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E. P. BUSILLO

3,232,106

FLOWMETER

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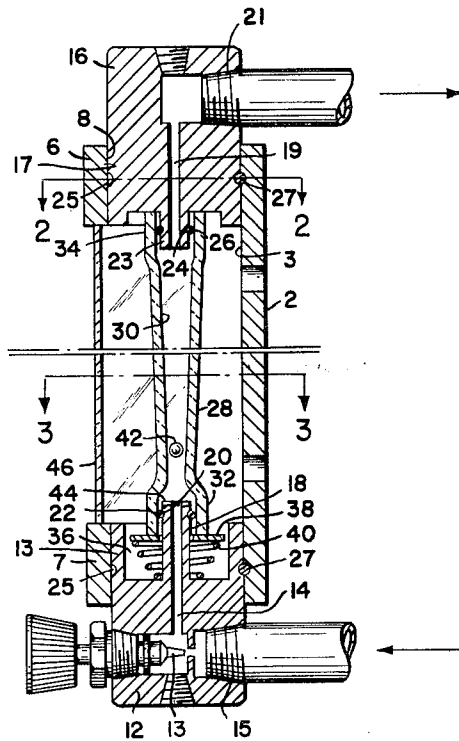


FIG. 1.

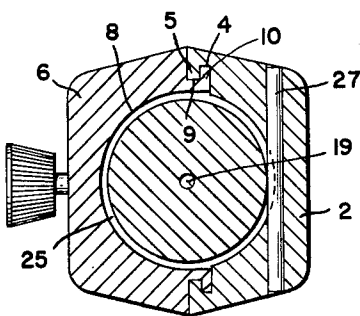


FIG. 2.

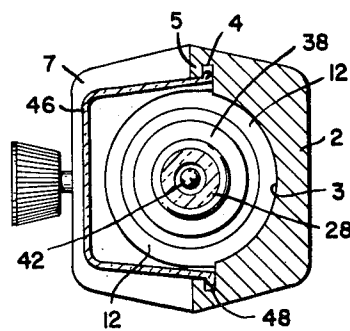


FIG. 3.

INVENTOR.

EUGENE P. BUSILLO

BY

Bussor, Smith & Hardy

ATTORNEYS

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FLOWMETER

Eugene P. Busillo, Huntingdon Valley, Pa., assignor to Fischer & Porter Company, Warminster, Pa., a corporation of Pennsylvania

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3 Claims. (Cl. 73-209)

This invention relates to flowmeters of the variable area type, and particularly to a simple, inexpensive and readily assembled frame for the mounting of the fittings and tube.

Various types of frames have been used for flowmeters of the type indicated, but these have generally involved specially machined parts giving rise to relatively high cost and fairly elaborate assembly. It is the general object of the present invention to provide a frame which is very simple in construction, comprising elements which may be merely sawed from aluminum extrusions and which are very easily assembled. In brief, the main portion of the frame comprises a length of an extrusion cut to suit the particular size of flowmeter involved, with which there are then assembled merely by sliding movement a pair of cut lengths of another extrusion.

The foregoing general object as well as others particularly relating to details of construction and assembly will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

FIGURE 1 is a vertical section showing the frame and the associated parts of a flowmeter;

FIGURE 2 is a transverse section taken on the plane indicated in 2-2 in FIGURE 1; and

FIGURE 3 is a transverse section taken on the plane indicated at 3-3 in FIGURE 1.

There is indicated at 2 the main portion of the frame of the flowmeter which is simply a length cut from an aluminum extrusion having the cross-section illustrated. The extrusion is provided with a semi-cylindrical socket 3 and at its edges is provided with a groove 4 and a tongue 5, the groove and tongue extending the length of the extrusion.

Arranged to be associated with the portion 2 of the frame are a pair of cut lengths 6 and 7 of another extrusion, these being identical so that consideration may be given solely to the upper of these shown particularly in FIGURE 2. This last extrusion is also provided with a semi-cylindrical socket 8 having the same radius as the socket 3. At the edges of this extrusion are the outwardly opening slot 9 and outwardly extending tongue 10. As will be evident from FIGURE 2, the described elements may be fitted together by relative sliding movement, the tongue 5 entering the groove 9 and the tongue 10 entering the groove 4. Dimensions are chosen so that a free sliding fit is provided, but by simple burring of the tongues or slight distortion thereof by peening provision is made for a forced fit, the result being that once assembled the elements 2, 6 and 7 retain their assembled positions as illustrated.

An inlet fitting 12 is provided at the bottom of the flowmeter and has a portion 13 for entry into the cylindrical opening which is provided by the sockets 3 and 8. This fitting has a fluid passage 14 extending centrally there-through and communicating with an opening 15 tapped for the reception of a connecting pipe. A conventional shut off valve 23 may be provided.

Similarly an outlet fitting 16 is provided having a cylindrical portion 17 entering the cylindrical opening at the top of the frame provided by the sockets 3 and 8. This fitting likewise has a central opening 19 for exit of fluid communicating with the opening 21 tapped to receive an outlet pipe. To retain the fittings against axial movement, each has its reduced cylindrical portion grooved as indi-

cated at 25 to receive a corresponding transverse pin 27 extending through an opening in the element 2. This arrangement permits the fittings to be rotated to adjusted positions for convenient attachment to piping. Furthermore, after assembly with the piping is completed, the entire flowmeter may be turned for convenient reading.

The lower fitting 12 is provided with a cylindrical portion 18 of reduced diameter through which the flow passage 14 extends concentrically. At its upper end the portion 18 is provided with an externally facing groove 20 in which an O-ring 22 may be located. In similar fashion the upper fitting 16 is provided with a reduced diameter cylindrical portion 23 circumferentially slotted at 24 to receive an O-ring 26.

The variable area flowmeter tube 28, generally desirably formed of glass and having the usual tapered bore 30, is provided with enlargements at 32 and 34 which embrace the O-rings 22 and 26 to provide fluid-tight seals. The inner diameters of the portions 32 and 34 of the tube are desirably equal so that irrespective of possibly high pressures of the fluid undergoing measurement there will be no substantial force tending to move the tube 28 in either direction.

It may be noted that the socket portions 32 and 34 of the tube may be standard for a wide variety of tubes having different tapers of their bores. The tubes 28, if of glass, may be molded on two-part mandrels to provide interior precision. Precision of external dimensions of the tube is immaterial.

Within an annular socket 36 in the lower fitting 12 there is housed a washer 38 loosely surrounding the portion 18 and urged upwardly by a spring 40 seated at the lower portion of the socket. Desirably this spring is of the conical shape illustrated to provide for centering thereof and, at the same time, lateral flexibility to facilitate removal and replacement of tubes. The washer 38 in view of its minor functions, may be replaced by a smaller diameter continuation of the upper end of the spring 40.

There is illustrated at 42 a float which may take any desired form but is shown as a sphere as is useful particularly in quite small instruments. Grooves 44 at the upper end of the portion 18 prevent closing off of the lower flow passage by the seating of the ball which is variably carried upwardly to positions within the tube 28 corresponding to rates of flow. As is usual, the tube may carry calibrations against which the position of the float may be read to determine rate of flow.

The particular mounting arrangement described for the tube 28, i.e. involving the washer 38 and spring 40, etc., forms no part of the present invention, being described in my prior application, Serial No. 112,845, filed May 26, 1961 now U.S. Patent No. 3,154,945.

To protect the tube 28 against accidental damage and to prevent accumulation of dirt thereon, it is desirable to provide a cover 46 formed of transparent plastic and having a cross-section generally corresponding to the outer contour of the frame elements 6 and 7. This cover is conveniently provided with an externally projecting bead 48 along each of its vertical edges which may be snapped into the grooves 4 of the frame member 2. The cover may be readily removed, when desired, merely by pressing inwardly on an outer edge portion thereof.

It will be evident from the foregoing description that there is provided in accordance with the invention a very simple and inexpensive frame from a pair of standard extrusions which may be cut to various lengths as may be required for flowmeters having different length metering tubes. Assembly is also very much simplified. It will be evident that various changes in details of construction may be made without departing from the invention as defined in the following claims.

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What is claimed is:

1. A flowmeter comprising an elongated support member having at least at its upper and lower ends portions of generally U-shape cross-sections defining socket portions, and elements each of generally U-shape and also defining socket portions, said end elements and said portions of the support member being provided with interlocking tongues and grooves extending lengthwise of the elongated support member for assembly of the support member with said end elements, the socket portions when such assembly is made providing axially extending aligned openings, end fittings in said openings, a metering tube supported at its ends by the end fittings, and a float within the metering tube.

2. A flowmeter according to claim 1 in which said support member and said end elements are formed of extrusions.

3. A flowmeter according to claim 1 in which said support member and said end elements are formed of metal extrusions.

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RICHARD C. QUEISSER, *Primary Examiner*.

20 ROBERT L. EVANS, *Examiner*.