Aug. 21, 1951 W. M. JONES 2,565,310

PITOT TUBE

Filed April 5, 1948

Fig. 1

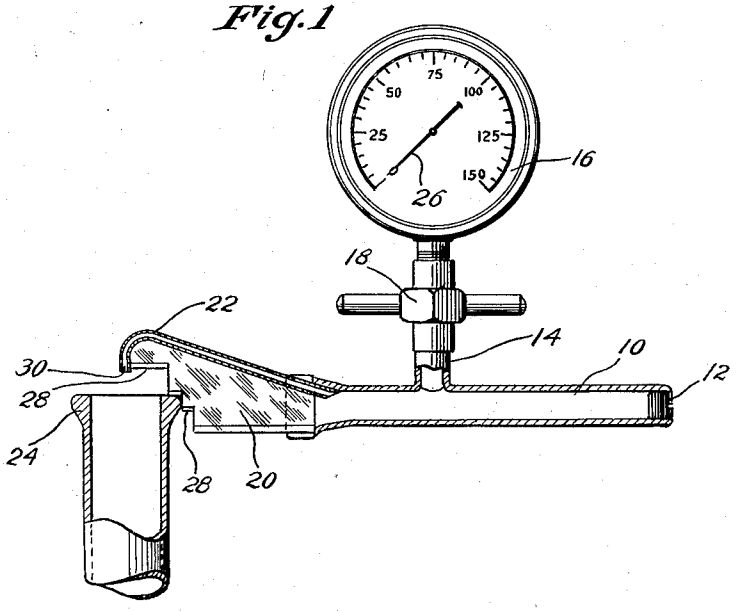


Fig. 2

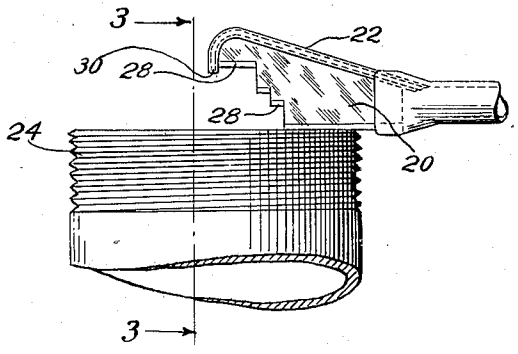
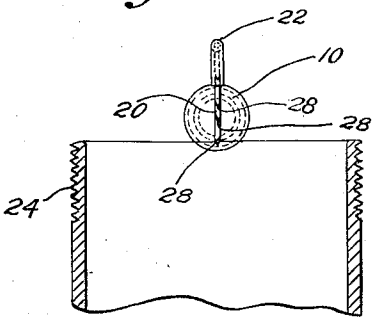


Fig. 3



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PITOT TUBE

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5 Claims. (Cl. 73—212)

1

This invention relates to Pitot tubes and more particularly to a Pitot tube for testing the velocity of water flowing from nozzles of different diameters.

A primary object of the invention is to provide an improved centering means for the Pitot tube opening enabling this opening to be manually centered relatively to the nozzle being tested and when in its centered position to cause minimum deflection and turbulence of the stream as it passes the Pitot tube.

A feature that enables the above object to be accomplished is that the centering of the device relative to the nozzle being tested is effected by a thin blade the edge of which is recessed to form successive steps and sharpened to cause the least possible turbulence or divergence of the stream flow past the device.

Another feature of the invention that is important is that the tube which is of small diameter is bent around and firmly fastened to the blade so that the opening of the tube will face the full velocity of the stream, the opposite end of the tube extending into one end of a closed chamber having an opening for connecting a pressure gage thereto.

And finally it is an object to provide a convenient hand tool or gaging device that can be conveniently carried about and used for all standard nozzles of fire protection equipment by manually positioning the blade against the end face of a nozzle with the opening of the Pitot tube facing the stream.

With the above and other objects in view the invention may include the features of construction and operation set forth in the following specification and illustrated in the accompanying drawing.

In the accompanying drawing annexed hereto and forming a part of this specification, I have shown the invention embodied in a testing device for fire protection hydrants, hose nozzles and so forth, but it will be understood that the invention can be otherwise embodied and that the drawing is not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawing:

Fig. 1 is a side elevation, partly in section showing a complete Pitot tube device made according to the present invention;

Fig. 2 is a similar view of a portion of the Pitot tube shown in Fig. 1 applied to a nozzle of larger diameter, and

2

Fig. 3 is a front or end view of the Pitot tube.

In the above mentioned drawing, there has been shown but one embodiment of the invention which is now deemed preferable, but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

Briefly, and in its preferred aspect, the invention may include the following principal parts: First, a hollow tube or cylinder closed at one end; second, a connection from said tube to a pressure gage; third, a blade attached to and sealing an end of the tube; fourth, a small diameter tube having an open free end adjacent the outer end of the blade and having its opposite end entering the chamber within the hollow cylinder; and fifth, spaced stepped portions on the forwarded surface of the blade member for centering the open end of the tube relative to the openings in nozzles of various diameters.

Referring more in detail to the figures of the drawing it will be seen that the device includes a cylinder 10 forming a handle for the device, the cylinder being hollow throughout its length and closed at one end preferably by means of a removable pressure tight threaded plug 12. At an intermediate part of the cylinder is provided a lateral extension 14 also hollow and having threaded connections at its free end for attachment of a pressure gage 16. As the pressure gage and its connection to the lateral branch 14 of the cylinder 10 may be standard, they will not need further description. Preferably the connection 14 is in the form of a standard threaded union 18 so that the gage 16 may be attached in pressure tight relation to the interior of the cylinder 10 with the face of the gage disposed in any direction.

The opposite end of the cylinder 10 is flattened and closed upon a flat blade member 20 extending in alignment with said cylinder and brazed thereto in pressure tight relation. Entering the hollow chamber within the cylinder 10 adjacent the blade member 20 is the inner end of a small diameter tube 22. This capillary tube is open throughout its length and for most of its length is fastened to an edge of the blade member 20 preferably by being brazed thereto. The outer or free end of the small tube 22 is bent so that it faces the nozzle 24 when in testing position and with the cylinder 10 disposed at right angles to the axis of the nozzle. The only opening into the space within the cylinder is through the length of the tube 22, the tube and blade 20 be-

ing preferably brazed to the flattened end of the cylinder so that this end is completely closed except for the opening through the tube.

From the above it will be seen that the force of the water or liquid from the nozzle 24 due to its velocity will increase the pressure within the cylinder 10 and thus actuate the indicator 26 of the pressure gage 16. Movement of the gage indicator 26 or pointer will indicate the pressure within the cylinder 10, and knowing the area of the nozzle opening the mass flow of water or other liquid can be quickly and accurately computed.

To facilitate use of the device with various standard nozzles the blade member 20 has its forward edge cut-away to form successive steps 28 the edges of which are parallel to each other and to the axis of the cylinder. With the device held with one of the stepped surfaces 28 contacting the nozzle periphery, the opening 30 of the capillary tube 22 will be disposed centrally of the discharging stream.

As shown in the figures, the forward or stepped edge of the blade member 20 is sharpened to a thin edge so that minimum turbulence and eddying of the discharging stream will take place in order that the reading will not be adversely affected. Also the outside diameter of the tube 22 may be made of substantially the same thickness as the blade member 20 so that there will be no appreciable divergence or turbulence of the stream past this portion of the tube where it is brazed to the blade 20.

If desired the plug 12, rather than being screwed into the end of the tube 10, may be permanently brazed in place.

Preferably the union 18 may have its female half rigidly secured, as by brazing, to the branch tube 14, the male portion of the union being attached to the gage 16. After tightening the union with the hand nut which is retained always in position on the extension 14 by the union, the gage 16 may be tightened without a wrench or other tool. With the gage tightened to the male member of the union and by slightly loosening the hand nut the gage may be angularly adjusted to any convenient position and the union again tightened by the hand nut.

In operation of the device and with the device manually held as shown in the figures, the pressure gage 16 is clamped in position by its union 18 so that its dial may be visible to the inspector and the pressures read on the graduations on the dial. With the area of the nozzle opening known, the mass flow from the nozzle may be quickly computed or obtained from previously established tables. To clean the device the plug 12 at the closed end of the cylinder 10 may be removed and the interior and length of tube 22 may be cleaned in any well-known manner.

I claim as my invention:

1. A testing Pitot tube comprising a hollow cylinder having a blade outstanding therefrom at one end and in alignment therewith, a small tube having its intermediate portion secured to the rear edge of said blade and having one end entering the space within said cylinder, the outer or free end of said tube being bent toward the front edge of the blade to an angle normal to said cylinder, spaced parallel stepped portions formed on said blade, and connections from an intermediate portion of said cylinder for a pressure indicating gage.

2. A testing Pitot tube comprising a hollow cylinder closed at one end and forming a handle, a blade outstanding therefrom at its opposite end and in alignment therewith, a small tube having its intermediate portion closely fitting and secured to the rear edge of said blade, said tube having one end entering the space within said cylinder in pressure tight relation thereto, the outer or free end of said tube being bent toward the front edge of the blade to an angle normal to said cylinder, spaced parallel stepped portions formed on the front edge of said blade, and connections from an intermediate portion of said cylinder for a pressure indicating gage, whereby said device may be manually positioned centrally of nozzle openings of different diameters.

3. A testing Pitot tube comprising a hollow cylinder closed at one end and having a blade outstanding therefrom at its other end, and a capillary tube extending from within said cylinder beyond said blade and having its open end normal to said cylinder, said blade having a series of steps formed thereon, one edge of each step extending parallel to said cylinder to position said tube end centrally of a nozzle when said device is used with nozzle openings of different diameter, and means to indicate the pressure within said cylinder.

4. A testing Pitot tube comprising a hollow cylinder closed at one end and having a blade outstanding therefrom at its other end, and a capillary tube extending from within said cylinder and attached along its length to an edge of said blade, the open end of said tube being normal to said cylinder, said blade having a series of steps formed thereon, one edge of each step extending parallel to said cylinder to position said tube end centrally of a nozzle when said device is used with nozzle openings of different diameter, and means to indicate the pressure within said cylinder.

5. A testing Pitot tube comprising a hollow cylinder closed at one end and having a blade outstanding therefrom at its opposite end, a capillary tube extending from within said cylinder to a point beyond said blade and having its open end normal to said cylinder, said blade and tube being brazed to each other and to one end of said cylinder, the forward edge of said blade being sharpened and provided with a series of steps formed thereon, one edge of each step extending parallel to said cylinder to position said tube end centrally of a nozzle when said device is used with nozzle openings of different diameter and means to indicate the pressure within said cylinder.

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