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J. L. SWIFT ETAL

3,042,079

ADJUSTABLE VENT

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FIG. 1

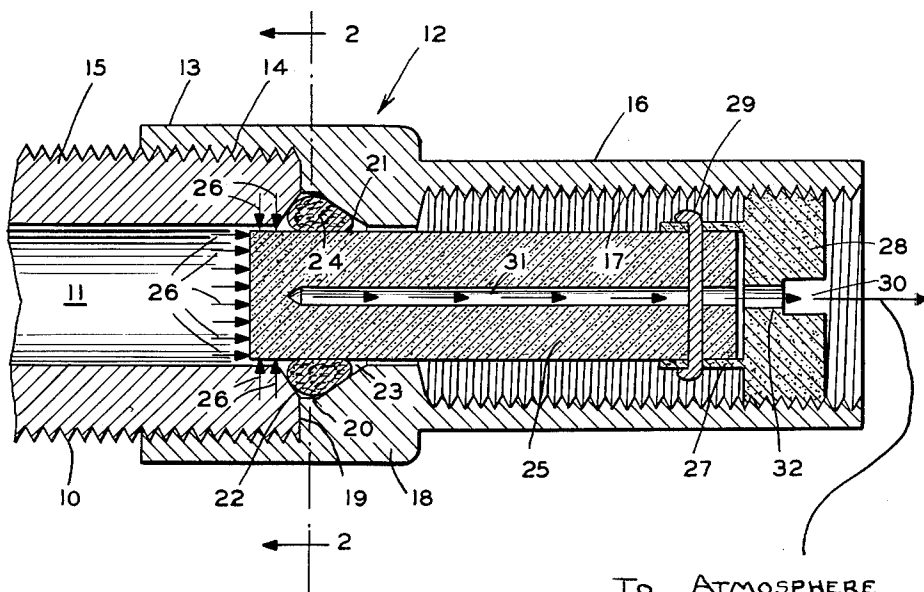
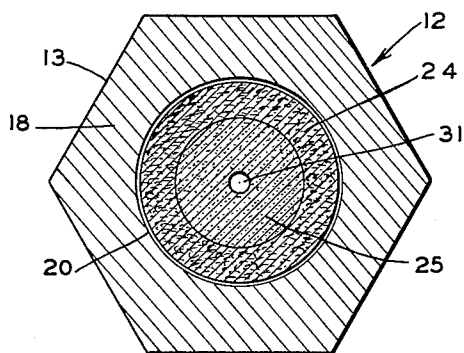


FIG. 2



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ADJUSTABLE VENT

James L. Swift and Francis C. Evans, Staten Island, N.Y., assignors to American District Telegraph Company, Jersey City, N.J., a corporation of New Jersey
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The present invention relates to adjustable vents and more particularly to adjustable vents for pressure systems in which the rate of venting should be adjustable.

The greatest utility of the present invention is in connection with automatic fire alarm systems employing pneumatic, rate-of-rise heat detection systems of the line type, and accordingly will be described in connection with such systems. These systems usually employ as a heat sensitive element a continuous length of copper tubing which may be up to about 1000 feet in length. The tubing is installed on or adjacent to the ceiling of the premises to be protected and each end of the tubing circuit is connected to a four-way valve assembly in a detector unit. Each valve assembly contains a flexible metallic diaphragm and a pressure vent. The pressure vent serves normally to maintain the air pressure in the tubing circuit at atmospheric pressure. However, the vent is relatively slow in action so that a rapid increase in surrounding air temperature, such as is caused by a fire, produces a pressure increase within the tubing circuit which is too great to be dissipated promptly by the vent. This increased pressure distends the diaphragm to close an electrical contact in an associated electrical circuit to initiate a fire alarm signal. Relatively small changes in air temperature cause a gradual increase or decrease in pressure within the tubing. The vent exhausts air from the tubing circuit or admits air thereto to maintain normal atmospheric pressure in the tubing circuit despite such small changes in temperature.

The venting rate is adjusted so that normal temperature increases in the protected premises will not result in a sufficient pressure increase to initiate an alarm, while the rapid temperature increase resulting from a fire will initiate an alarm. It will be evident that the venting rate must be adjusted individually for every installation because of differences in what constitute normal or non-alarm temperature change conditions. Moreover, the venting rate for any particular installation may have to be varied from time to time, for example, upon a change in the heating system.

In vents heretofore used, porous carbon rods have been provided to vent the pressure system to the atmosphere. However, it has been difficult to adjust the vents heretofore used.

A principal object of the invention has been the provision of a novel and improved adjustable rate vent for pressure systems.

More particularly it has been an object of the invention to provide a novel and improved vent for pressure systems in which the venting rate is easily adjustable.

Another object of the invention has been to provide a novel and improved vent for pressure systems in which the venting rate is adjustable without disassembly of the vent.

Other and further objects, features and advantages of the invention will appear more fully from the following description.

The adjustable rate vent of the invention comprises a threaded nipple-like element communicating with the pressure system, a generally cylindrical hollow body member having a first portion with internal threads in threaded engagement with the nipple-like element and having a second portion with internal threads, the hollow centers of the nipple-like element and the body member being coaxial

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and communicating with each other, a porous carbon rod and a disc member having external threads in threaded engagement with the internal threads of the second portion of the body member. Means are provided to interconnect rigidly one end of the rod and the disc member whereby the disc member supports the rod coaxially within the body member and with the other end of the rod projecting into the nipple-like element, rotation of the disc member changing the axial position of the rod relative to the body member whereby the extent of projection of the rod into the nipple-like element is changed. The body member and the nipple-like element have adjacent but spaced surfaces forming an annular chamber. A washer element is located partially within the chamber and is arranged to be in sealing contact with the spaced surfaces and with the surface of the rod, contact between the washer element and the spaced surfaces preventing axial movement of the washer element as the rod is moved in an axial direction.

The invention will now be described in greater detail with reference to the appended drawing in which:

FIG. 1 is a longitudinal sectional view of an adjustable vent constructed in accordance with the invention; and

FIG. 2 is a sectional view taken along the line 2-2 of FIG. 1.

In the drawings, the element 10 is a nipple-like element or boss projecting from the valve body of a pneumatic rate-of-rise fire detection system. The hollow space 11 within the nipple 10 communicates with the pneumatic tubing of the fire detection system so that the space 11 contains air at the same pressure as the pneumatic tubing. A hollow generally cylindrical body member 12 has an end portion 13 with internal threads 14 in threaded engagement with the threads 15 of the nipple 10. As shown in FIG. 2, the exterior of the portion 13 may be made hexagonal in shape to facilitate tightening of the threads 14 and 15. The term "generally cylindrical" as applied to the portion 13, is intended to include such an external shape. The body member 12 has another cylindrical end portion 16 provided with internal threads 17. A cylindrical central portion 18 of the body member 12 has a vertical surface 19 arranged to contact the end of the nipple 10, a horizontal surface 20, and a diagonal surface 21. The inner corner of the nipple 10 is beveled to provide a diagonal surface 22.

The surfaces 20, 21 and 22 define an annular chamber 23. A sealing washer, in this case an O ring seal 24, is disposed partially within the chamber 23. The washer 24 affords an air-tight sealing contact between the nipple 10, the body member 12, and the surface of a porous carbon rod 25.

One end of the carbon rod 25 extends into the interior 11 of the nipple 10. The diameter of the rod 25 is less than the internal diameter of the nipple 10 so that both the end of the rod 25 and the peripheral portion thereof extending beyond the washer 24 are exposed to the pressure in the pressure system, as illustrated by the arrows 26. The other end of the rod 25 is supported in a cylindrical socket formed by a cylindrical flange 27 which extends axially from a disc 28. The disc 28 may be made of carbon and may, if desired, be formed integrally with the rod 25. The disc 28 is provided with threads adapted to engage the internal threads of the portion 16 of the body member 12.

The rod 25 and the flange 27 are provided with aligned radial holes which accommodate a pin 29. The pin 29 acts to prevent relative axial or angular motion of the rod 25 and the disc 28. Thus, when the disc 28 is rotated relative to the body member 12, the rod 25 rotates with the disc 28. Because of the threaded engagement between the disc 28 and the portion 16 of the body member

12, rotation of the disc 28 causes axial motion of the disc 28 and the rod 25, the direction of axial movement depending on the direction of rotation. The disc 28 is provided with a slot 30 adapted to receive a screwdriver for facilitating rotation of the disc 28.

The rod 25 is provided with a central axial hole 31 which extends from a point adjacent but spaced from the left end thereof (in FIG. 1) to the right end thereof. The hole 31 communicates with a central axial hole 32 in the disc 28, which in turn communicates with the slot 30.

That portion of the porous carbon rod 25 between the central hole 31 and the space 11 serves to provide communication between the pressure system and a pressure sink or reservoir, in this case the atmosphere outside of the body member 12. Thus, if air pressure within the space 11 exceeds atmospheric pressure, air from the space 11 will diffuse through the carbon in the rod 25 and be discharged to the atmosphere through the hole 31, the hole 32 and the slot 30. Should the air pressure within the space 11 fall below atmospheric pressure, air will follow a reverse path into the space 11.

It will be evident that the porous carbon rod in the path of air flow retards the flow. The rate of air flow will be dependent upon the surface area of the carbon rod which is in contact with the air in the space 11 since the greater this surface area the greater will be the quantity of pores in the carbon rod through which the air may flow. Thus, by inserting a screwdriver in the slot 30 and rotating the disc 28 and the rod 25 in a direction to move the rod to the left in FIG. 1, the surface area of the carbon rod 25 in communication with the space 11 is increased. This in turn increases the rate of venting. Rotation of the disc 28 and the rod 25 in the opposite direction will cause the rod 25 to move to the right in FIG. 1, decreasing the surface area in communication with the space 11. This in turn decreases the rate of venting.

Contact of the sealing washer 24 with the surfaces 21 and 22 and with the surface of the rod 25 prevents communication between the space 11 and the atmosphere except through the porous carbon rod 25. The sealing washer 24 is prevented from moving axially, as the rod 25 moves, by being disposed partially within the annular chamber 23. The contact of the sealing member 24 with the walls of the chamber 23, i.e., the surfaces 21 and 22, is preferably sufficiently tight to prevent rotation of the washer 24 as the rod 25 is rotated.

In operation, the rod 25 is adjusted to some intermediate axial position, such as the one shown in FIG. 1. The venting rate is then measured and the axial position of the rod is again adjusted, if this be necessary, to attain the desired venting rate. The venting rate may be measured by pumping a few ounces of pressure on the pressure side of the vent, i.e., within the space 11, and then measuring the time required for the pressure to drop to normal. In one embodiment of the invention, the testing pressure was 1.2 oz. per sq. in. and the normal time for the pressure to fall to 0.925 oz. per sq. in. was 35 seconds.

While the invention has been described in connection with specific embodiments thereof and in a specific use, various modifications thereof will occur to those skilled in the art without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. In an externally adjustable rate vent for a low pressure pneumatic system, the combination comprising a threaded nipple-like element communicating with said pressure system, a generally cylindrical hollow body member having a first portion with internal threads in threaded engagement with said nipple-like element and having a second portion with internal threads, the hollow centers of said nipple-like element and said body member being in axial alignment, a porous carbon rod communicating at one end thereof with ambient atmosphere, a disc member having external threads in threaded engage-

ment with said internal threads of said second portion of said body member, means to interconnect said rod and said disc member whereby said disc member supports said rod coaxially within said body member and with said one end of said rod projecting into said nipple-like element, rotation by externally applied means of said disc member changing the axial position of said rod relative to said body member whereby the extent of projection of said rod into said nipple-like element is changed, said body member and said nipple-like element having adjacent but spaced internal beveled corner surfaces forming an annular chamber, and a washer element located partially within said chamber and arranged to be in sealing contact with said spaced surfaces and with the surface of said rod, thereby to prevent communication between the inside of said nipple-like element and the inside of said body member except through said porous carbon rod and to control the venting rate of said pressure system proportional to the area of said rod exposed to the pressure of said system, contact between said washer element and said spaced surfaces preventing axial movement of said washer element as said rod is moved in an axial direction.

2. An externally adjustable rate vent for a pneumatic fire detection system, comprising a threaded nipple-like element communicating with said system, a generally cylindrical hollow body member having a first end portion with internal threads in threaded engagement with said nipple-like element and having a second end portion with internal threads, the hollow centers of said nipple-like element and said body member being in axial alignment, a porous carbon rod having a central hole extending from one end thereof to a point adjacent but spaced from the other end thereof, a disc member having external threads in threaded engagement with said internal threads of said second portion of said body member, means including a cylindrical projection on said disc member to interconnect rigidly said rod and said disc member whereby said disc member supports said rod coaxially within said body member and with said other end of said rod projecting into said nipple-like element, rotation of said disc member changing the axial position of said rod relative to said body member whereby the extent of projection of said rod into said nipple-like element is changed, said disc member having a central hole communicating at one end thereof with the central hole in said rod and at the other end with ambient atmosphere, said hole at said other end of said disc member being formed as a slot adapted to be engaged by an externally applied screwdriver to facilitate rotation of said disc member, said body member and said nipple-like element having adjacent but spaced internal beveled corner surfaces forming an annular chamber, and a washer element located partially within said chamber and arranged to be in sealing contact with said spaced surfaces and with the surface of said rod thereby to prevent communication between the interior of said nipple-like element and the ambient atmosphere except through said porous carbon rod and to control the venting rate of said pneumatic fire detection system in proportion to the area of said rod exposed to the pressure within said pneumatic fire detection system, contact between said washer element and said spaced surfaces preventing axial movement of said washer element as said rod is moved in an axial direction.

3. In an externally adjustable rate vent for a low pressure pneumatic system, the combination comprising a threaded nipple-like element communicating at one end thereof with the pressure system to be vented and having an internal beveled corner surface adjacent the other end thereof, a generally cylindrical hollow body member having a first portion at one end thereof adapted for engagement with said element, said one end of said member having an internal beveled corner surface, said member having internal threads at the other end thereof, the axes of said hollow body member and said element being

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aligned so that the hollow portions thereof are in axial alignment and said internal beveled corner surfaces thereof form an annular chamber, a porous rod having an external diameter smaller than the internal diameters of said hollow body member and said element and having an aperture communicating with a pressure reservoir, supporting means for supporting said rod within and in axial alignment with said member and with one end of said rod projecting into said element, said supporting means including a threaded disc portion in threaded engagement with said internal threads whereby rotation by externally applied means of said threaded disc portion changes the axial position of said rod and the extent of projection thereof within said element, and a washer member arranged to provide pressure-tight sealing contact between the adjacent surfaces of said rod and said annular

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chamber whereby communication between the interior of said element and said pressure reservoir occurs solely through said rod, the relative position of said washer on said rod maintaining the venting rate proportional to the surface area of said rod which is exposed to the pressure of the system to be vented.

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