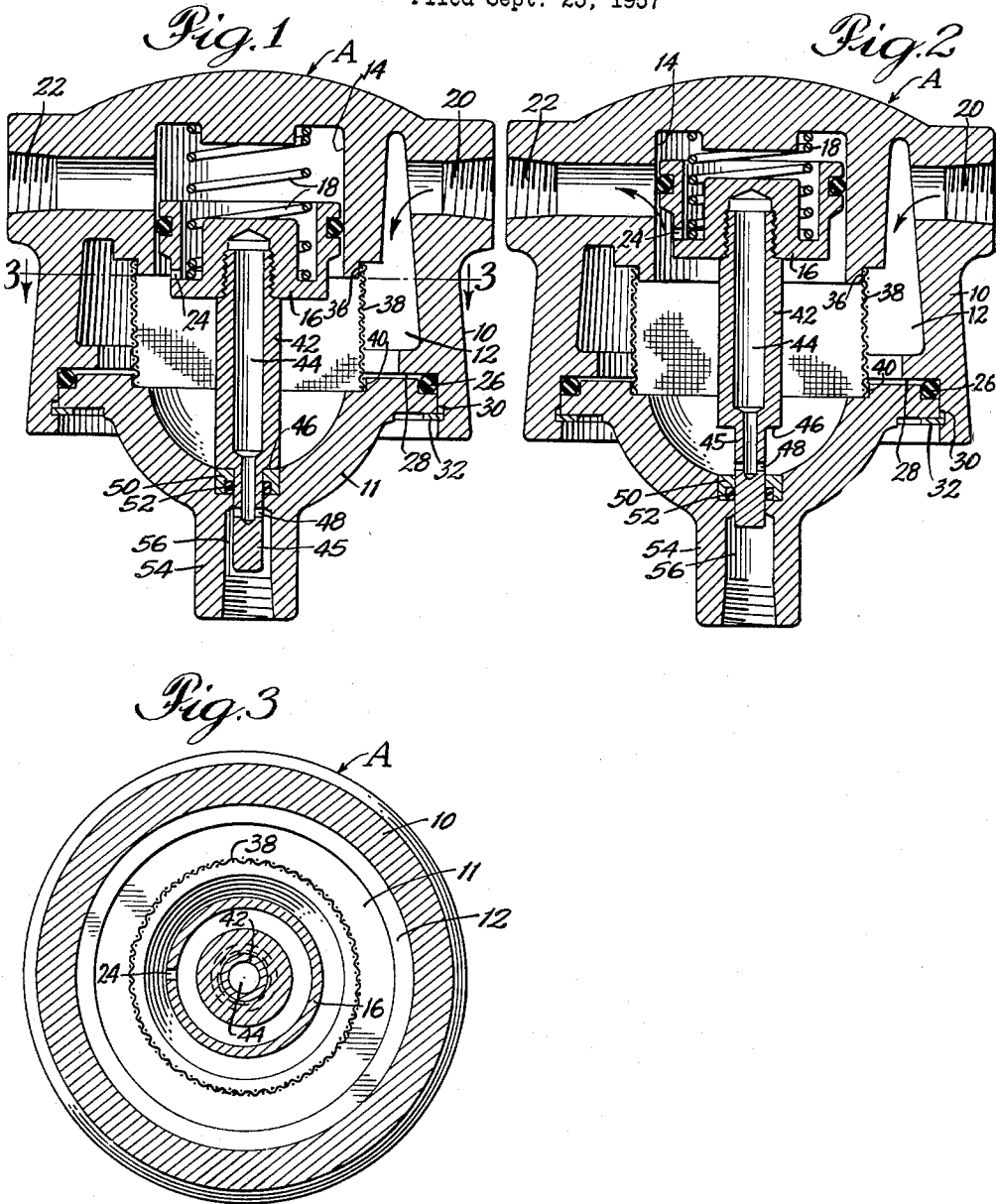
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AUTOMATIC MOISTURE EXTRACTOR FOR COMPRESSED AIR LINES

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1

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AUTOMATIC MOISTURE EXTRACTOR FOR COMPRESSED AIR LINES

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This invention relates to moisture extractors for compressed air lines, and more particularly to extractors of the type for automatically separating liquid contaminants and discharging them from the system.

One of the objects of this invention is to provide an improved moisture extractor of the character indicated, which is constructed and arranged for automatically discharging liquid contaminants separated from the air in the lines when the flow of air through the device is discontinued.

Another object is to provide an improved moisture extractor of the character indicated which is constructed and arranged so as to permit quick and easy assembly and disassembly, and which permits servicing and/or replacement of parts without removal of the device from the lines.

A further object is to provide an improved moisture extractor of the character indicated which is of simple design and construction, composed of relatively few parts, which is highly efficient in operation, and which is economical to manufacture and assemble.

Other objects and advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a vertical sectional view through the extractor device embodying the present invention shown at full scale.

Figure 2 is a view similar to Figure 1, showing the position of the various parts while the device is in operation.

Figure 3 is a transverse, sectional view through the device taken substantially as indicated at line 3—3 on Figure 1.

Moisture extractor devices of the type embodying the present invention are adapted to a relatively wide field of use, such as in connection with various types of air operated tools, paint spray guns, pneumatic cylinders, printing presses, molding machines, carton forming machines, and various other equipment and machines which are intermittently operated. The device embodying the present invention serves to automatically separate and discharge continuously, liquid contaminants, such as water, oil, or other liquids, from compressed air lines. While reference is made to the device being usable in connection with compressed air lines, it is to be understood that this term is intended to be broadly interpreted as including steam lines, since the device functions equally satisfactorily for removing water and other liquid contaminants in steam lines.

The device embodying the present invention comprises a housing A, formed of two main parts, including a body 10, and a bottom member 11. The body and bottom members are preferably formed as metallic castings and, when assembled, define a closed chamber 12. The cross-section of the body, in the main, is of generally circular cross-section, and the upper portion thereof is formed with a centrally located, downwardly open piston bore 14, for communicating with the chamber 12. A

2

piston 16 is slidably mounted in the bore 14, and is normally urged in a downward direction by a coil spring 18. The body is formed with a fluid inlet opening 20 in direct communication with the chamber 12, and an outlet opening 22 in direct communication with the piston bore 14. When the device is in an inoperative position with the piston in the position seen in Figure 1 of the drawings, communication between the chamber 12 and the outlet opening 22 is closed. The piston is provided with an equalizing vent opening 24, so that pressure at opposite sides of the piston is substantially equalized after flow of compressed air through the device is shut off, so as to permit the piston to return to an inoperative position, as seen in Figure 1 of the drawing.

The bottom member 11 is formed so as to constitute a sump for collecting liquid contaminants in the system. This bottom member has its outer marginal edge formed as a flange provided with a groove for the reception of a sealing gasket 26, adapted to be compressed against an annular shoulder 28, formed in the bore in the lower end of the body 10. The bore formed in the lower portion of the body 10 is provided with a groove 30, into which is adapted to be projected a C ring 32, for detachably locking the bottom member 11 in sealed relation to the body 10. By virtue of this construction, the parts of the device may be quickly and easily assembled without the use of bolts or screws, and may be quickly and easily disassembled for servicing or replacement of parts, without removing the device from the compressed air lines.

The interior of the body is provided with a downwardly extending annular shoulder 36, around which is seated the upper marginal edge of a cylindrical screen 38. The lower marginal edge of the screen is adapted to be seated in a recess 40, formed in the bottom member 11, for assisting in confining the screen 38 in position. The purpose of the screen is to separate and strain out of the fluid in the system, lint, pipe scale and any other solid matter.

Threaded into the bottom of the piston 16 is a hollow stem 42, having an elongated cavity or chamber 44. The lower end of the stem is reduced in cross-section, as indicated at 45, thereby defining an annular shoulder 46. The reduced portion 45 of the stem is provided with a moisture loading and discharge port 48 in communication with the cavity 44. The lower or reduced portion 45 of the stem is slidably guided in a sealing device mounted in the bottom member 11. The sealing device comprises an assembly including an annular ring 50, with a groove in which is seated a resilient O ring 52, positioned for sealing engagement with said reduced portion 45 of the stem. The sealing device, comprising the parts 50 and 52, is press fitted in a bore formed in the upper surface of the bottom member 11. The bottom member 11 is formed with a depending nipple 54, having an internal bore 56 of a size so as to provide clearance around the reduced stem portion 45 for free discharge of the liquid contaminants when the device is in an inoperative position, as hereinafter described. The bore 56 of the nipple is internally threaded for connection to a pipe for conveying away the liquid separated from the system. If desired, however, the entire nipple portion 54 may be omitted so that the collected liquid, when discharged by the device, may be discharged freely directly onto the floor, or into a receptacle.

The inlet and outlet openings 20 and 22 of the body of the device are threaded for the reception of threaded ends of pipe of the system in which the device is to be connected. Once the device is connected in the piping of a system, it need not be disconnected for purposes of servicing of the device, or replacement of any parts thereof.

When compressed air flows through the device, pres-

3

sure builds up in the chamber 12, and the pressure above the piston drops, thereby permitting the piston to move upwardly against the pressure of the spring 18, to the position seen in Figure 2 of the drawing, thereby permitting the compressed air to flow from the chamber 12, through the outlet opening 22, to the tool, machine or apparatus being operated by compressed air. During the time compressed air is flowing through the device, liquid contaminants are caused to collect in the sump portion of the bottom member 11. In this condition of the device, the moisture loading port 48 is in registry with the sump portion of the bottom member 11, so that liquid is permitted to flow through the port 48, into the cavity or chamber 44 of the stem 42. When the flow of air through the system is discontinued, the spring 18 moves the piston and stem in a downward direction to the position seen in Figure 1 of the drawings, where the shoulder 46 of the stem seats against the top of the sealing member 50. Such movement of the piston and stem, by the spring 18, results from equalization of the pressure, at opposite sides of the piston, by flow of air through vent 24 in the piston. In this position of adjustment of the piston and stem, the loading and discharge port 48 of the stem registers within the bore 56, of the nipple 54, so that all liquid contained within the cavity 44 is permitted to be freely discharged.

Since devices of the type embodying the present invention are essentially used in connection with apparatus of the intermittently operated type, it will be apparent that each time the flow of air through the device is discontinued, the liquid contained in the cavity 44 of the stem is dumped or discharged, thereby continuously removing liquid contaminants from the system.

The device embodying the present invention is adapted for use in systems of various pressures, and the device herein illustrated will perform satisfactorily in systems wherein the pressure ranges vary from 10 to 250 p.s.i. The device requires no adjustments, and automatically compensates at any pressure range.

While in the claims reference is made to the device as being usable in connection with compressed air lines, it is contemplated that such language be given a broad interpretation as being applicable to any system for handling fluids, such as steam.

Although I have herein shown and described certain preferred embodiments of my invention, manifestly it is capable of further modification and rearrangement without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise embodiment herein disclosed, except as I may be so limited by the appended claims.

I claim:

1. In a moisture extractor for a compressed air line comprising, a unitary body of inverted, cup shaped form, having a downwardly open chamber, and a piston bore at the upper end thereof, a piston movably mounted in said bore, a fluid inlet opening in said body in communication with the chamber, a fluid outlet in said body in communication with the piston bore and adapted to be placed in communication with the chamber, through said bore, when the piston is in one position of adjustment, said body having a downwardly facing annular shoulder surrounding said bore, an annular screen seated at its upper end against said shoulder, a bottom member detachably connected to the lower end of the body and constituting a closure for the chamber and formed to provide a sump for collecting liquid contaminants, said member being provided with a shoulder for seating against the lower end of the screen for confining it in position, and means operable incident to a reduction in pressure in said chamber for moving the piston in a downward direction, to another position of adjustment, for discharging collected liquid contaminants externally of said chamber.

2. In a moisture extractor for a compressed air line comprising, a housing formed with a chamber therein,

4

and a piston bore opening off of said chamber, a piston movably mounted in the bore, said housing having a fluid inlet opening in communication with the chamber and a fluid outlet opening in communication with the piston bore and adapted to be placed in communication with the chamber, through the bore, when the piston is in one position of adjustment, the bottom of the housing being formed to provide a sump for collecting liquid contaminants, a spring for normally urging the piston to a position to close the communication between the outlet opening and the chamber, and an elongated stem connected at one end to the piston and the other end being mounted for sliding movement in a guide opening in the bottom of the housing, said stem having a liquid receiving cavity therein and a port in open communication with the cavity, said port being so located as to be positioned externally of said guide opening, when the piston is in a normal inoperative position, and above the guide opening, in registration with the sump when the piston is in an operative position, providing communication between the outlet opening and the chamber.

3. In a moisture extractor for a compressed air line comprising, a housing formed with a chamber therein, and a piston bore opening off of said chamber, a piston movably mounted in the bore, said housing having a fluid inlet opening in communication with the chamber and a fluid outlet opening in communication with the piston bore and adapted to be placed in communication with the chamber, through the bore, when the piston is in one position of adjustment, the bottom of the housing being formed to provide a sump for collecting liquid contaminants, a spring for normally urging the piston to a position to close the communication between the outlet opening and the chamber, and an elongated stem connected at one end to the piston and the other end being mounted for sliding movement in a guide opening in the bottom of the housing, said stem having a liquid receiving cavity therein and a port in open communication with the cavity, said port being so located as to be positioned externally of said guide opening, when the piston is in a normal inoperative position, and above the guide opening, in registration with the sump when the piston is in an operative position, providing communication between the outlet opening and the chamber, and a fluid seal positioned in the guide opening and surrounding said stem.

4. In a moisture extractor for a compressed air line comprising, a housing formed with a chamber therein, and a piston bore opening off of said chamber, a piston movably mounted in the bore, said housing having a fluid inlet opening in communication with the chamber and a fluid outlet opening in communication with the piston bore and adapted to be placed in communication with the chamber, through the bore, when the piston is in one position of adjustment, the bottom of the housing being formed to provide a sump for collecting liquid contaminants, a spring for normally urging the piston to a position to close the communication between the outlet opening and the chamber, an elongated stem connected at one end to the piston and the other end being mounted for sliding movement in a guide opening in the bottom of the housing, said stem having a liquid receiving cavity therein and a port in open communication with the cavity, said port being so located as to be positioned externally of said guide opening, when the piston is in a normal inoperative position, and above the guide opening, in registration with the sump when the piston is in an operative position, providing communication between the outlet opening and the chamber, and a fluid seal assembly press fitted in the bottom of the housing, around the guide opening and including a resilient O-ring surrounding said stem.

5. In a moisture extractor for a compressed air line comprising, a housing formed with a chamber therein and a piston bore opening off of said chamber, a piston

5

movably mounted in the bore, said housing having a fluid inlet opening in communication with the chamber and a fluid outlet opening in communication with the piston bore and adapted to be placed in communication with the chamber, through the bore, when the piston is in one position of adjustment, the bottom of the housing being formed to provide a sump for collecting liquid contaminants, a spring for normally urging the piston to a position to close the communication between the outlet opening and the chamber, and an elongated hollow stem threaded at its upper end into the bottom of the piston and the other being reduced in cross-section and mounted for sliding movement in a guide opening in the bottom of the housing, said reduced portion providing a shoulder adapted to abut the bottom of the sump wall to limit downward movement of the piston, said reduced portion of the stem having a port in open communication with the cavity in the stem, said port being so located as to be

6

positioned externally of said guide opening, when the piston is in a normal inoperative position, and above the guide opening, in registration with the sump when the piston is in an operative position, providing communication between the outlet opening and the chamber.

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