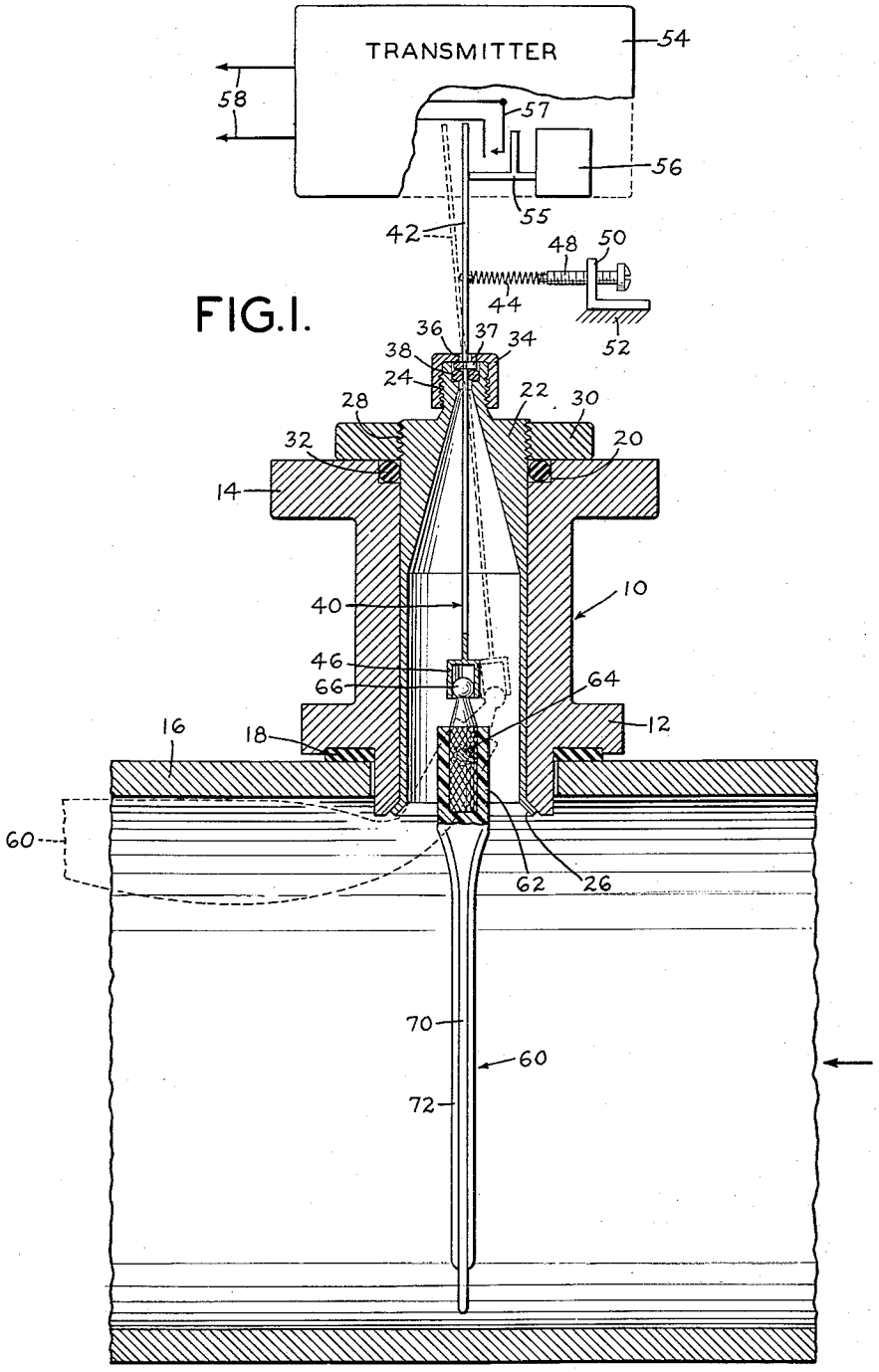
Dec. 27, 1960 A. B. HUBE 2,966,133

WATER FLOW DETECTOR

Filed Dec. 31, 1958 2 Sheets-Sheet 1

FIG. 1.

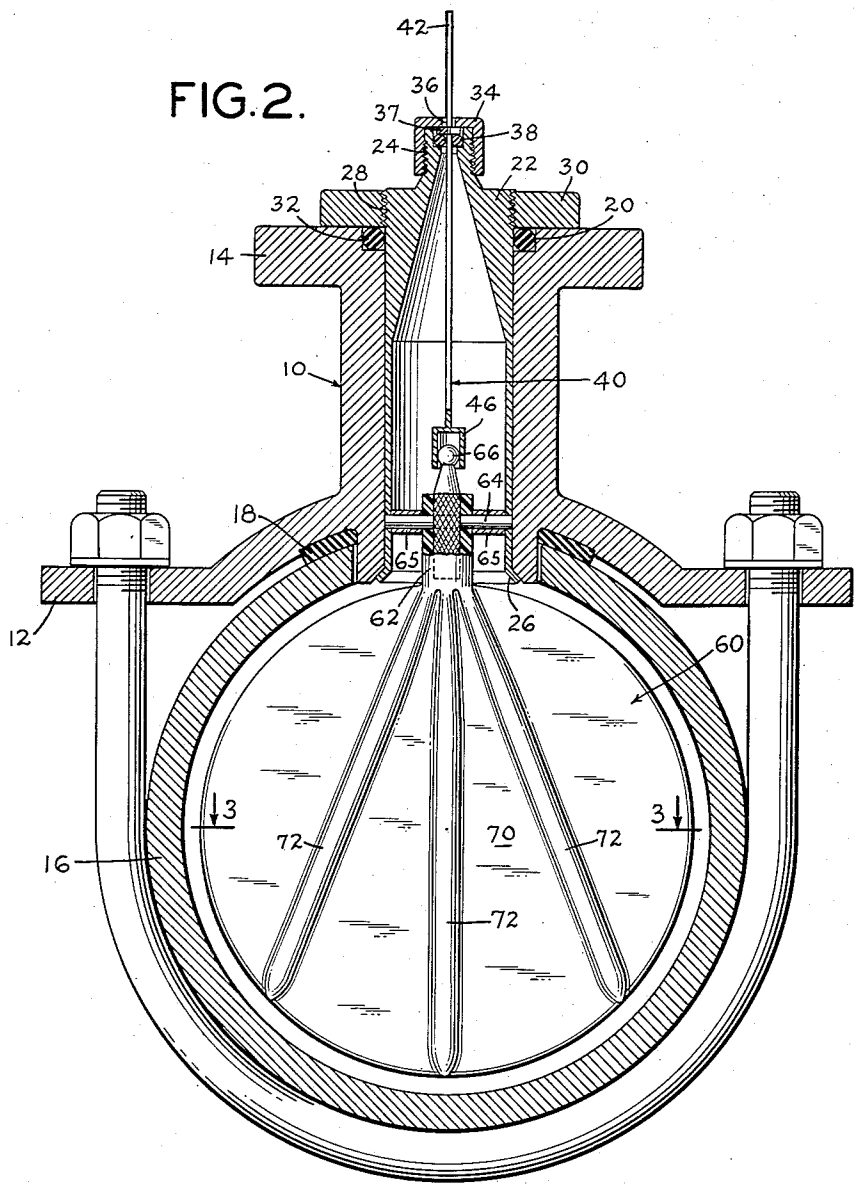


Dec. 27, 1960 A. B. HUBE 2,966,133

WATER FLOW DETECTOR

Filed Dec. 31, 1958 2 Sheets-Sheet 2

FIG.2.



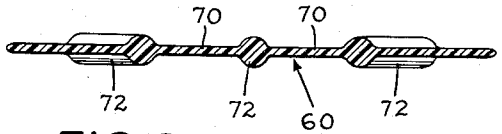


FIG.3.

United States Patent Office 2,966,133 Patented Dec. 27, 1960

2,966,133

WATER FLOW DETECTOR

Arthur B. Hube, Huntington Station, N.Y., assignor to American District Telegraph Company, Jersey City, N.J., a corporation of New Jersey

Filed Dec. 31, 1958, Ser. No. 784,372

5 Claims. (Cl. 116—117)

The present invention relates to a signaling device to detect flow in a fluid conduit system and, more particularly, to a vane mechanism for use in such a signaling device.

In closed fluid systems, such as sprinkler systems used for fire-protection purposes in factories, stores, warehouses, and the like, signaling devices are used to communicate abnormal or emergency conditions to a central office or station. In such a system, fluid conduits or pipes, each provided with a plurality of sprinkler heads spaced at intervals along the fluid conduit, are connected to a pressure fluid supply, each of the sprinkler heads being held in a closed position by a temperature sensitive element. Under normal conditions, the fluid in the conduit is static, that is, there is little, if any, fluid flow.

Each of the sprinkler heads in the system acts independently of the other sprinkler heads and serves as an independent fire extinguisher for that portion of the building its spray will cover. When a fire occurs in the vicinity of a particular sprinkler head, the element on the particular head operates to open the head and allow fluid from the conduit to spray the area to extinguish the fire. This, of course, causes a sudden flow of fluid in the system from the pressure supply source. Once the spray head is opened, the fluid will continue to flow until the head is replaced, or the system is turned off, even after the fire is extinguished.

The type of building usually provided with a sprinkler system is one which is occupied only during a part of the day or in which large areas are unattended. Hence, a signaling device to detect emergency or abnormal conditions in the fluid system, such as those resulting from a fire or a leak in the system, and to communicate such conditions to a central, attended office, is desirable.

One type of signaling device in use in such systems employs a vane pivotally mounted in a fluid conduit of the system, the vane being connected to a transmitter to transmit an electrical impulse to an alarm at a central station when abnormal conditions occur in the system. In order that the vane not impede the fluid flow through the system when a sprinkler head is opened and, at the same time, to maintain the vane in a plane perpendicular to the fluid path when the sprinkler heads are closed, such vanes have been provided with a hinged joint, the hinged joint being biased by a spring or other metallic means to maintain the vane perpendicular to the fluid conduit when the fluid in the system is static but allowing the vane to be pivoted out of the fluid path when abnormal flow occurs. Because of prolonged exposure to fluid such metallic means are subject to corrosion, and the like, require frequent inspections and have not been completely satisfactory.

It is the object of the present invention to provide an improved vane for installation in a fluid flow system as a fluid flow detector for use with a signaling system.

It is a further object of the invention to provide a vane for use with such a device which will render the device responsive to abnormal flow conditions, such as those caused by a fire or leak, without substantially impeding the fluid flow.

A further object of the invention is to provide a vane for use with such a device which may be readily installed and removed.

A still further object is to provide a vane which will automatically reset itself for subsequent operation after abnormal fluid flow has abated.

Other and further objects, features and advantages of the invention will appear more fully from the following description and the accompanying drawings in which:

Fig. 1 is a side view, partly in section, of a vane mechanism in accordance with the present invention for use in a signaling device;

Fig. 2 is a front elevational view, partly in section, of the device of Fig. 1;

Fig. 3 is a fragmentary view of the vane in section on the line 3—3 of Fig. 2.

Referring now to Figs. 1 and 2, a housing **10**, having a lower flange **12** and an upper flange **14** is mounted over an opening in and attached to pipe or conduit **16** by means of a U-bolt as shown in Fig. 2, a gasket **18** being positioned between the flange **12** and conduit **16** to provide a fluid-tight connection.

A bell-shaped sleeve **22**, having a threaded end **24** is fitted into the housing **10** and is connected thereto by spreading the lower edge **26** outward, by welding or brazing or by any other suitable manner. The sleeve **22** is threaded at **28** to receive a collar **30**, a gasket or seal **32** being first installed in an annular recess **20** formed in the upper end of housing **10** to provide a fluid-tight connection between the housing **10** and sleeve **22**.

A cap **34**, having an opening **36**, is threaded onto the sleeve **22** at the threaded end **24**, a retaining ring **37** and a gasket or seal **38** being positioned between the cap **34** and sleeve **22** to provide a water-tight connection.

An operating stem **40**, pivotally supported by seal **38**, is connected near its upper end **42** to one end of a spring **44** and is provided at its lower end with a socket **46**. The spring **44** is connected at its other end to a screw **48** adjustably positioned in a support **50** on the fixed member **52**. At its upper end **42**, the operating stem **40** extends into a transmitter **54** and is positioned adjacent a plunger **55** of a retard mechanism **56** of a type in common use in devices of this nature, the retard mechanism **56** being set to close the contacts **57** a predetermined time interval after the operating stem is actuated as will be more fully described hereinafter. The transmitter **54** is connected by electrical leads **58** to the central control station.

A vane, generally indicated at **60**, is pivotally connected at its hub **62** to the housing **10** and sleeve **22** by a pin **64** and is provided at its upper end with a ball **66** in engagement with the socket **46** of the stem **40**. The vane **60** is held in spaced position on the pin **64** by spacers **65**.

Referring now to Figs. 2 and 3, the vane **60** comprises a flexible web **70** and semi-rigid ribs **72** integrally formed therewith, the semi-rigid ribs extending from the hub **62** outwardly along the flexible web **70**. The hub **62**, web **70** and ribs **72** are formed as a single unit of the same material, the flexibility of the web and semi-rigidity of the ribs being attained through a variation in the relative thickness between the web and ribs. Both the web **70** and semi-rigid ribs **72** are resilient, that is, when the web and ribs are released after having been deflected or bent they will return to their initial position. It is preferred to form the vane **60** from a plastic material and polyethylene has been found suitable for this purpose.

In operation, the vane **60** is positioned vertically in a feed line between the main water supply, such as a municipal water supply, and the sprinkler heads, the main water supply being to the right of the vane, as shown in Fig. 1, and the sprinkler heads being to the left, water flow caused by the opening of the sprinkler heads being in the direction of the arrow in Fig. 1. Due to the resiliency of the web and the ribs, the vane **60** can be deformed sufficiently for insertion into and withdrawal from the conduit **16** through the opening in the conduit, allowing the device to be readily removed for inspection. When in place, the web **70** and ribs **72** will readily return to their normal position. With the device in position, the spring **44** is adjusted to position the stem **40** and vane **60** vertically in the housing **10** and conduit **16**, respectively.

With all of the sprinkler heads closed there will be no flow in the conduit **16** and, under usual conditions, the pressure in the conduit on the right and left sides of the vane **60**, as shown in Fig. 1, will be equal. Under such condition the web **70** and ribs **72** substantially close the conduit.

As aforestated, when connected to a municipal water supply, the system is subject to minor flows of short duration due to fluctuations in municipal supply and it is desirable that such minor flows not be transmitted to the signaling device. In the device of the invention, when minor fluctuations occur, the vane **60** pivots the stem **40** thereby expanding the spring **44** and moving the upper end **42** of the stem **40** away from the plunger **55** freeing the retard mechanism **56** to move at a rate governed by its adjustment. Because of the clearance in the conduit **16** around the vane **60** and the flexibility of the web **70**, particularly at its marginal edges, fluid passes from one side of the vane to the other side until the pressure on the opposite sides of the vane equalizes. Since such fluctuations are only slight and of short duration, equalization of the pressure on the opposite sides of the vane is rapid and the spring **44** returns the stem **40** and vane **60** to the vertical position against the plunger **55**, as shown in Fig. 1, resetting the retard mechanism **56** before it has moved a sufficient distance to close the contacts **57** to actuate the alarm. Each time a fluctuation occurs in the supply the vane **60** pivots, allowing sufficient flow to rebalance the system on the opposite sides of the vane and, thereafter, the vane returns to its original vertical position. As aforestated, the flow required to rebalance the system is only minor and, due to the action of the retard mechanism, is accomplished without actuating the alarm.

When one or more sprinkler heads are opened, fluid is exhausted from the left of the vane, as shown in Fig. 1, causing a continuous flow of fluid from the right to the left of the vane. As this flow occurs, the vane **60** and stem **40** pivot in the housing **10** moving the upper end **42** of the stem away from the plunger **55** thereby freeing the retard mechanism **56** to move at its pre-adjusted rate until the contacts **57** are closed causing the transmitter, through the leads **58**, to actuate the signal in the central station. As the vane **60** pivots, the hub **62** contacts the lower end of the housing **10** thereby limiting the pivotal movement of the stem **40** at its upper end **42**. However, since the ribs **72** are semi-rigid, they bend under the force of the water and, with the flexible web **70**, are forced against the inner wall of the conduit **16**, as shown in dotted lines in Fig. 2, thereby allowing unimpeded flow of fluid. The resilient vane **60** is held by the force of the water against the inner wall of the conduit until the fluid flow is shut off.

When the sprinkler heads are replaced or the fluid flow otherwise stopped, the resilient vane straightens and, under the influence of spring **44**, the stem **40**, together with vane **60**, is returned to its unactuated vertical position in the conduit. The signal device is then reset for subsequent operation in response to flow in the system.

As used herein and in the claims, the term "flexible," when used in connection with the web, connotes the characteristics of this portion of the vane to bend or deflect with minor flow, such as caused by slight variations in pressure, and the term "semi-rigid," when used in connection with the ribs, connotes the characteristic of this portion of the vane to remain rigid during minor flow but to bend or deflect upon the occurrence of a substantial flow along the conduit. Due to the resiliency of the web and the ribs, the vane will, in and of itself and without application of an external force, return to its undeflected condition when the fluid in the system returns to a static state.

The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

What is claimed is:

1. A flow detector for a fluid conduit, comprising a vane in said conduit, said vane having an area slightly smaller than that of said conduit cross section, a support adjacent said conduit, said vane having an extended hub portion, said hub portion being intermediately pivoted on said support on a joint transverse to the longitudinal axis of said conduit, a signal circuit having a switch therein, an operating stem pivotally mounted on said support, one end of said stem having operative engagement with said switch and the other end of said stem having engagement with said hub portion.

2. A flow detector as defined in claim 1, said vane being formed of plastic material with the body portion thereof in said conduit being resilient and said hub portion being rigid.

3. A flow detector as defined in claim 2, said hub portion extending in said support and being free for limited rotation about its pivot in said housing, initial rotation of said vane about said hub portion pivot in response to a predetermined rate of fluid flow causing rotation of said hub portion to its extreme position and rotation of said stem to operate said switch while the body portion of said vane remains substantially undeflected relative to said hub portion and said body portion being deflected relative to said hub portion in response to a rate of fluid flow greater than said predetermined rate.

4. A flow detector as defined in claim 3, said body portion of said vane having a flexible sector and a semi-rigid sector.

5. A flow detector as defined in claim 3, said body portion having a resilient flexible web and a plurality of semi-rigid ribs, and said semi-rigid ribs being joined adjacent to said hub portion and extending substantially across said body portion in mutually divergent relation away from said hub portion.

References Cited in the file of this patent

UNITED STATES PATENTS

384,570	Grovesteen	June 12, 1888
1,830,673	Noren	Nov. 3, 1931
1,903,713	Baule	Apr. 11, 1933