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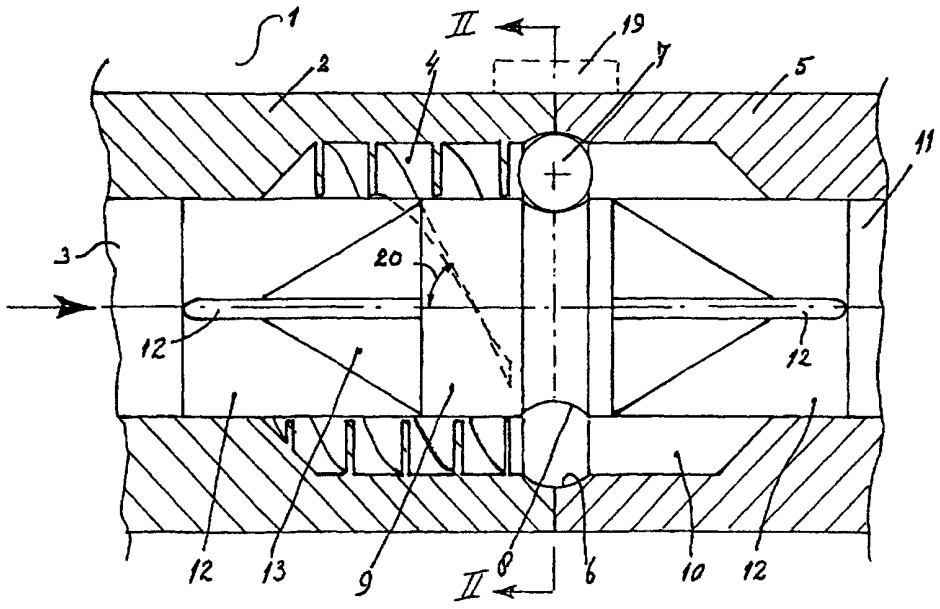
(54) Title: ORBITAL BALL FLOW METER FOR LIQUIDS AND GASES



(57) Abstract: The invention concerns a flow meter of the type that uses a measuring ball which is brought in movement by the liquid or gas stream. The ball is led in a radial track and the number of revolutions is an indication of the flow that passes the flow meter. The invention is characterised by keeping the circumference of the passages constant until beyond the ball. The liquid- or gas stream moves axial in the inlet and enters radial in a section with spiral grooves after which the measuring ball in a radial track is driven by the stream. By making the inner diameter of the spiral groove equal or larger than the diameter of the inlet there will come into being hardly any turbulence in the stream. Therefore has the ball a small diameter and the resistance in the meter will be low.

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ORBITAL BALL FLOW METER FOR LIQUIDS AND GASES

The invention concerns a flow meter of the type that uses a measuring ball which is brought in movement by the liquid or gas stream. The ball is led in a radial track and the number of revolutions is an indication of the flow that passes the flow meter.

Flow meters of this type are known from the American patent US-A-4,658,654. A drawback of this construction is that the passage of the flow meter is considerable limited by the body and the ring which prevent falling out of the ball. The dimension of the ball is considerable, which creates extra resistance, while the stream in the region of the ball is disturbed. The expected accuracy is not great.

The invention surmounts these drawbacks by keeping the passages equal in circumference until past the ball. The liquid- or gas stream moves axial in the inlet and enters radial in a section with spiral grooves after which the measuring ball in a radial track is taken by the stream. By making the inner diameter of the spiral grooves equal or larger than the diameter of the inlet there will come into being hardly any turbulence in the stream. Therefore the ball has a small diameter and the resistance in the meter will be low. The accuracy of the measuring will be very good.

The invention will be described with the help of the drawing.

Fig. 1 shows a cross section of the measuring section.

Fig. 2 shows cross section II of Fig. 1

Fig. 3 shows a cross section of a variant of the invention.

In Fig.1 is indicated with (1) the measuring section. The rest of the housing is for clearness not drawn. The stream liquid or gas to be measured enters the inlet section (2) via inlet (3) and enters radial in the with spiral channels (4) foreseen part of inlet section (2). On the separation between inlet section (2) and outlet section (5) is created a ball trace (6). Measuring ball (7) can free roll between ball trace (6) and ball trace (8) of body (9). In outlet section (5) is a return channel (10) which leads to outlet (11).

Body (9) is fitting in inlet (3) an is foreseen with partitions (12) which are parallel with the axis of the measuring section. At (13) is a conical part that an even entering in the spiral channels (4) ensures. Cone (13) can if necessary executed hollow or spherical. Body (9) has also on the outlet side partitions (12).

Channels (4) have preferable a inner diameter which is equal to the diameter of inlet (3) and outlet (11) and have such an outer diameter that the total circumference is equal to the of the inlet (3). The number of channels (4) is dependent of the incidence of the spiral and the preferred cross section which is preferable square.

In Fig. 3 is given a variant where the ball track on the outer diameter is created by inlet section (2) and outlet section (5) with conical parts (16) and cylindrical parts (17, 18) while body (14)

cylindrical fits into inlet (3). Body (14) is foreseen with slits (15) for a radial return of the stream liquid or gas.

The counting of the number of passages of measuring ball (7) can be done in several ways, par example with fibre glass optics which permits also to measure dark coloured liquids like hydraulic oil. Transparent plastics are preferred for the production of diverse parts. The design of the invention as shown with a relative small measuring ball (7) gives the possibility for a direct signalling of the passage of the measuring ball. At (19) is the position of an sensor indicated. The angle of incidence (20) of spiral channels (4) is between 5 and 75 degrees to the axis of measuring section (1).

Claims.

1. Flow meter for liquids and gasses characterised by that the liquid or gas stream enters radial in spiral channels (4) and is brought in rotation where measuring ball (7) which is guided in radial tracks (6, 8) in body (9, 14) and section (2, 5) is set in movement where with sensor (19) the number of passages per unity of time is counted.

2. Flow meter for liquids and gasses as per claim 1 characterised by that body (9, 14) has a diameter which is about the same or larger than the diameter of inlet (3) where the total circumference of channels (4) is equal to the circumference of the cross section of inlet (3).

3. Flow meter for liquids and gasses as per claim 1 and 2 characterised by that ball tracks (6, 8) have the form of a circle with a radius that is larger than the radius of the measuring ball (7).

4. Flow meter for liquids and gasses as per claim 1, 2 and 3 characterised by that the ball track consist of cylindrical parts (17, 18) and conical parts (16).

* * * *

FIG 2

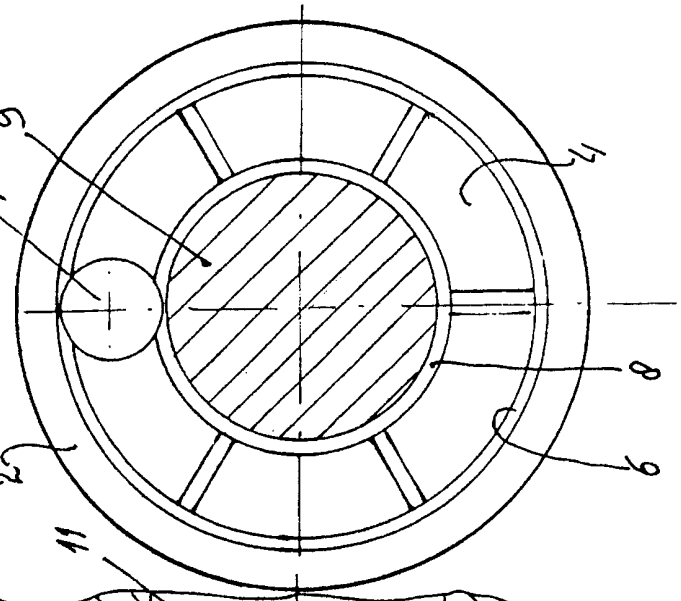


FIG 1

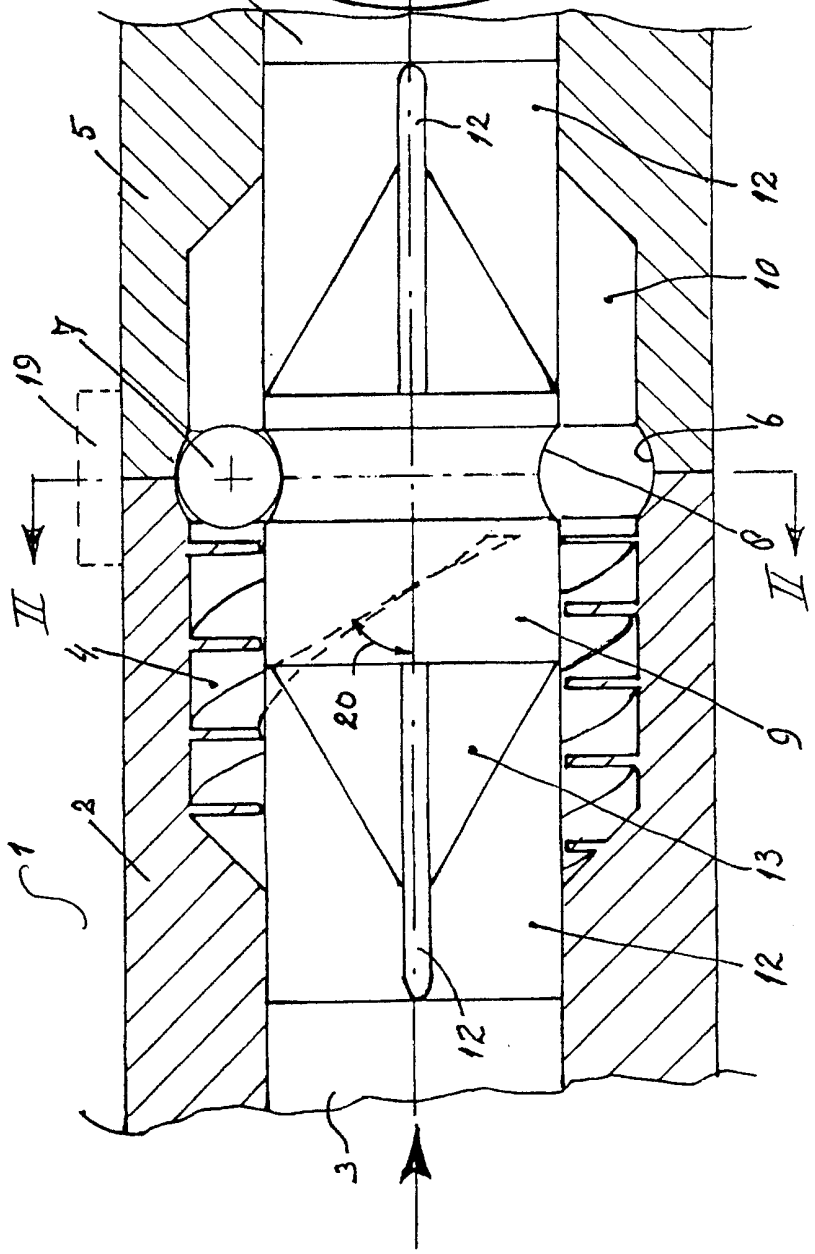
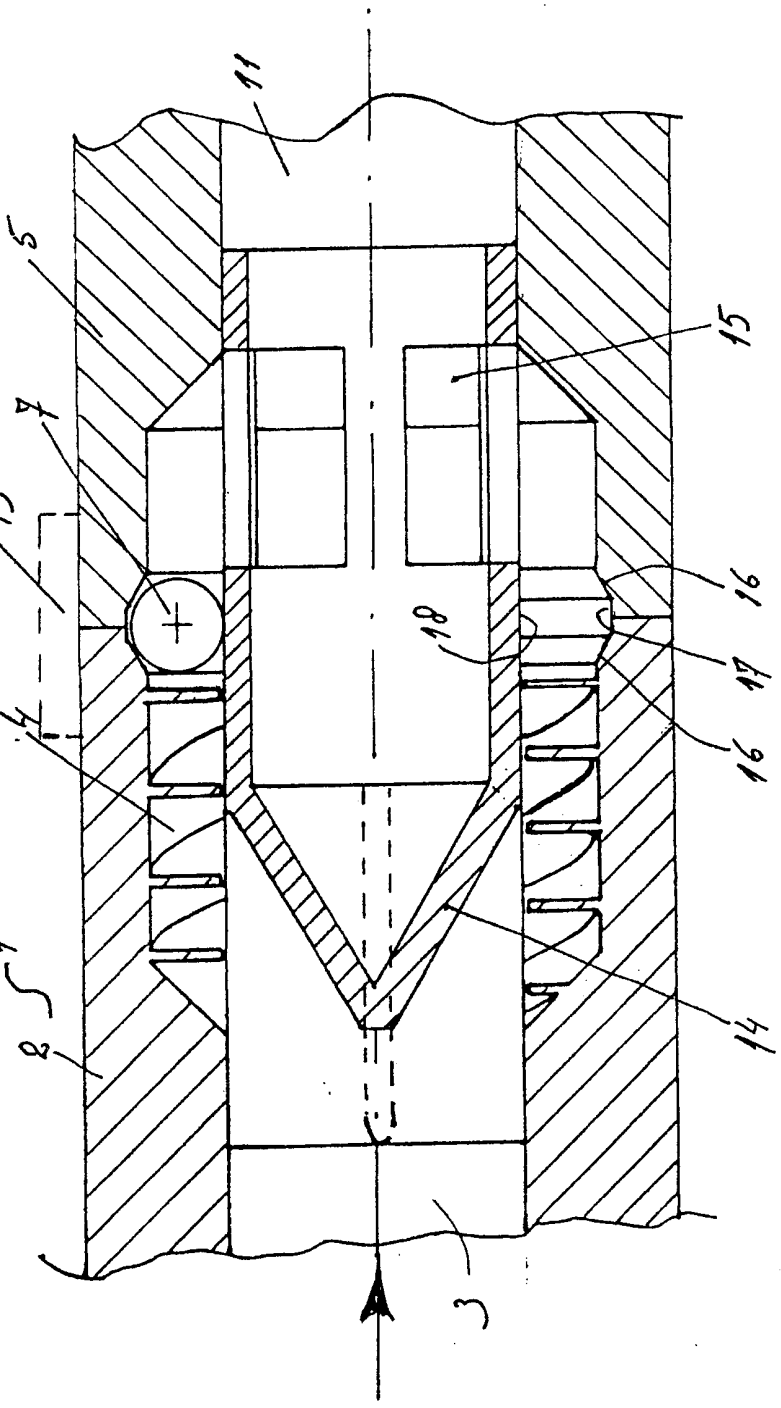


FIG 3



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01F1/05

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	figure 1	3
Y	DE 26 33 803 A (KLEIN HARTMUT) 2 February 1978 (1978-02-02)	3
A	figures 1,2	1
X	NL 6 704 339 A (NIITEPLOPRIBOR) 2 October 1967 (1967-10-02)	1,2,4
A	page 2, line 7 - line 22; figures 2,3	3

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Boerrigter, H

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information on patent family members

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