

A FLUID METER INCLUDING A COUNTER HELD BY A RESILIENT MEMBER ✓

5 The invention relates to a fluid meter comprising a case, a counter having display wheels housed in said case so that said display wheels are visible from outside the case through an opening formed therein, and at least one part exerting a mechanical force on the counter to hold it in position against said opening.

10 In fluid meters, and in particular water meters of the kind shown in section view as seen from above in Figure 1, it is conventional to place a counter 4 in a case 2, the counter having display wheels and receiving mechanically and/or magnetically metering information concerning a fluid volume as delivered by a measuring
15 element in contact with the fluid, and displaying said information on said wheels which can be seen from outside the case via an opening 6 formed in a wall 8 of the case. Generally, as shown in Figure 1, the counter 4 is a block made of plastics material that is transparent, at least
20 in the portion thereof that can be seen from the outside and in which the wheels are disposed.

The size of the block is smaller than that of the case 2 and the block is held in a stationary position against the wall having the opening 6 formed therethrough
25 by means of two abutments 10 and 12 that are rigid and secured to said case, and by means of an undeformable spacer 14 disposed between said abutments and said block.

When the water meter is assembled, the counter block 4 is initially inserted in the case 2 and pressed against
30 the wall in which the opening 6 is formed so that the display wheels can be seen from the outside via said opening. When the case 2 containing the counter 4 is filled with fluid, e.g. water or oil, a sealing gasket (not shown in Figure 1) is initially interposed between
35 the counter block 4 and the portion of the wall 8 of the case 2 that surrounds the opening 6. After the counter block 4 has been put into place, the spacer 14 is forced

between the abutments 10 and 12 and the block so as to prevent any subsequent movement of the block.

It is important to ensure that the counter 4 cannot move inside the case 2 as from the moment when the assembled meter is to be taken to its installation site, since while the meter is being transported it can sometimes be dropped unintentionally. It is therefore essential to ensure that once on site, the meter cannot be installed in a damaged condition such that subsequent reading of the wheels is made difficult by the counter block being wrongly positioned, or such that leakage occurs when said case is filled with fluid.

The Applicant has observed that when an external mechanical force is exerted on the wheel display of the counter via the opening 6 in the meter, e.g. in an attempt at fraud, the transparent plastics block 4 of the counter that suffers most from the static and dynamic forces applied, given that it is not as strong as the spacer 14 and the abutments 10 and 12. Consequently, the counter block can be subjected to phenomena of cracking or permanent deformation that can disturb reading the display wheels and can even prevent the wheels from rotating, thereby preventing metering from taking place.

Also, cracks can allow fluid to penetrate into the counter block. Given that a fluid such as water may convey impurities (algae, ...) this can interfere with proper operation of the counter. When the counter block is itself filled with a liquid such as oil, cracks can lead to the oil leaking out and consequently to problems of condensation within the counter block.

The present invention seeks to remedy the above problem by proposing a fluid meter which comprises: a case, a counter having display wheels housed in said case in such a manner that said display wheels are visible from outside said case through an opening formed therein, and at least one piece exerting a mechanical force on the counter to keep it positioned against said opening, the

meter being characterized in that said piece is a spring-forming resilient member.

When external pressure is exerted on the counter, e.g. in the event of fraud, it is the resilient member that takes up the forces transmitted to the counter, by deforming. Consequently, the counter is no longer damaged as in the past. Also, the risk of the wheels being jammed is thus avoided. When the case is filled permanently with fluid, there is no risk of leakage given that the resilient member returns to its initial position once the external pressure is no longer being exerted on the counter. In its initial position, the resilient member exerts sufficient force on said counter to hold it against the opening, thereby preventing any risk of a permanent leak.

In a first embodiment of the invention, the resilient member bears firstly against the counter and secondly against the case.

More particularly, the resilient member bears against a portion of the case which is opposite from the portion thereof in which the opening is formed.

By way of example, the resilient member is a shaped metal blade.

The metal blade has a central portion for coming into contact at least in part with the counter, and two lateral portions bearing against the portion of the case opposite from the portion in which the opening is formed.

For example, the central portion may be concave facing the counter, with two bearing zones on either side of said concave portion, and from which said concave shape extends, thereby giving the blade an M-shape.

Advantageously, the lateral portions have ends that are curved so as to offer a thrust surface for coming into contact with the case.

The ends of the lateral portions may be curved outwards or inwards relative to the blade so as to form loops.

The central portion may be plane, convex, or concave in shape, and its concave side may face towards or away from the counter.

5 The resilient member, e.g. implemented in the form of a metal blade, may be configured so as to leave a passage to allow the fluid that passes through the meter to flow between the counter and the portion of the case that is opposite from the opening.

10 In a second embodiment of the invention, the meter comprises one or more stationary elements disposed between the metal blade and the portion of the case opposite from the portion thereof in which the opening is provided, thereby limiting displacement of said metal blade towards said portion of the case.

15 In a third embodiment of the invention, the resilient member bears firstly against the counter and secondly against one or more abutments secured to the case.

20 By way of example, the resilient member may be shaped metal blade.

The metal blade includes a central portion for coming at least partially into contact with the counter, and two lateral portions that bear against at least two abutments.

25 The central portion may be plane, convex, or concave in shape, with its concave side facing towards or away from the counter.

30 The resilient member, e.g. implemented in the form of a metal blade, may be shaped in such a manner as to leave a passage for the flow of the fluid that passes through the meter between the counter and the portion of the case which is opposite from the opening.

35 The invention may be applied to water meters, to gas meters, and to meters for any fluid (milk, gasoline, ...) for which there arises a problem similar to that described herein.

Other characteristics and advantages appear from the following description given by way of non-limiting illustration and made with reference to the accompanying drawings, in which:

- 5 • Figure 1 is a plan view in cross-section of a prior art water meter;
 - Figure 2 is a longitudinal section view of a water meter constituting a first embodiment of the invention;
 - Figure 3 is a simplified cross-section view of the
10 Figure 2 water meter on A-A, and in which only the counter block and the resilient member are shown;
 - Figure 4 shows a first variant embodiment of the resilient member shown in Figure 3;
 - Figure 5 shows a second variant embodiment of the
15 resilient member shown in Figure 3;
 - Figure 6 shows a third variant embodiment of the resilient member shown in Figure 3;
 - Figure 7 shows a variant embodiment of the resilient member shown in Figure 6;
 - 20 • Figure 8 shows another variant embodiment of the resilient member shown in Figure 6;
 - Figure 9 is a cross-section view through a water meter fitted with the resilient member shown in Figure 8;
 - Figures 10 and 11 are respectively a longitudinal
25 section and a cross-section through a water meter constituting a second embodiment of the invention;
 - Figure 12 is a simplified cross-section view of a water meter constituting a third embodiment of the invention; and
 - 30 • Figure 13 is a view analogous to that of Figure 12 showing a variant embodiment of the resilient member.
- As shown in Figure 2, and given overall reference 20, a fluid meter, e.g. a water meter, constituting a first embodiment of the invention comprises a first case
35 22 that encloses a measuring chamber 24 that is in communication with a water feed 26, with the arrow marked F giving the water flow direction.

The case 22 includes a plate 28 provided with orifices and disposed beneath the measuring chamber 24. In order to reach the measuring chamber 24, the fluid rising via the feed 26 must pass through the plate 28 which acts as a filter. The measuring chamber is defined by a wall 30 and includes a piston referenced 32 which is moved within said chamber under drive from the fluid flow so as to rotate about a pivot 34. The piston 32 transmits its rotary motion to a coupling member 36 which passes through a wall 38 between the first case 22 and a second case 40. The coupling member 36 transfers the rotary motion of the piston 32 to a shaft 42 which is mechanically connected by a gear train 44, shown in part in Figure 2. A counter 46 having display wheels co-operates in conventional manner with the gear train 44 to enable the metering information transmitted by the piston 32 to rotate the wheels in appropriate manner and thus display the corresponding increase in water consumption. The wheels are shown in Figure 9.

Naturally the coupling between the piston and the gear train could equally well be implemented by a magnetic coupling system, e.g. constituted by two magnetized elements, each placed in a respective one of the cases 22 and 40 on either side of a wall.

The housing 40 includes an opening 48 shown in Figure 3 which is a simplified view on plane A-A of the counter in Figure 2, which opening 48 is formed in the wall 38 and is designed to put the measuring chamber 24 into communication with the case 40 so as to allow water that has passed through the measuring chamber in the case to flow away. This outflow of water is referenced by arrow F' in Figure 2 and passes through the housing 40 to leave via a water outlet 50 placed at the top of said case.

As can be seen in Figure 2 and in Figure 3, the counter block 46 is disposed against a wall 52 of the housing 40 in which an opening 54 is formed. The counter

block 46 is made of transparent plastics material and is projecting in shape at one of its ends 46a so as to enable it to be inserted in the opening 54. Thus, when an observer looks at the case 40 in the direction of arrow B in Figure 3, the wheels of the counter can be seen together with the digits carried by the wheels. A sealing gasket 56 is placed in a housing provided in the wall 52 around the opening 54, inside the case 40 between said wall and the counter block in order to prevent water leaking permanently through the opening.

When the counter block 46 is in place against the opening 54, a resilient member 58 is forced to bear firstly against the counter block and secondly against the case 40. As shown in Figure 3, the resilient member presses against a portion 60 of the case 40 which is opposite from the wall 52 in which the opening is formed. By way of example, the resilient member is a shaped spring-forming metal blade 58.

The blade 58 has a central portion 58a that is substantially plane and designed to come into contact with the end 46b of the counter block 46 that is remote from its end 46a, engaging a first bearing surface thereon. The blade 58 also has two lateral portions or legs 58b and 58c which bear against the wall 60 of the case 40. The legs 58b and 58b of the blade are substantially plane and form an angle relative to the central portion 58a which is greater than 90° , for example, e.g. being equal to 105° . As shown in Figure 3, the blade 58 has end portions 58d and 58e at the ends of its legs 58b and 58c. These portions are curved so as to provide respective second and third bearing surfaces for coming into contact with the wall 60.

The end portions 58d and 58e are curved outwards relative to the blade so as to slip better over the wall 60 of the case 40. Nevertheless, these portions 58d and 58e could equally well be curved inwards relative to the blade to provide the same function.

The metal blade 58 is shaped so as to leave an empty passage to allow the fluid coming from the opening 48 and passing through the case 40 of the meter to flow between the counter block and the wall 60. Thus, no additional
5 headloss is added through the meter by the presence of the blade.

Given that the metal blade 58 is engaged by force between the counter block 46 and the wall 60 of the case, it is deformed elastically and therefore exerts a
10 mechanical return force against the end portion 46b of said block via its first bearing surface, so as to keep the block permanently pressed against the wall 52 of the case 40.

When external pressure is exerted on the portion of
15 the counter that is visible from the outside, the spring function of the metal blade 58 is provided by the lateral portions 58b and 58c thereof buckling and also by the end portions 58d and 58e thereof sliding on the wall 60, thereby enabling the blade to adjust its position. The
20 blade therefore takes up the forces transmitted to the counter block 46, thus preventing the block from cracking and preventing it from becoming permanently deformed which would run the risk of making it impossible
subsequently to read the wheels, and possibly even
25 preventing metering from taking place by preventing rotation of said wheels.

The invention also presents a dissuasive aspect in that in the event of fraud, when anybody presses against the visible portion of the counter block from the
30 outside, some of the fluid contained in the case 40 escapes via the opening 54.

To hold the counter block in place against the opening, a resilient member must exert a force that lies, for example, in the range 10 daN to 30 daN, with this
35 figure varying as a function of the sizes of the counter block and of the case 40. The figure of 10 daN corresponds, in this example, to the minimum compression

force that must be exerted on the gasket 56 to ensure sealing.

Advantageously, the blade makes it possible to compensate for manufacturing tolerances due to the machining the counter blocks, which is not possible with a prior art rigid spacer-forming piece of the kind described above. With a prior art spacer-forming piece, in order to ensure that the sealing gasket 56 is always compressed sufficiently to avoid any permanent leak, the piece must be manufactured to very tight tolerances. This can make assembling the piece in the case difficult on occasion. In contrast, if assembly is to be simplified, then it is necessary to take the risk of increasing tolerances and therefore of not having sufficient compression on the sealing gasket.

It should be observed that two spring-forming resilient members could be used instead of only one. For example, it is possible to provide two metal blades or two coil springs, each guided by a rod and disposed substantially perpendicularly to the end surface 46b of the counter block, with each rod having one of its ends fixed to the wall 50 and its other end being left free so as to enable the springs to be fitted thereover.

It is also possible to provide for the resilient member, e.g. made in the form of a metal blade, not to press against the wall 60 of the case 40, but to press against the opposite wall 52 via abutments secured to said wall and exerting a retaining force on the end portions of the spring. Thus, the resilient member, once in position, is deformed elastically in traction instead of in compression.

Figure 4 is a view analogous to Figure 3, showing a first variant embodiment of the resilient member shown in Figure 3. The case 62 and the counter block 64 are slightly different from those in Figure 3, but that does not affect the invention in any way. In Figure 4, the resilient member is implemented in the form of a shaped

metal blade 66 having a central portion 66a that is substantially plane for coming into contact with the counter block 64, and two lateral portions 66b and 66c which bear against the wall 68 opposite from the wall 70 in which the opening 72 is formed. The lateral portions extend from respective opposite ends of the central portion 66a with concave portions facing towards the inside of the blade, followed by respective U-shapes facing towards the outside of the blade. At its two opposite ends, the blade 66 has two end portions 66d and 66e each coinciding with one of the branches of the U-shapes of the corresponding lateral portions, curved towards the outside of the blade so that each of them offers a thrust surface that is designed to come into contact with the wall 68 of the case. The shape given to the lateral portions 66b and 66c serves to stiffen the blade. These lateral portions 66b and 66c also act as abutments, thus limiting maximum displacement of the blade towards the wall 68.

A second variant of the resilient member shown in Figure 3 is shown in Figure 5. In this figure, the shaped metal blade 74 has a central portion 74a in contact with the counter block 76 and legs 74b and 74c bearing against the wall 78 of the case 80. Each of the legs has a concave zone situated about halfway therealong between the central portion and the end 74d or 74e of the corresponding leg 74b or 74c, which end is in contact with the wall 78 and has its concave shape outwardly directed relative to the blade 74. Said concave zones serve to stiffen the blade. The shape of the legs gives the blade greater resilience than the blade of Figure 4, and it also enables said legs to act as abutments for limiting maximum possible displacement of the blade towards the wall 78.

Figure 6 shows a third variant embodiment of the resilient member shown in Figure 3, and in this figure the water meter is not shown. In this figure, the metal

blade 82 has a central portion constituted by a first portion 82a that is concave facing towards the outside of the blade, and two other portions 82b and 82c on either side of said first portion and from which the first
5 portion extends. The two outer portions 82b and 82c of the central portion are designed to come into contact with the counter block (not shown in this figure) via their thrust surfaces. These two portions are substantially plane and thus press against the counter
10 block over their entire surface areas.

The blade also has two substantially plane legs 82d and 82e which extend from the two portions 82b and 82c at angles of inclination that are substantially equal to 90°, for example. However this angle could be greater
15 than 90°, e.g. it could be equal to 105° in order to make it easier to mount the blade in the case. At its two opposite ends, the blade also has two end portions 82f and 82g that are curved towards the outside of the blade and that are designed to press against a wall of the
20 meter case. The shaped blade is thus generally M-shaped. It is advantageous to give a slightly concave shape or even a convex shape to the central portion in order to determine the direction in which said portion deforms when subjected to mechanical stress.

25 In a variant, the blade 84 shown in Figure 7 differs from that of Figure 6 in the shape of the two portions 84b and 84c on either side of the concave first portion 84a of the central portion. These two portions 84a and 84b are still substantially plane, but they form between
30 them an angle of inclination, that is equal to 140°, for example. Thus, the thrust surfaces for coming into contact with the counter block no longer coincide with the full areas of these two portions 84b and 84c, but are reduced to two contact zones C and D. This configuration
35 imparts greater stiffness to the portion of the blade that is designed to come into contact with the counter block.

Figure 8 shows a variant embodiment of the blade shown in Figure 6. In Figure 8, only the end portions 86f and 86g of the blade 86 differ from the end portions 82f and 82g of the blade 82 shown in Figure 6. The end portions 86f and 86g are curved towards the outside of the blade in such a way as to form respective loops. In addition to their mechanical function, the loops make the blade simple and easy to mount by means of a tool such as pliers for inserting a spring clip, with the jaws of the pliers being inserted into said loops in order to take hold of the blade. By squeezing the pliers, pressure is exerted tending to move the legs 86d and 86e of the blades towards each other and said blade is thus mounted in the case 88 of the meter shown in cross-section from above in Figure 9.

In this figure, elements that are the same as corresponding elements in Figure 2 are given the same references. The counter block 46 has wheels 47a to 47h that are not shown in Figure 2. The blade is inserted into the case 40 so that the two portions 86b and 86c of the central portion are in contact with two projections 90 and 92 formed on the end surface 46b of the counter block 46 remote from its end 46a facing the read window 54. As soon as the blade has been put into place and the pliers removed, the legs 86d and 86e tend to move apart from each other, causing the thrust surfaces of the end portions 86f and 86g to slide along the wall 60 of the case. This enables the blade to adapt its position as a function of the varying dimensions of the counter block 46 due to manufacturing tolerances. The resilient member is thus particularly simple to mount. It would equally be possible to provide for the end portions to be curved inwards rather than outwards so as to form inside loops.

By way of example, the blade 86 can be made of stainless steel, e.g. having a width of 10 mm and a thickness of 0.7 mm. The shaped blade is obtained by cutting and folding a plane sheet, e.g. by using a

plurality of jigs in succession. It is thus particularly simple to manufacture such a resilient member. In addition, the number of parts required is smaller than the number required for the above-described prior art
5 water meter.

In a second embodiment of the invention, as shown in Figures 10 and 11, a plurality of stationary elements 94, 96, e.g. integral with the case 40, are disposed between the blade 86 (identical to the blade of Figures 8 and 9)
10 and the wall 60 of the case so as to limit displacement of said blade towards said wall in the event of excessive axial thrust being exerted on the counter block 46 along arrow B. These elements are located at a distance from the blade so as to enable them to prevent the blade
15 deforming beyond its elastic limit. By way of example, the stationary elements are pegs 94 and 96 of longitudinal size or height equal to the width of the blade (Figure 10) and of cross-section that is
20 semicircular in shape for example (Figure 11), with the flat portion of each peg facing towards the portion of the blade with which it is to co-operate. As shown in Figure 11, the plane portions of the pegs 94 and 96 co-operate respectively with the portions 86b and 86c of the
25 central portion of the blade 86 situated facing them and taking up the external forces exerted on the counter block 46.

It is also possible to provide only one stationary element between the blade 86 and the wall 60, which element then extends over the length lying between the
30 two portions 86b and 86c so as to be capable of providing sufficient support for these portions. In general, the stationary element(s) must be positioned behind the portion(s) of the blade subjected to the forces transmitted to the counter block by external action. The
35 stationary element(s) may be associated with any of the various resilient members described above with reference to Figures 2 to 9.

Figure 12 is a fragmentary diagrammatic view in cross-section of a water meter constituting a third embodiment of the invention and in which the resilient member 100 bears firstly against the counter block 102 and secondly against two abutments 104 and 106 secured to the wall 108 of the case 110 opposite from the wall 112 in which the opening 114 is formed. In this figure, the resilient member 100 is implemented in the form of a shaped metal blade having a central portion 100a for coming at least partially into contact with the counter block 102 and two lateral portions 100b and 100c that bear against the two abutments 104 and 106. The central portion 100a is substantially plane in the part thereof that comes into contact with the counter block. At rest, i.e. when the blade is not deformed, the central portion 100a is convex with its convex side facing towards the counter block, as shown in dashed lines in Figure 12. The shape shown in dashed lines in the figure is deliberately exaggerated. The two lateral portions 100b and 100c are substantially plane and coplanar. The plane of the contacting part of the central portion 100a and the plane of the lateral portions 100b and 100c are different. This shape is of simple design.

This blade can be thicker than the blades shown in the other figures in order to provide sufficient compression on the sealing gasket. The blade is therefore stiffer and provides greater opposition to external actions applied to the counter block.

A variant embodiment of the Figure 12 resilient member is shown in Figure 13. In this figure, the metal blade 120 has a convex central portion 120a with the convex side thereof directed towards the counter block 122, two lateral portions 120b and 120c bearing against two abutments 124 and 126 secured to the wall 128 of the case 130, and two intermediate portions 120d and 120c each extending between the central portion 120a and a respective one of the lateral portions 120b and 120c.

The lateral portions 120b and 120c (and also the intermediate 120d and 120e) are coplanar when they press against the abutments 124 and 126, and thereafter their ends form respective loops extending towards the counter
5 block. Each end-forming loop of the lateral portions 120b and 120c comes into contact via a portion of its outside surface with the counter block.

The planes of the lateral portions and of the intermediate portions are different. The lateral
10 portions 120b and 120c are set back relative to the intermediate portions where they press against the abutments 124 and 126.

The convex central portion 120a is semicircular in shape and comes into contact with the counter block
15 solely via the top portion of the circle, thus forming a third contact zone with said counter block. The loops formed at the ends of the portions 120b and 120c can facilitate mounting of the blade by means of an appropriate tool provided with two arms with each arm
20 being inserted in a respective one of the loops.

The forces transmitted to the counter block are thus better distributed over the blade than they are over the blade of Figure 12.

CLAIMS

- 1/ A fluid meter comprising: a case (40; 62; 80; 110; 130), a counter (46; 64; 76; 102; 122) having display wheels (47a to 47h) housed in said case in such a manner
5 that said display wheels are visible from outside said case through an opening (54; 72; 114) formed therein, and at least one piece exerting a mechanical force on the counter to keep it positioned against said opening, the meter being characterized in that said piece is a spring-
10 forming resilient member (58; 66; 74; 82; 84; 86; 100; 120).
- 2/ A meter according to claim 1, in which the resilient member (58; 66; 74; 82; 84; 86) bears firstly against the
15 counter (46; 64; 76) and secondly against the case (40; 62; 80).
- 3/ A meter according to claim 2, in which the resilient member (58; 66; 74; 82; 84; 86) bears against a portion
20 (60; 68; 78) of the case (40; 62; 80) which is opposite from the portion thereof (52; 70) in which the opening (54; 72) is formed.
- 4/ A meter according to claim 1, in which the resilient
25 member (100; 120) bears firstly against the counter (102; 122) and secondly against one or more abutments (104, 106; 124, 126) secured to the housing (110; 130).
- 5/ A meter according to any one of claims 1 to 4, in
30 which the resilient member is a metal blade (58; 66; 74; 82; 84; 86; 100; 120).
- 6/ A meter according to claim 5, in which the metal blade (58; 66; 74; 82; 84; 86; 100; 120) is shaped.
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- 7/ A meter according to claims 4 and 5, in which the metal blade (100; 120) includes a central portion (100a;



120a) for coming at least partially into contact with the counter (102; 122) and two lateral portions (100b, 100c; 120b, 120c) for bearing against at least two abutments (104, 106; 124, 126).

5

8/ A meter according to claims 6 and 7, in which the two lateral portions (100b, 100c; 120b; 120c) are substantially coplanar, at least in part.

10

9/ A meter according to claim 6 and claim 7 or 8, in which the two lateral portions (120b, 120c) are curved at their ends towards the counter (122) to form loops each having a portion that is designed to come into contact with said counter.

15

10/ A meter according to claims 6 and 7, in which the central portion (100a) is substantially plane.

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11/ A meter according to claims 8 and 10, in which the plane of the central portion (100a) is different from that plane of the lateral portions (100b; 100c).

25

12/ A meter according to claims 6 and 7, in which the central portion (120a) is convex towards the counter.

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13/ A meter according to claims 8 and 12, in which the blade (120) includes two intermediate portions (120d, 120e) lying between the central portion (120a) and respective ones of the lateral portions (120b, 120c).

35

14/ A meter according to claim 13, in which each intermediate portion (120d, 120e) is substantially contained in a plane that is different from the plane of the lateral portions (120b, 120c).

15/ A meter according to claims 3, 5, and 6, in which the metal blade (58; 66; 74; 82; 84; 86) includes a central



portion (58a; 66a; 74a; 82a, 82b; 84a; 84b, 84c; C; D) designed to come at least partially into contact with the counter (46; 64; 76) together with two lateral portions (58b; 58c; 66b; 66c; 74b, 74c; 82d, 82e; 86d, 86e)

- 5 bearing against the portion (60; 68; 78) of the case (40; 68; 80) that is opposite from the portion thereof (52; 70) in which the opening (54; 72) is formed.

10 16/ A meter according to claim 15, in which the central portion (58a; 66a; 74a) is substantially plane.

15 17/ A meter according to claim 15, in which the central portion is concave with its concave side (82a; 84a) facing towards the counter, and has two thrust zones (82b, 82c; C; D) on either side of said concave side and from which said concave side extends, thus imparting an M-shape to the blade.

20 18/ A meter according to claim 16 or 17, in which the lateral portions (58b; 58c; 82d, 82e; 86d, 86e) are at an angle of inclination relative to the central portion.

25 19/ A meter according to any one of claims 15 to 18, in which the lateral portions (58b; 58c; 66b, 66c; 74b, 74c; 82d, 82e; 86d, 86e) include ends (58d; 58e; 66d, 66e; 74d, 74e; 82f, 82g; 86f, 86g) which are curved so as to provide thrust surfaces for coming into contact with the case.

30 20/ A meter according to claim 19, in which the ends (86f, 86g) of the lateral portions (86d, 86e) are curved towards the outside of the blade (86) to form respective loops.

35 21/ A meter according to claim 18, in which the lateral portions (58b; 58c; 82d, 82e; 86d, 86e) are substantially plane.



22/ A meter according to claim 18, in which each of the lateral portions (66b, 66c; 74b, 74c) has a stiffener-forming concave zone.

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23/ A meter according to claim 22, in which the concave side of the zone faces towards the outside of the blade (66; 74).

10 24/ A meter according to any one of claims 15 to 23, including one or more stationary elements (94, 96) disposed between the metal blade (86) and the portion (60) of the case (40) opposite from the portion (52) thereof in which the opening (54) is provided, thereby
15 limiting displacement of said metal blade towards said portion of the case.

20 25/ A meter according to any one of claims 1 to 24, in which the resilient member (58; 66; 74; 82; 84; 86; 100; 120) is shaped so as to leave a passage for the flow of fluid passing through the meter between the counter and the portion of the case which is opposite from the opening (54; 72).

