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(54) Device for determining the speed and direction of a flowing medium.

(57) Device for determining the flow direction of a medium, consisting of a cylinder-shaped shaft, on which a first and a second, almost identical circular disc, are put at a certain distance from one another, perpendicular to a common axis, this axis preferably being more or less perpendicular to the plane of the flow and preferably coinciding with the shafts' axis, the medium flowing between said discs. Preferably the shaft is extended through the first disc and at its end and provided with a third disc of smaller diameter than first and second disc and situated between the two other discs. A flowrate-meter then is positioned on that third disc.

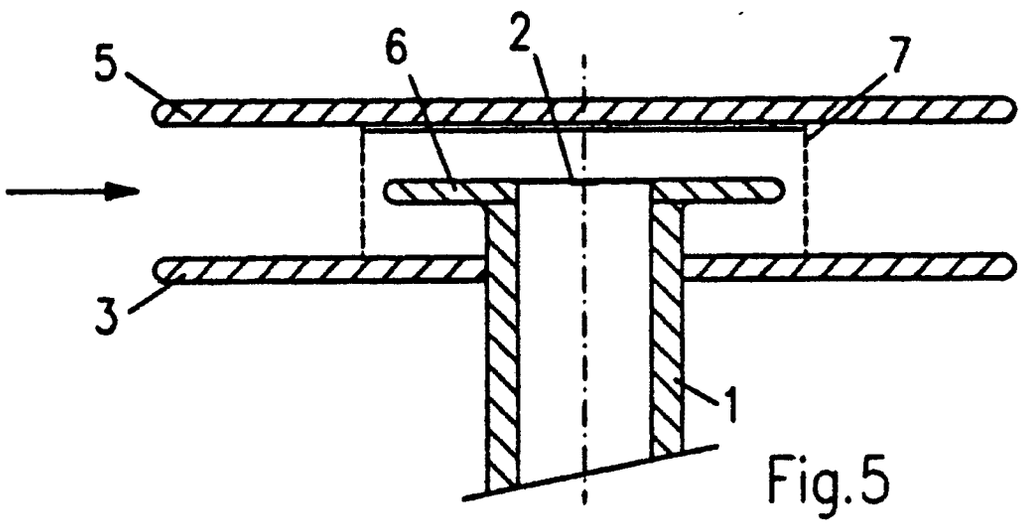

Fig.5

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DEVICE FOR DETERMINING THE SPEED AND DIRECTION OF A FLOWING MEDIUM

The invention relates to a device for determining the flow direction of a medium, consisting of a cylinder-shaped shaft, on which a first and a second, almost identical circular disc, are put at a certain distance from one another, perpendicular to a common axis, this axis preferably being more or less perpendicular to the plane of the flow and preferably coinciding with the shafts' axis, the medium flowing between said discs.

Such a meter for the rate of flow is known from the American patent 2.496.339, particularly Fig. 7, in which the bottom disc is heated in comparison to the medium, the flow being led over three thermic converters, put at 120° around the axis on the bottom disc, which converters are cooled irregularly, after which the ratio of the output tensions is used to determine the direction of the medium.

According to a characteristic of this invention, a direction-sensitive thermic speedometer is situated in, or at least near the center of the top surface of the first circular disc, with its sensitive side to the second circular disc. The advantage of this is that a simple embodiment is obtained with only one converter, which not only shows the direction of the flow, but also shows its speed, and an advantage is also that not the whole disc needs to be heated, but only the speedometer, so that in order to get a similar rise in temperature, considerably less electrical power is needed. Also the number of measuring points is reduced from three to one, which improves the accuracy of the measurement, because differences in flow between different measuring points can no longer occur.

According to another characteristic of the invention, the shaft is extended through the first circular disc and at its end, at least about halfway the two circular discs, the shaft is provided with a third circular disc, perpendicular to the axis of the shaft, the discs diameter being smaller than that of the first and second circular discs, a direction-sensitive flowrate-meter being positioned in the center of the top surface of the third circular disc, its sensitive side directed to the second circular disc. The advantage of this is, that for the third circular disc in which the flow meter is put, the dependency on the angle of the flow, that is the deviation of the flow with regard to the plane of the discs, is smaller than for the first and second circular disc, because the flow is already bent away before it reaches the third disc, because of which the medium is led over the flowrate-meter with more regularity.

According to another characteristic of the invention, the edge of the circular disc is rounded, preferably semicircular. This has the advantage that flow deviations and eddying, which could occur because of sharp corners at the edges of the third disc, thereby making the flow impression irregular, can be avoided to a large degree.

According to another characteristic of the invention, the cross-section of the third disc is mostly elliptical. Thus it is attained that flow deviation is avoided even more, because of which the flow is led over the flowrate-meter even better.

According to a further characteristic of the invention, the first and second circular disc are connected by distance-pieces, distributed regularly along the circumference.

According to another characteristic of the invention, the first and second circular disc are connected by a cylinder of wire netting. The advantage of this is, that no strong deviations occur in the flow-pattern over the speedometer at certain angles of the flow, the wire netting at the same time causing a smooth, even flow over the speedometer.

All this will be explained at the hand the following figures, showing an example of a device according to the invention, in which:

Fig. 1 shows an embodiment with the rate of flowrate-meter in the first disc;

Fig. 2 shows an embodiment with three discs;

Fig. 3 shows a third disc with a semicircular edge;

Fig. 4 shows a third disc, of which the cross-section is elliptical, and

Fig. 5 shows an embodiment with a cylinder of wire netting as a connection piece between the first and second disc.

In Fig. 1, a first circular disc 3 is applied on a shaft 1 which is made hollow for the transport of the connection wires for the flow rate-meter 2. There is a second circular disc 5 of the same diameter, moved axially with regard to disc 3, and attached to it by connection pieces 4. This set-up is placed in a flowing medium, in liquid or gas phase, so, that the medium flows between these circular discs 3 and 5, and of which flow the direction and speed are determined by means of the direction-sensitive flowrate-meter 2, which preferably consists of a semiconductor substrate, heated by a resistor-element, on which substrate thermocouples are situated, of which the contact points are cooled unequally by the flowing medium, the rate of cooling being a measure for the speed and the direction of the flowing medium. This substrate is put in the top surface of the first circular disc 3 in such a way, that the two planes coincide.

Fig. 2 shows an embodiment in which the shaft 1 is extended, and at its end is provided with a

third circular disc 6, the discs diameter being smaller than that of the circular discs 3 and 5, the direction-sensitive rate of flow meter being put in the center of the surface, directed to the circular disc 5. Because discs 3 and 5 bend the flow in the plane of the discs, before it reaches the third circular disc, the dependence on the angle of the flowing medium and on the influence of eddying around the cylinder-shaped shaft 1 is smaller for the flow over the top surface of the third circular disc 6 and, therefore, for the flow over the speedometer 2.

Fig. 3 shows an embodiment in which the edge of the third circular disc 6 is realized semi-circularly, because of which eddying at the edge, which disturb the smoothness of the flow, is diminished greatly or even is totally avoided.

In Fig. 4, the cross-section of the circular third disc 6 is elliptical, because of which the flow becomes even more smooth.

In Fig. 5, the distance pieces 4, which can consist of thin bars or thin, streamlined fins, radially directed inwards, are replaced by a cylinder of wire netting 7. This results in that for any direction in which the flow enters, the flow impression over the flowrate-meter 2 is identical, because the disturbing influence of the pieces 4, which can occur at certain angles, is totally absent, the wire netting at the same time promoting a smooth, homogeneous flow.

It will be clear that the edges of the first and second disc 3 and 5 can also be rounded.

Claims

1. Device for determining the flow direction of a medium, consisting of a cylinder-shaped shaft, on which a first and a second, almost identical circular disc, are put at a certain distance from one another, perpendicular to a common axis, this axis preferably being more or less perpendicular to the plane of the flow and preferably coinciding with the shafts' axis, the medium flowing between said discs,
characterized in that a direction-sensitive thermic speedometer is positioned in, or at least near, the center of the top surface of the first circular disc, its sensitive side directed to the second circular disc.

2. Device according to claim 1,
characterized in that the shaft is extended through the first circular disc and that at its end, at least about halfway the two circular discs, the shaft is provided with a third circular disc, perpendicular to the axis of the shaft, the discs' diameter being smaller than that of the first and second circular discs, a direction-sensitive flowrate-meter being positioned in the center of the top surface of the third circular disc, its sensitive side directed to the second circular disc.

3. Device according to claim 2,
characterized in that the edge of the third circular disc is round, preferably semicircular.

4. Device according to claim 2,
characterized in that the cross-section of the third disc is, at least mainly, elliptical.

5. Device according to claims 1 through 4,
characterized in that the first and second circular disc are connected by connection pieces, positioned at regular intervals along the perimeter.

6. Device according to claims 1 through 4,
characterized in that the first and second circular disc are connected by means of a cylinder of wire netting.

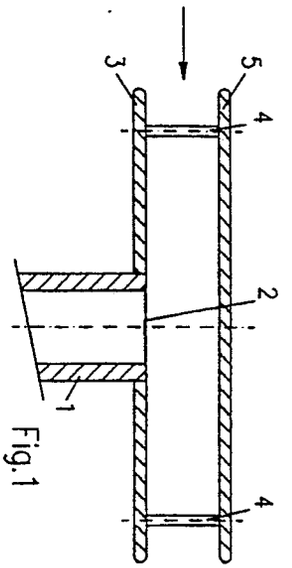

Fig.1

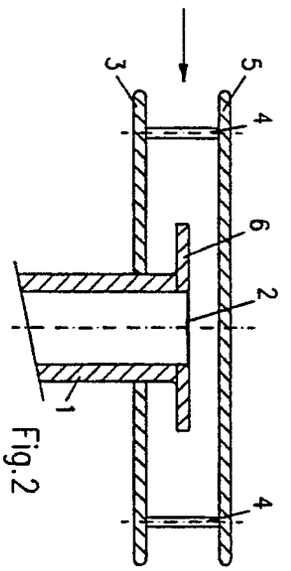

Fig.2

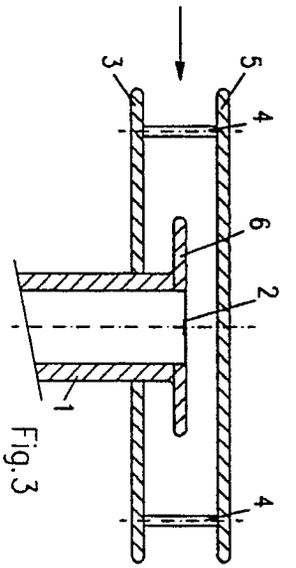

Fig.3

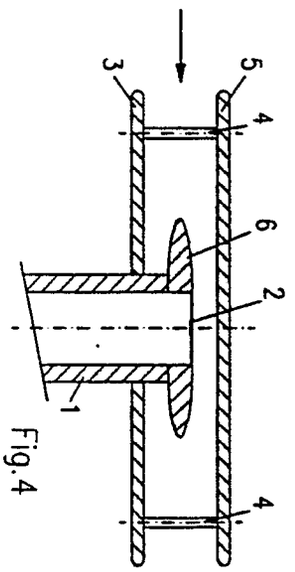

Fig.4

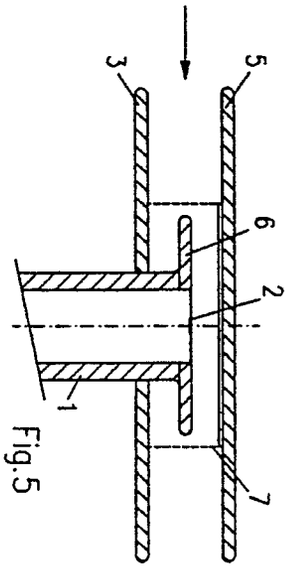

Fig.5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 1385

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,Y	US-A-2 496 339 (GIERS et al.)(07-02-1950) * Figure 7 *	1	G 01 P 5/12 G 01 P 13/02
Y	EP-A-0 313 120 (BRONKHORST)(26-04-1989) * Figure 1; abstract *	1	
A	GB-A-1 488 012 (HAWKER)(05-10-1977) * Figure 2; page 2, lines 26-46 *	2,3	
A	US-A-3 881 350 (NOSLEY)(06-05-1975) * Figure 1; abstract *	4	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

G 01 P
G 01 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13-09-1990	KOLBE W.H.

CATEGORY OF CITED DOCUMENTS

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