Aug. 22, 1939. E. E. HEWITT 2,170,074

AIR FILTER

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Fig. 1

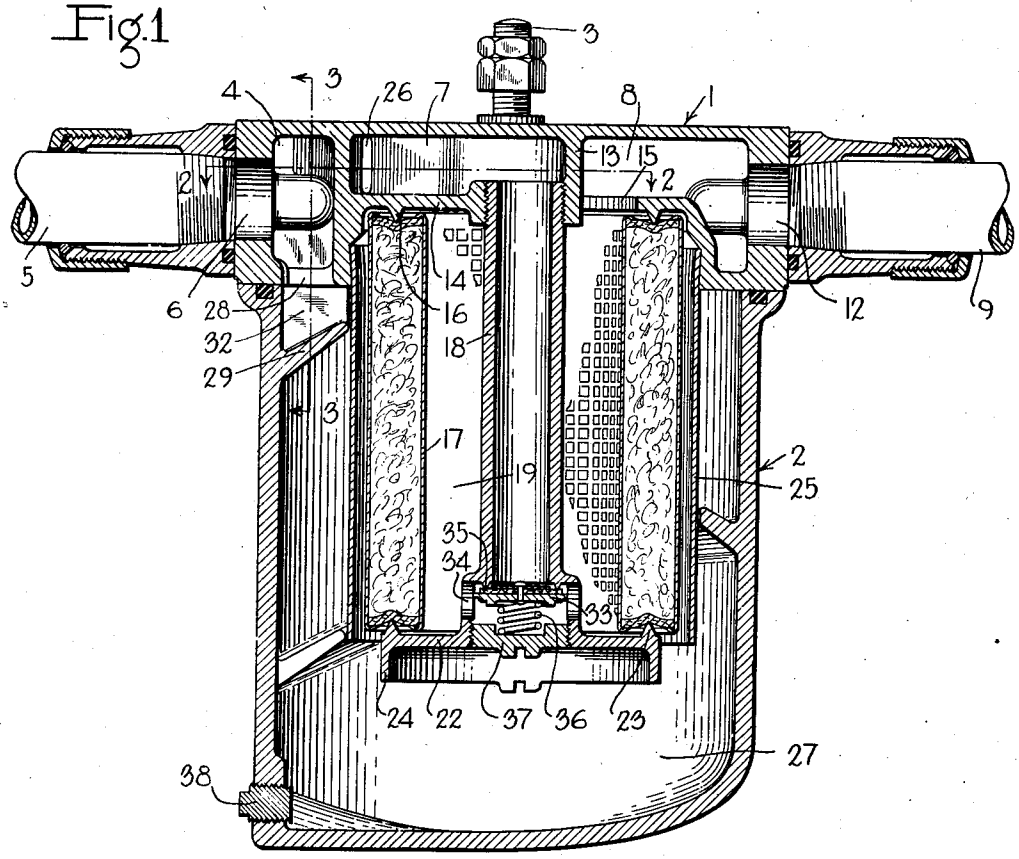


Fig. 2

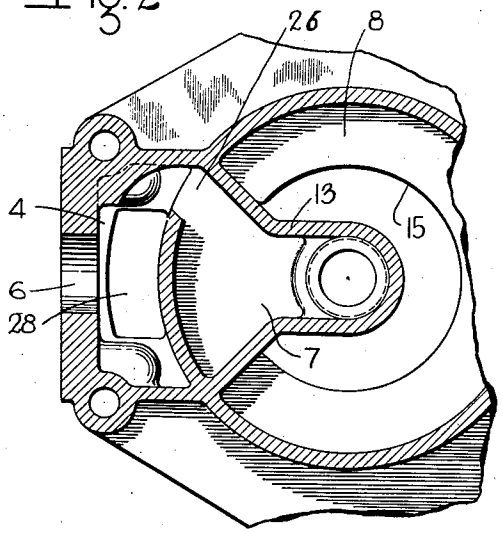
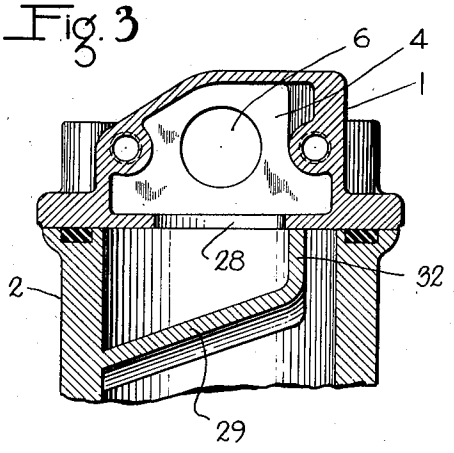


Fig. 3



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Fig. 4

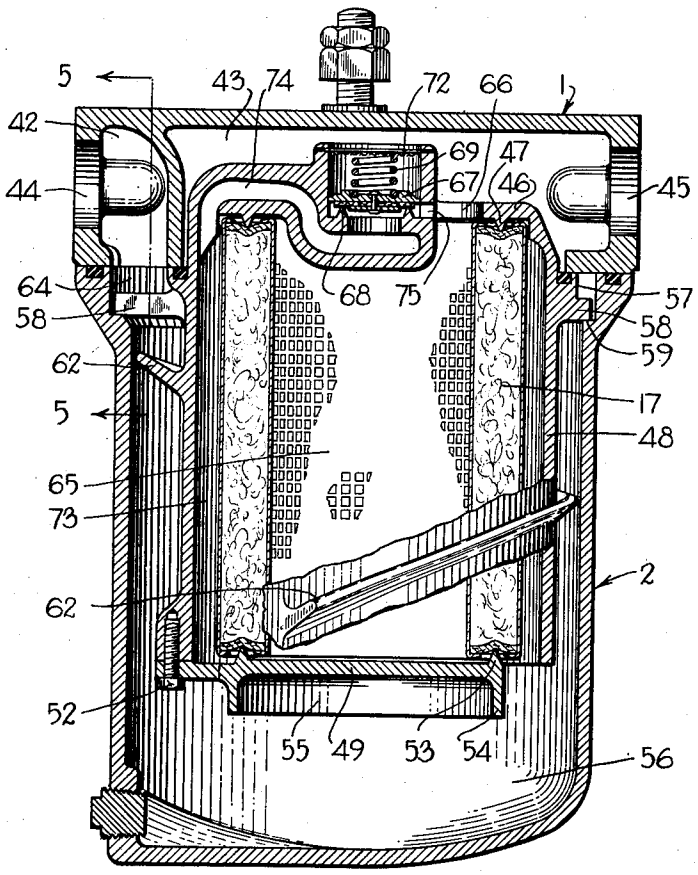
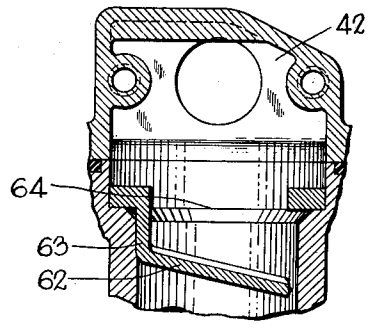


Fig. 5



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UNITED STATES PATENT OFFICE

2,170,074

AIR FILTER

Ellis E. Hewitt, Edgewood, Pa., assignor to Westinghouse Air Brake Company, Wilmerding, Pa., a corporation of Pennsylvania

Application October 15, 1936, Serial No. 105,660

9 Claims. (Cl. 183—49)

My invention relates to an improvement in air filters or cleaning devices of the type adapted to be used in the pipe line of fluid pressure brake systems for collecting dirt and moisture from the fluid passing therethrough. My air filter and dirt collector is particularly adapted for use in the pipe line connection between the main reservoir and the feed valve device.

An object of my invention is the provision of an air strainer or cleaning device for fluid pressure systems for collecting dirt and moisture from the air or fluid passing therethrough.

Another object of my invention is the provision of a strainer or cleaning device having an elongated spiral path for the fluid passing therethrough.

A further object of my invention is the provision of a strainer or cleaning device having a dirt collecting chamber for collecting dirt and moisture provided with an expansion chamber that will permit the expansion of ice formed therein without crushing the strainer holding mechanism.

Other objects and advantages of my invention will be apparent from the following description of certain preferred embodiments thereof, reference being had to the accompanying drawings, in which,

Fig. 1 is a vertical sectional view through one preferred embodiment of the invention,

Fig. 2 is a sectional view taken along the line 2—2 in Fig. 1,

Fig. 3 is a sectional view taken along the line 3—3 in Fig. 1,

Fig. 4 is a vertical sectional view of another embodiment of the invention, and

Fig. 5 is a sectional view along the line 5—5 in Fig. 4.

Referring to the drawings and particularly to Figs. 1, 2 and 3 thereof, the air filter comprises a bracket portion 1 and a body portion 2 depending and supported therefrom by suitable means, not shown. A bolt 3 is provided on the bracket portion for mounting it on the car body. The bracket portion comprises a casing providing an inlet chamber 4 that is in constant open communication with an inlet pipe 5 through an opening 6; a central chamber 7 that is in constant communication with the inlet chamber 4; and an outlet chamber 8 that is in constant open communication with an outlet pipe 9 through an opening 12. The chambers 7 and 8 are separated by a vertical wall 13, and a horizontal wall 14 is provided as the lower boundary of the chamber 7, a portion of which also extends under the chamber 8 to provide an annular strainer support 15 that is provided on its under side with a bead 16 for engaging the upper end of a cylindrical curled hair strainer 17. A tubular member 18 extends downwardly from an opening in the wall 14 to effect communication between the central chamber 7 and a chamber 19 formed within the boundary of the cylindrical strainer 17, while the lower end of the tubular member 18 has secured thereon a lower strainer support 22 having an upwardly extending annular bead 23 for engaging the lower end of the cylindrical strainer 17. An annular wall 24 is provided on the outer circumference of the strainer support 22 extending downwardly into the dirt collecting chamber 27 at the bottom of the body portion 2 of the air filter device.

An annular shield 25 extends downwardly from the bracket portion 1 into the body portion 2, the shield surrounding, and being spaced from the cylindrical strainer 17, and terminating substantially at the bottom of the strainer 17.

The inlet chamber 4 is in constant open communication with the central chamber 7 through a passageway 26, and is in constant open communication with the dirt and moisture collecting chamber 27 through a passageway 28 and an annular space surrounding the shield 25.

A spiral ledge 29 extends inwardly from the casing of the body portion 2 adjacent the shield 25, the upper end of which terminates in a vertical wall 32 that is fitted against the under side of the bracket portion 1. The ledge provides a spiral passageway for the flow of fluid under pressure from the inlet chamber 4 to the dirt collecting chamber 27.

A check valve 33 is provided at the lower end of the tube 18 for controlling communication between the central chamber 7 and the chamber 19 within the cylindrical strainer 17 and with the pipe 9 through the outlet chamber 8. The check valve 33 is adapted to engage a rib seat 35 on the lower end of the tubular member 18 and is urged against its seat by a spring 36, the upper end of which engages the valve 33 and the lower end of which is positioned within a bore in a nut 37 that is screw threaded within a bore in the central portion of the strainer support 22.

When fluid under pressure enters the air filter device through the inlet pipe 5, it normally passes through the inlet chamber 4 downwardly along the spiral path effected by the spiral ledge 29 about the shield 25 into the dirt collecting chamber 27 in the lower part of the body portion 2, the spiral ledge increasing the length of travel

of the fluid under pressure and therefore increasing the opportunity for the condensation of moisture in the fluid, to more effectively remove moisture and dirt from the fluid as it passes downwardly into the chamber 27. From the dirt collecting chamber 27 the fluid under pressure passes upwardly within the shield 25, between the shield and the cylindrical strainer 17, through the strainer into the central chamber 19, and upwardly to the outlet chamber 8 and thence to the pipe 9.

If, for any reason, the strainer 17 becomes clogged with dirt to such an extent that the differential pressure between the inlet chamber 4 and the central chamber 19 increases above a predetermined amount, the check valve 33 will be forced downwardly from its rib seat 35, thus permitting the direct flow of fluid under pressure from the pipe 5 through the chambers 4 and 7 down the passage within the tubular member 18, past the unseated check valve 33 and through ports 34, chambers 19 and 8 to the pipe 9.

A plug 38 is provided in the lower part of the casing 2 through which moisture may be withdrawn from the dirt collecting chamber 25. Should the moisture collected therein become sufficient to rise to the lower edge of the annular rib 24 extending downwardly from the lower strainer support 22, the air pocket within the inverted bell formed by the strainer support 22 and the downwardly extending annular rim 24 prevents the moisture from rising directly against the support 22 so that, should the moisture freeze, room for the expansion of ice is provided with this cupped or bell shaped structure without damage to the support 22.

Dirt may be most effectively removed from the dirt chamber 25 within the body portion 2 by detaching the body portion from the bracket portion and sliding the body portion downwardly about the shield 25, after which it may be readily cleaned.

The cylindrical strainer 17 may be of any suitable construction such, for example, as that disclosed and claimed in the copending application of Clyde C. Farmer for Air strainers, Serial No. 85,519 filed June 16, 1936, and assigned to the same assignee as this application.

Referring to Figs. 4 and 5, the embodiment therein illustrated comprises a bracket portion 1 and body portion 2 that are in general similar to the bracket and body portions of the device illustrated in Figs. 1, 2 and 3, the bracket portion having an inlet chamber 42 and an outlet chamber 43 that communicate respectively through openings 44 and 45 with the inlet and outlet pipes of the pipe line. The upper strainer support 46, having an annular rib 47 for engaging the upper end of the strainer 17, is formed integral with a shield 48 that is spaced from, and extends downwardly about the cylindrical strainer 17 to substantially the lower end thereof, and to the lower end of which is attached a lower strainer support 49 by means such as screws or bolts 52, one of which is shown in the drawings. The lower strainer support 49 is provided with an upwardly extending annular rib 53 for engaging the lower end of the cylindrical strainer 17, and with a flange 54 that extends downwardly from the periphery of the disc-shaped support 49 to form a cupped air chamber 55 above the dirt collecting chamber 56 to prevent the formation of ice in the chamber 56 that might rest solidly against the support 49, should water in the chamber 56 from the condensed moisture passing through the device be sufficient to bring the liquid level to the elevation of the support 49.

A shoulder 57 is provided on the upper portion of the shield 48 that is adapted to engage the under side of the bracket portion 1, and an annular lug or flange 58 is provided on the shield that is adapted to engage a shoulder 59 on the body portion 2 for supporting a shield 48 rigidly in place when the body portion 2 and the bracket portion 1 are secured together by means, not shown.

A spiral ledge 62 is provided on the shield 48 extending outwardly therefrom toward the body portion 2 and having an end wall 63 at the upper end thereof to provide a spiral passageway from the inlet chamber 42 in the bracket portion 1 to the dirt collecting chamber 56 in the lower portion of the casing 2, fluid under pressure passing from the inlet chamber 42 through passageway 64 as guided by the spiral ledge 62 to the dirt collecting chamber 56, and therefrom upwardly within the cylindrical shield 48 about the cylindrical strainer 17, through the strainer 17 to the space 65 enclosed by the strainer, and through the annular opening 66 to the outlet chamber 43.

A check valve 67 is provided in the upper part of the shield 48 for controlling communication between the dirt collecting chamber 56 and the outlet chamber 43 should the strainer 17 become clogged. The check valve 67 is adapted to engage a rib seat 68 against which it is urged by spring 69, the lower end of which engages the check valve 67 and the upper end of which engages a strainer 72. The check valve 67 controls communication from the dirt collecting chamber 56 to the outlet chamber 43 through the annular space 73 between the shield 48 and the strainer 17, through passage 74 past the unseated check valve 67, and through passage 75 to the outlet chamber 43.

It will be noted that, in the form of the invention illustrated in Figs. 4 and 5, the check valve is at a higher elevation than in the form of the invention illustrated in Figs. 1, 2 and 3, this having the advantage that should moisture collect in the dirt chamber 56 at the lower part of the body portion 2 sufficiently that the water level rise above the lower part of the cylindrical strainer 17 and then freeze, the check valve would be less likely to be frozen shut.

It will be noted in the form of the invention illustrated in Figs. 4 and 5 that, upon removal of the body portion 2 from the support or bracket portion 1, the cylindrical strainer 17 and the check valve device supported directly on the shield 48 are removed also. The strainer 17 may be readily removed from the shield 48 for cleaning by removal of the lower support 49 that is attached to the shield 48 by the screws 52.

Many modifications in the structures illustrated and described may be made within the spirit of my invention, and I do not wish to be limited otherwise than by the scope of the appended claims.

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

1. In an air strainer device for fluid pressure systems, in combination, a cylindrical casing having a dirt and moisture collecting chamber therein, a strainer therein having a central duct and positioned vertically above said chamber in the path of fluid flowing from said chamber and adapted to permit the flow of fluid radially in-

wardly therethrough, supporting means for the lower end of said strainer comprising a cup member having a downwardly extending outer rim forming an air pocket to prevent liquid in said chamber from rising into direct contact with said supporting member.

2. In an air straining device for fluid pressure systems, in combination, a cylindrical casing having a dirt and moisture collecting chamber therein, a strainer therein having a central duct and positioned vertically above said chamber in the path of fluid flowing from said chamber and adapted to permit the flow of fluid radially inwardly therethrough, supporting means for the lower end of said strainer comprising a cup member having a downwardly extending outer rim forming an air pocket to prevent liquid in said chamber from rising into direct contact with said supporting member, a cylindrical shield about said strainer spaced therefrom and from said casing for directing the flow of fluid from said chamber to said strainer, and means for directing the incoming fluid spirally about said shield.

3. In combination, an air straining device for fluid pressure systems comprising a bracket portion having an inlet chamber and an outlet chamber therein, and a cylindrical body portion depending therefrom and having a dirt and moisture collecting chamber in the lower portion thereof, a hollow cylindrical strainer positioned within said body portion above said dirt collecting chamber in the path of fluid flowing from said dirt collecting chamber to said outlet chamber and adapted to permit the flow of fluid radially therethrough, an annular shield extending downwardly from said bracket portion about said strainer and spaced therefrom and from the casing of the body portion, and a spiral ledge extending inwardly from the casing of said body portion toward said shield to effect a spiral movement of fluid flowing from said inlet chamber to said dirt collecting chamber.

4. In an air straining device for fluid pressure systems, in combination, a body portion having an inlet chamber and an outlet chamber and a body portion extending therefrom and having a dirt collecting chamber in the lower part thereof, a hollow cylindrical strainer therein positioned vertically above said dirt collecting chamber in the path of fluid flowing from said dirt collecting chamber to said outlet chamber and permitting the flow of fluid radially inwardly therethrough, supporting means for the lower end of said strainer comprising a tubular member extending downwardly from said bracket portion and provided with a partition for dividing the space within said hollow strainer from the dirt collecting chamber and having an annular rib for engaging the lower end of said strainer, a cylindrical shield extending downwardly from said bracket portion about said strainer adjacent the lower end thereof, said shield being spaced from said strainer and from the casing of said body portion, and a spiral ledge extending inwardly from the casing of the body portion adjacent said shield for effecting a spiral movement of fluid flowing from said inlet chamber downwardly to said dirt collecting chamber.

5. In combination, an air straining device for fluid pressure systems comprising a bracket portion having an inlet chamber and an outlet chamber therein, a body portion depending from said bracket portion and comprising a cylindrical casing having a dirt collecting chamber in the lower portion thereof, a hollow cylindrical strainer positioned vertically within said body portion in the path of fluid flowing from the dirt collecting chamber to said outlet chamber and adapted to permit the flow of fluid radially inwardly therethrough, a cylindrical shield supported from said body portion surrounding and spaced from said strainer and from the casing of said body portion, and a strainer supporting member supported from said shield for supporting the strainer and for closing direct communication between the dirt collecting chamber and the space within said strainer, said shield being provided with a spiral ledge extending outwardly therefrom and terminating adjacent the casing of said body portion to provide a spiral path for fluid passing from said inlet chamber to said dirt collecting chamber.

6. An air straining device comprising, in combination, a bracket portion having an inlet chamber and an outlet chamber therein, a cylindrical body portion depending from said bracket portion and having a dirt and moisture collecting chamber in the lower portion thereof, a hollow cylindrical strainer positioned within said body portion above said dirt collecting chamber in the path of fluid flowing from said dirt collecting chamber to said outlet chamber and adapted to permit the flow of fluid radially inwardly therethrough, an annular shield extending downwardly from the bracket portion and surrounding said strainer, said shield being spaced from said strainer and also being spaced from the cylindrical wall of said body portion, and means positioned between said shield and the wall of said body portion and cooperating therewith to form a spiral passageway through which fluid flows from the inlet chamber to said dirt and moisture collecting chamber.

7. An air straining device comprising a bracket portion having an inlet chamber and an outlet chamber therein, a cylindrical body portion detachably secured to said bracket portion and having a dirt collecting chamber in the lower portion thereof, a cylindrical shield clamped between said bracket and body portions and extending into said dirt collecting chamber, said shield being spaced from the cylindrical wall of said body portion, means positioned in the space between said shield and the cylindrical wall of said body portion and cooperating therewith to form a spiral passageway through which fluid flows from the inlet chamber to said dirt collecting chamber, a hollow cylindrical strainer mounted within said shield and carried thereby, said strainer being positioned in the path of fluid flowing from said dirt collecting chamber to said outlet chamber and being adapted to permit the flow of fluid radially inwardly therethrough.

8. An air straining device comprising a bracket portion having an inlet chamber and an outlet chamber therein, a cylindrical body portion detachably secured to said bracket portion and having a dirt collecting chamber in the lower portion thereof, a cylindrical shield clamped between said bracket and body portions and extending into said dirt collecting chamber, said shield being spaced from the cylindrical wall of said body portion, means positioned in the space between said shield and the cylindrical wall of said body portion and cooperating therewith to form a spiral passageway through which fluid flows from the inlet chamber to said dirt collecting chamber, and air straining means mounted within said shield and carried thereby, said air straining means being positioned in the path

of fluid flowing from said dirt collecting chamber to said outlet chamber.

9. In combination, an air straining device for fluid pressure systems comprising a bracket portion having an inlet chamber and an outlet chamber therein, a cylindrical body portion depending from said bracket portion and having a dirt and moisture collecting chamber in the lower portion thereof, a hollow cylindrical strainer positioned within said body portion above said dirt collecting chamber in the path of fluid flowing from said dirt collecting chamber to said outlet chamber and adapted to permit the flow of fluid radially therethrough, an annular shield extending downwardly from said bracket portion about said strainer and spaced therefrom and from the casing of the body portion, said shield having formed thereon a spiral ledge extending outwardly therefrom and terminating adjacent the wall of said cylindrical body portion and cooperating therewith to form a spiral passageway through which fluid flows from the inlet chamber to said dirt and moisture collecting chamber.

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