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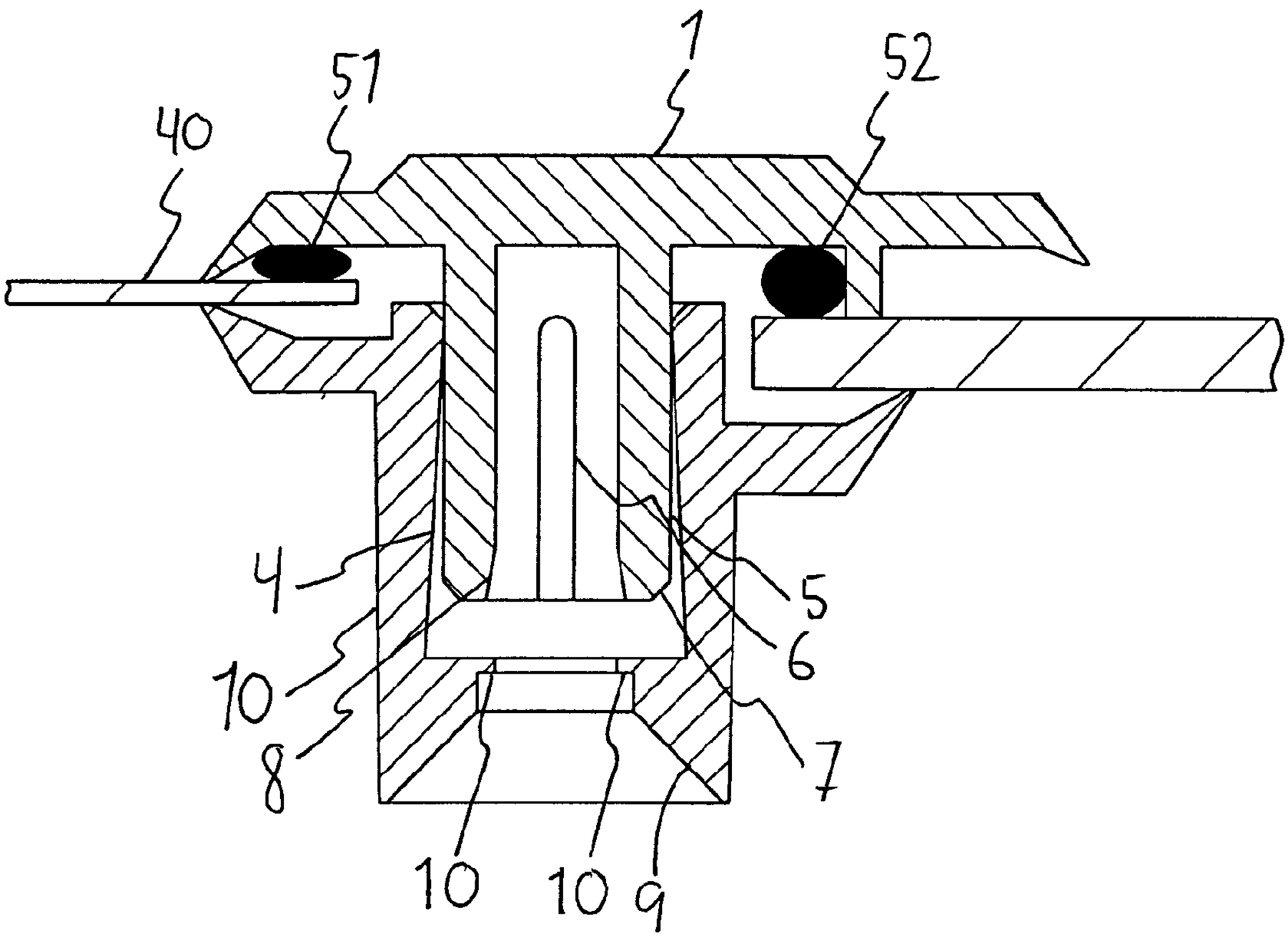


(57) Abrégé/Abstract:
A window frame comprises two frame members (1, 2) adapted to mutual locking engagement, between which members a window pane (50) can be secured, one frame member (1) comprising a tubular portion (5), into which a screw (3) may be driven through the second frame member (2). Said second frame member (2) further comprises an engagement means in the form of a cavity (4), in which the tubular portion (5) may be inserted through an opening in the cavity, the tubular portion (5) being slit in such a manner that it may expand for engagement with the engagement means.

A WINDOW FRAME

A B S T R A C T

A window frame comprises two frame members (1, 2) adapted to mutual locking engagement, between which members a window pane (50) can be secured, one frame member (1) comprising a tubular portion (5), into which a screw (3) may be driven through the second frame member (2). Said second frame member (2) further comprises an engagement means in the form of a cavity (4), in which the tubular portion (5) may be inserted through an opening in the cavity, the tubular portion (5) being slit in such a manner that it may expand for engagement with the engagement means.

The present invention relates to a window frame comprising two frame members adapted to mutual locking engagement, between which members a window pane can be secured, one frame member comprising a tubular portion, into which a screw may be driven through the second frame member.

Window frames of the type mentioned by way of introduction are known, in which a window is retained between two frame members. These window frames are designed in such a manner that the two frame members constitute counterparts fitting into an aperture in a mounting surface such as a wall, a gate, a car body, etc., said frame members overlapping, however, to a certain extent said mounting surface. The two frame members are mounted from each side of the mounting surface, such that the members overlapping the mounting surface clamp said surface, the window being thus secured in the mounting surface.

Such window frames may for instance be manufactured from a thermoplastic material by injection moulding or the like.

To obtain a locking engagement between the two frame members, one of the frame members may as mentioned by way of introduction be provided with one or more tubular portions, whereas the second frame member may be provided with holes at places corresponding to the positioning of the tubular parts on said first-mentioned frame member.

By driving in a screw through the holes to abutment on the frame, the two frame members may be brought into locking engagement, the screw engaging the tubular portion and pulling the two frame members together during the driving in. During the driving in the screw cuts a thread which to the necessary extent ensures the locking.

When such frames are to be mounted, it will typically be a question of one out of three mounting situations. Namely, the primary mounting in a factory, the secondary mounting by a fitter at the end user's or the tertiary mounting by the end user himself.

The primary mounting may for instance be mounting in a factory in a garage door. Mounting in a factory typically involves a large number of items, and the mounting process will as a consequence be rationalized in the form of automation.

The secondary mounting may be mounting of frames with window panes at the end user's. This might for instance include postmounting of windows in an already existing, previously installed garage door, which has not been provided with windows before, such that a fitter has to cut out openings first, or it might include the change to other types of windows and frames.

The tertiary mounting is the one made by the end user himself. In this case it may for instance be a question of replacing a single defect pane in an already existing, previously mounted garage door, which entails that the end user needs to be able to dismount the frame without ruining it, insert a new pane and then mount the frame again.

It is in particular in respect of the tertiary mounting of importance that the mounting may take place without the use of special tools, the common end user not being assumed to possess such special tools. As, moreover, the end user cannot be assumed to possess any essential experience in or knowledge of dismounting (or mounting) window frames, it is important that the end user can intuitively dismount the window frames, such that he, when trying to separate the frame members, does not inadvertently ruin them.

The screw mounting mentioned by way of introduction does meet the requirements made to the secondary and tertiary mounting, the only tool required being a suitable screwdriver for screwing the screws in and out.

The screwing in of the screws does, however, clash with the primary mounting, where there is a need for the quickest possible mounting of the comparatively big number of screws which is to be used for holding the frame together. Screwing in of the screws one by one is, even when a robot is used, fairly time-consuming, and by simultaneous screwing in of several or all screws with several tools the complexity of the required equipment increases, and erection or readjustment time therefore becomes time-consuming.

With a view to automatic mounting, frames have admittedly already been developed, in which screwing is completely avoided, as self-locking members are used which are pressed into one another. These frames do, however, not meet the requirements made to the second and tertiary mounting, due to the fact that either the frames cannot be disassembled without the frame members being ruined, or a separation can only be made by use of a special tool or by someone having a special knowledge of the construction of the locking mechanism.

The object of the present invention is to provide a window frame of the type mentioned by way of introduction, in which window frame the above-mentioned requirements stemming from the varying mounting situations have been met.

The object is according to the invention met by a window frame of the type mentioned by way of introduction and characterized in that said second frame member further comprises an engagement means in the form of a cavity, in which the tubular portion may be inserted

through an opening in the cavity, the tubular portion being slit in such a manner that it may expand for engagement with the engagement means.

In order to obtain the best possible locking by friction or by form it is advantageous if the form and the cross section of the opening correspond to the cross section of the tubular part.

This locking becomes particularly advantageous if the tubular part by driving in of the screw expands to a form substantially complementary to the cavity.

In an embodiment of the invention the cavity is undercut as a truncated cone, preferably in such a way that the mathematical generating line of the truncated cone forms an acute angle, preferably approx. 1°, with the axis of rotation.

This makes it possible to injection mould the frame members in an injection moulding process with double ejection.

In another embodiment of the invention the cavity is undercut as a frustum of a pyramid, preferably such that the edges of the frustum of the pyramid form an acute angle, preferably 1°, with an axis perpendicular to the base and extending through an imaginary pyramidal apex.

It is particularly advantageous if the screw may be driven into the tubular portion without rotation, as the screw at the primary automatic mounting may be pressed in simultaneously with the pressing in place of the two frame members.

To retain the screw in the frame during said automatic mounting, it is advantageous if the bottom of the cavity positioned opposite the opening is provided with means for retaining the screw.

This is obtained in a simple way thereby that the means for retaining the screw comprise a thin membrane.

For aesthetic and practical reasons each of the two frame members may be provided with tubular portions or cavities, respectively. Hereby is obtained that in connection with all three mounting types mentioned, work only has to be done from one side and that the screws will only be visible from one side, for instance the side of a garage door facing away from the street.

The invention will be described in the following with reference to non-limiting examples and with reference to the drawings, in which

Fig. 1 is a sectional view of a first embodiment of a frame member comprising tubular portions,

Fig. 2 is a sectional view of a first embodiment of a frame member comprising engagement means,

Fig. 3 shows in connection with two assembled frame members a sectional view along the line III-III in Figs 1 and 2 through a tubular portion and an engagement means,

Fig. 4 shows in connection with two assembled frame members a sectional view along the line IV-IV in Figs 1 and 2 at a point away from the tubular portions and the engagement means,

Figs 5 and 6 show sectional views corresponding to Figs 3 and 4, the frame member carrying the engagement means being, according to a second embodiment, adapted for mounting in a thicker mounting surface,

Fig. 7 shows a sectional view corresponding to Figs 3 and 4, the frame members being, according to a third embodiment, adapted for mounting in an even thicker mounting surface, and

Fig. 8 shows a sectional view corresponding to Fig. 3 but without inserted mounting screw.

In the following description, identical members in the various embodiments have identical reference numerals.

In Fig. 1 a sectional view is shown of a first frame member 1. The first frame members is preferably injection moulded from a thermoplastic material by an injection moulding process with double ejection. The chosen material can, from a moulding technical point of view, be practically any thermoplastic material, but for reasons of use a plastic type having good weather resistance, including resistance towards UV sunlight, will typically be chosen. Acrylic-styrene-acrylonitrile (ASA) will thus be preferred, said material having good weather resistance, but dyed acrylonitrile-butadiene-styrene (ABS) or polyvinyl chloride (PVC) may for instance also be used.

The first frame member 1 is provided with longitudinal raised members 30 which contribute to the rigidity of the frame and prevent sink marks from the moulding process. These raised members 30 fit, when the frame members 1, 2 have been assembled, into recesses 31 in the second frame member 2. The raised members 30 may be provided with longitudinal ribs 32 contributing to the positioning of the frame members 1, 2 relative to each other during the mounting.

In Figs 3-7 sectional views are shown through different embodiments of the window frame comprising the two frame members 1, 2 in assembled, finished condition. In this condition the two frame members 1, 2 clamp a window pane 50 and a mounting surface 40. The window pane 50 may be a single-layer pane or a multi-layer pane, but is here only exemplified as a single-layer pane. The mounting surface 40 may be of varying make-up. In the simplest make-up (Figs 2 and 3) it is constituted of a thin plate of for instance metal. For certain purposes the mounting surface 40 will consist of a thick laminate, for instance plastic foam 42 of a given thickness, and one or more layers of a strong

skin 41 protecting the plastic foam 42 and giving the mounting surface a suitable aesthetic appearance. The skin 41 may for instance be a non-foamed plastic layer or a metal plate. Such laminated mounting surfaces are for instance used if noise reduction or heat insulation is desirable.

For sealing of the window sealing strips 51, 52 in the form of elastic sealing material may be inserted along one of the frame members. These sealing strips 51, 52 will preferably be placed against the frame member 1 which is positioned outdoors.

When assembled, the two frame members 1 are in locking engagement with one another. To obtain that, a tubular portion 5 is positioned on the frame member 1, said tubular portion being in the embodiment shown of substantially cylindrical shape.

Typically, a large number of cylindrical portions will be present, as will be seen from Fig. 1, but the following description will be given as if only one single cylindrical portion were present.

The cylindrical, tubular portion has, which will best be seen in Fig. 8, a cross section which is constant lengthwise, and a height which is smaller than the height of the raised members 30. The tubular portion 5 is furthermore provided with longitudinal slits 6 and a tapering 7 at the free end. The tapering 7 may in principle extend over the major part of the height of the cylinder, viz. such that the cylinder in practice gets close to a conical form, a condition being that it will not affect the desired effect of the cylinder as described in the following. Moreover, the interior cavity of the cylinder may have an area 8 with increased cross-section at the mouth. This increased cross sectional area facilitates the positioning and the driving in of a screw 3. In the embodiments shown

the number of slits is two, of which only one is shown in Figs 3-8. There may be more than two, and it will in particular in case of a polygonal cross section of the tube be advantageous with a number corresponding to the number of sides of the polygon, the slits thus suitably positioned at the corners of the polygon.

The tubular portion 5 is in the assembled condition of the frame placed in a cavity 4 in the second frame 2. The cavity 4 has in the embodiment shown the shape of an undercut truncated cone. Preferably, the mathematical generating line of the truncated cone forms an acute angle of approx. 1° with the axis of rotation of the truncated cone. For illustrative reasons the angle is, however, magnified in the figures.

In another embodiment, not shown, the cavity has the shape 4 of an undercut frustum of a pyramid. It should be noted that the base of the frustum of the pyramid is not necessarily quadratic, but may have any other polygonal form, such as a triangular, hexagonal, octagonal or rectangular form.

To ensure the locking engagement between the two frame members 1, 2 a screw is, when the frame is in its assembled condition, driven through the second frame member 2 into the tubular portion 5. Hereby the tubular portion is expanded on account of the fact that the cylinder segments between the slits 6 are bent outwards. Compare for instance Figs 8 and 3.

When the cylinder segments are bent outwards in this manner, a form locking is in principle obtained, when the cross sectional area of the expanded, tubular body exceeds the cross sectional area of the opening, through which it is inserted in the cavity 4 having the form of a truncated cone. In practice, certain reservations should be made, however, in respect of

deformability of the materials, from which the frame members are made.

Irrespective of the fact that in the drawing a gap is shown between the cylinder segments and the wall of the truncated cone, the geometry will preferably be chosen such that the cylinder segments are bent so far outwards that they abut the wall of the truncated cone and constitute a form substantially complementary to the form of the truncated cone. Hereby is ensured that, in addition to the highest possible degree of form locking between the geometries, the highest possible friction is obtained between the outwards bent segments and the wall of the truncated cone, which further contributes to the locking.

Tests have shown that the friction and the form locking in itself is sufficient for holding the two frame members 1, 2 together. This means that the abutment 9 of the screw head on the second frame member 2, contrary to what is the case of the prior art described by way of introduction, is of no importance for the locking. These tests have further shown that the screw 3 may be driven in straight away without rotation, i.e. it may for instance be pressed or rammed in.

The screw will, however, on account of that normally to a certain extent ruin the interior surface of the tubular portion 5. It may at the pressing in fray the comparatively soft plastic material and it may, at a possible screwing out in connection with a subsequent separation of the frame, to a certain extent cut a thread in the material.

This is, however, of little practical importance, as this will not be a process which is to be repeated very often. Typically, the screw will be driven in at the primary mounting in a factory and then never be

removed again.

It should, however, be mentioned in this connection that the above-mentioned ruining may be prevented by using a screw which has no sharp thread, the screw only having to keep itself in place on the interior of the tubular portion.

As mentioned above, it is possible to unscrew the screws 3 in order for instance to replace a defect window pane 50. Although this will very seldom be necessary, it should, however, be possible according to the invention. With a view to this only a suitable screwdriver is needed for unscrewing the screws 3, following which the frame may be disassembled and a new window pane inserted. Then the frame may be reassembled merely by pressing the screws 3 in with a hard instrument, hit them with a hammer, or screw them in anew with the screwdriver.

It is on account of the use of common screws 3, which are visible, intuitively obvious for the end user, how the frame is to be disassembled, irrespective of whether the screws 3 originally at the mounting in the factory have been driven in without rotation.

To facilitate the automatized mounting at in factory of the frame of for instance a garage door, fastening means 10 for the screw 3 may be positioned in the base of the undercut truncated cone 4. The fastening means may be a thin membrane, which is penetrated by the screw 3 in connection with the premounting of the screws. The membrane may also, as will be seen in Fig. 8, be broken in advance, i.e. be provided with an opening having slightly smaller diameter than the screws.

PATENT CLAIMS

1. A window frame comprising a first and a second frame members adapted to mutual locking engagement, between which frame members a window pane can be secured, the first frame member comprising a tubular portion, into which a screw is driven through the second frame member, characterized in that said second frame member further comprises an engagement means in a form of a cavity, in which the tubular portion is insertable through an opening in the cavity, the tubular portion being slit in such a manner that it expands for engagement with the engagement means.

2. The window frame according to claim 1, wherein a shape and a cross-sectional area of the opening correspond to a cross-section of the tubular portion.

3. The window frame according to claim 1, wherein the tubular portion, by a driving in of the screw, expands to a form substantially complementary to a form of the cavity.

4. The window frame according to claim 1, wherein the cavity is undercut as a truncated cone.

5. The window frame according to claim 4, wherein a mathematical generating line of the truncated cone forms an acute angle with an axis of rotation.

6. The window frame according to claim 4, wherein the acute angle is of about 1°.

7. The window frame according to claim 1, wherein the cavity is undercut as a frustum of a pyramid.

8. The window frame according to claim 7, wherein edges of the frustum of the pyramid form an acute angle with an axis perpendicular to a base and extending through an imaginary pyramidal apex.

9. The window frame according to claim 8, wherein the acute angle is of about 1°.

10. The window frame according to claim 1, wherein the screw is driven into the tubular portion without rotation.

11. The window frame according to claim 1, wherein a bottom of the cavity positioned opposite the opening is provided with means for retaining the screw.

12. The window frame according to claim 11, wherein the means for retaining the screw comprise a thin membrane.

13. The window frame according to claim 1, wherein each of the frame members is provided with one of: i) tubular portions and ii) cavities, respectively.

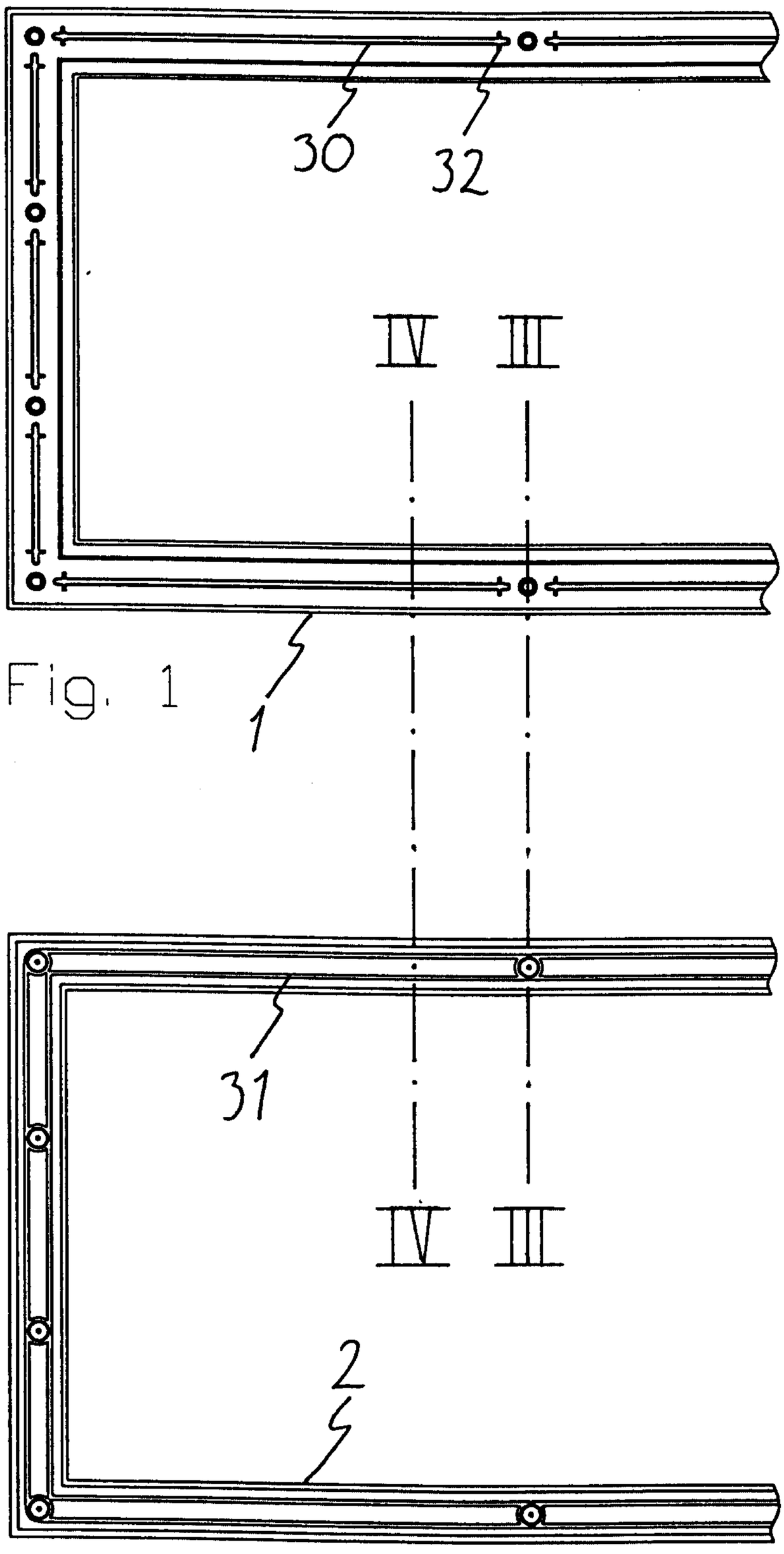


Fig. 1

Fig. 2

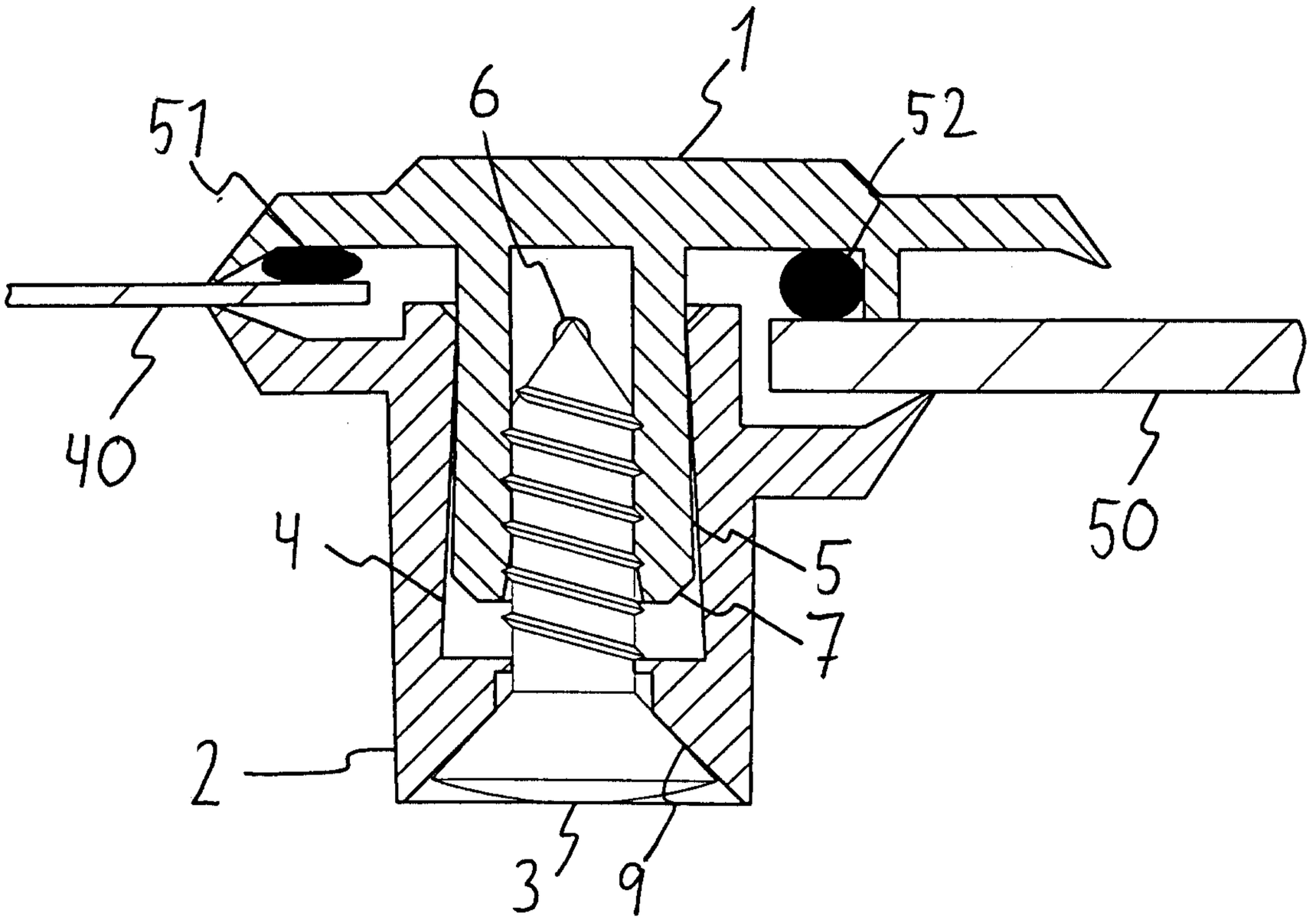


Fig. 3

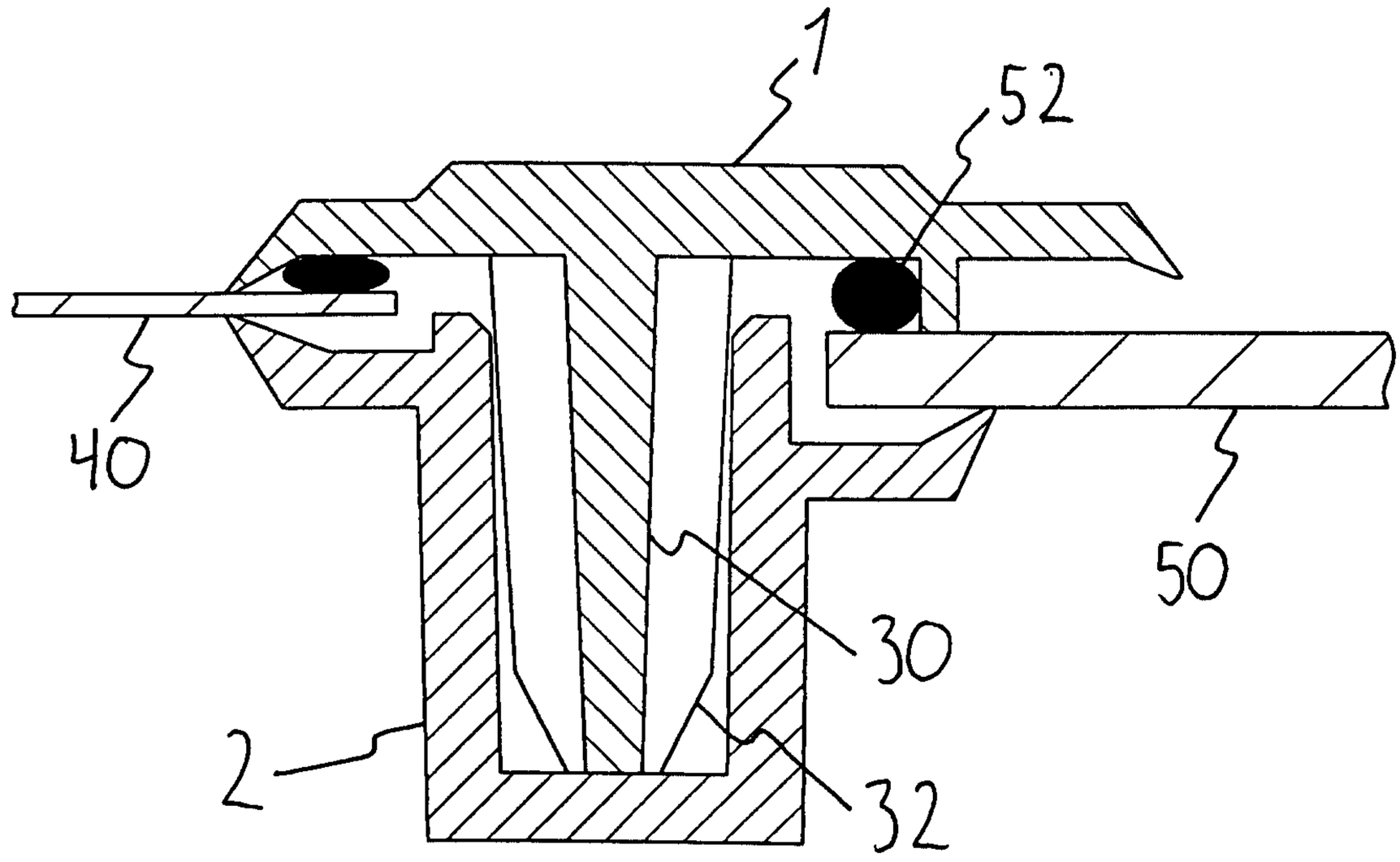


Fig. 4

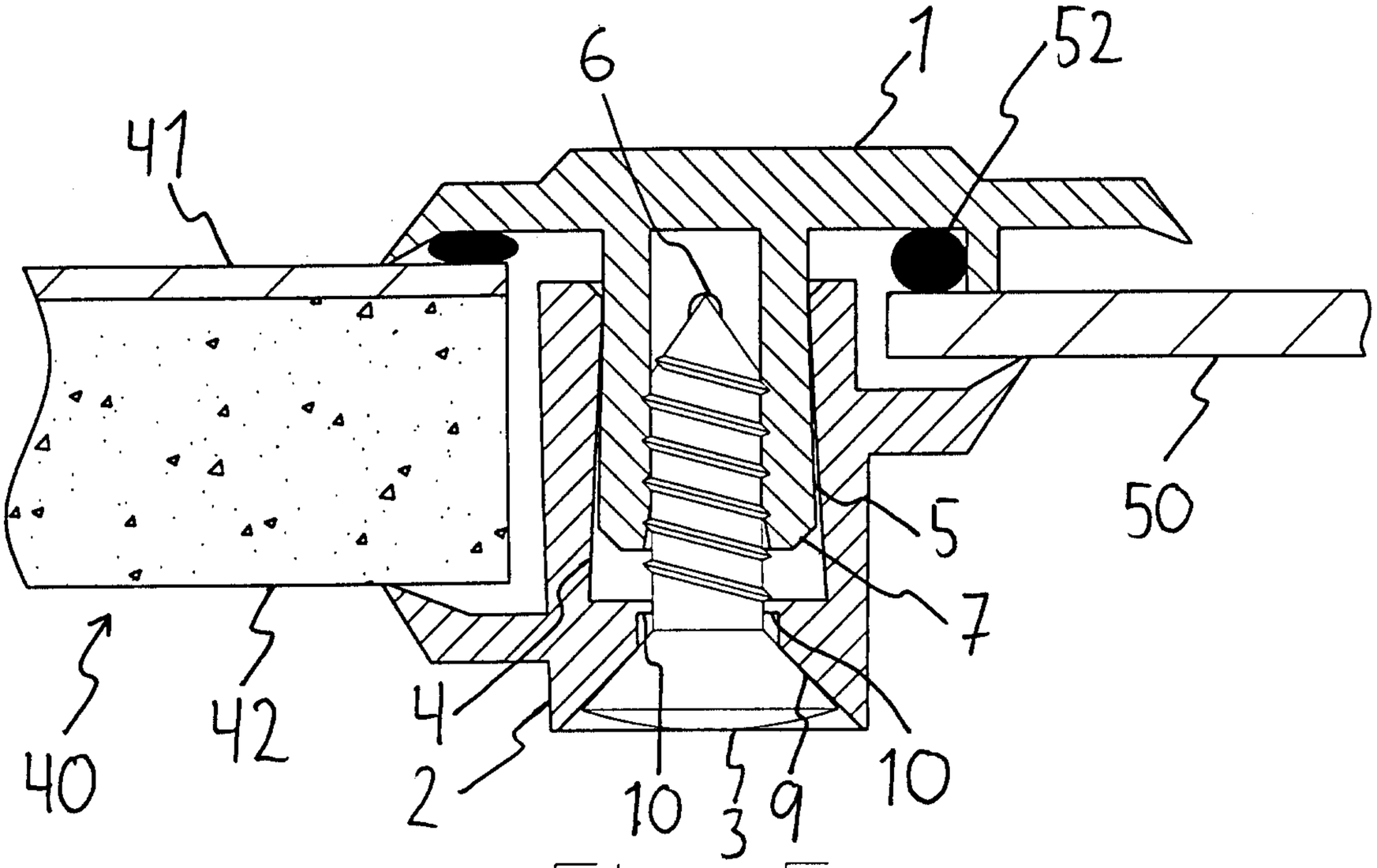


Fig. 5

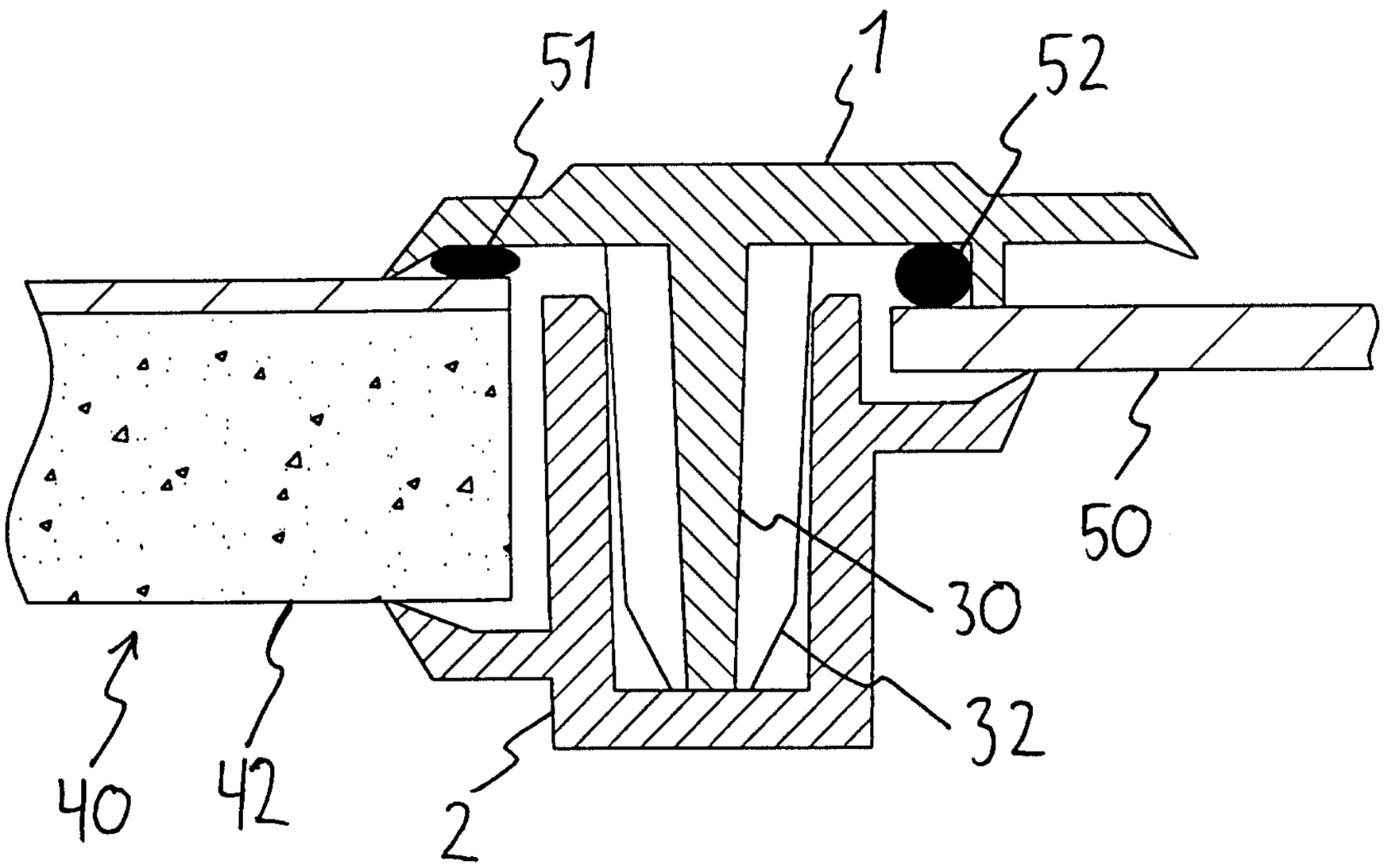


Fig. 6

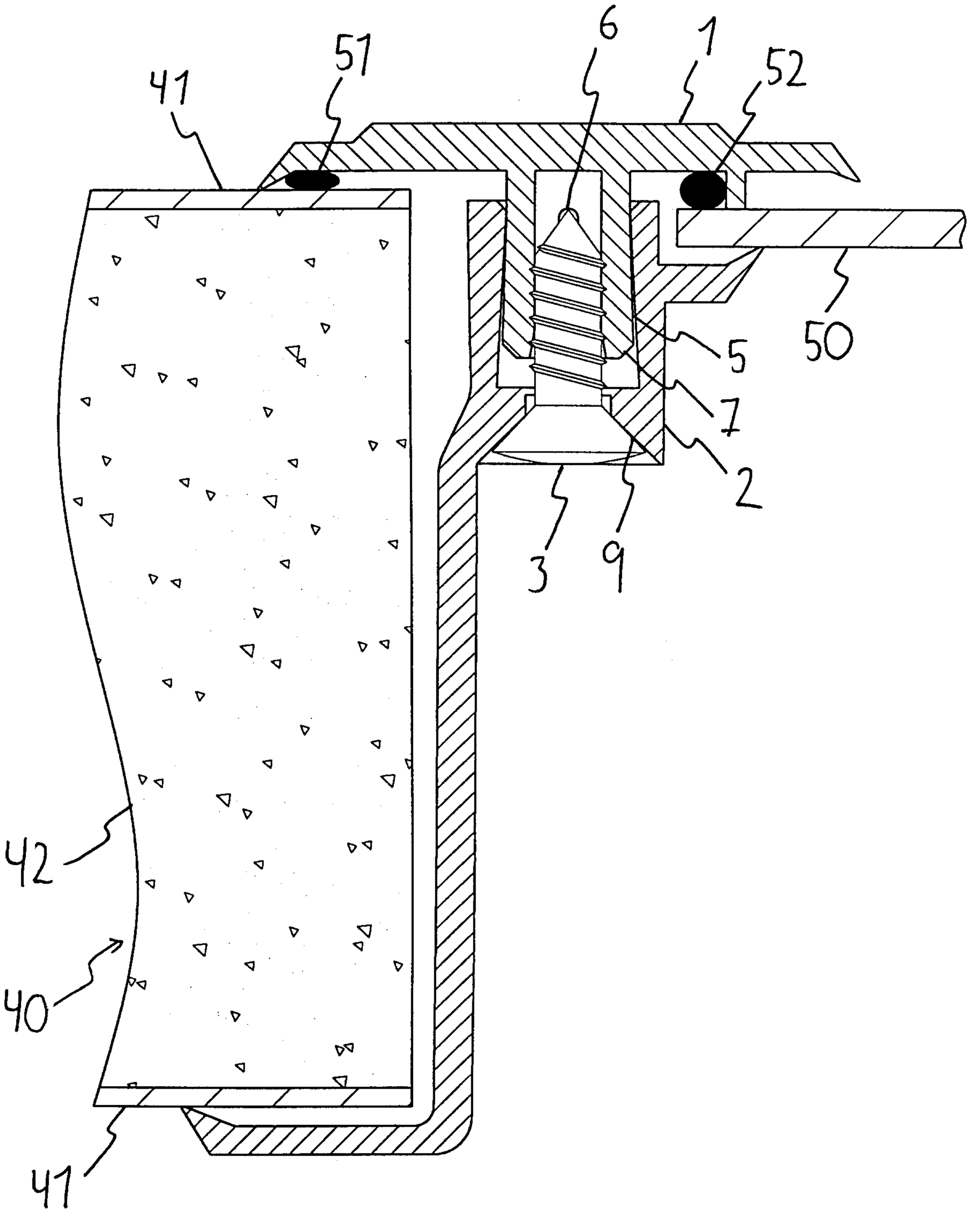


Fig. 7

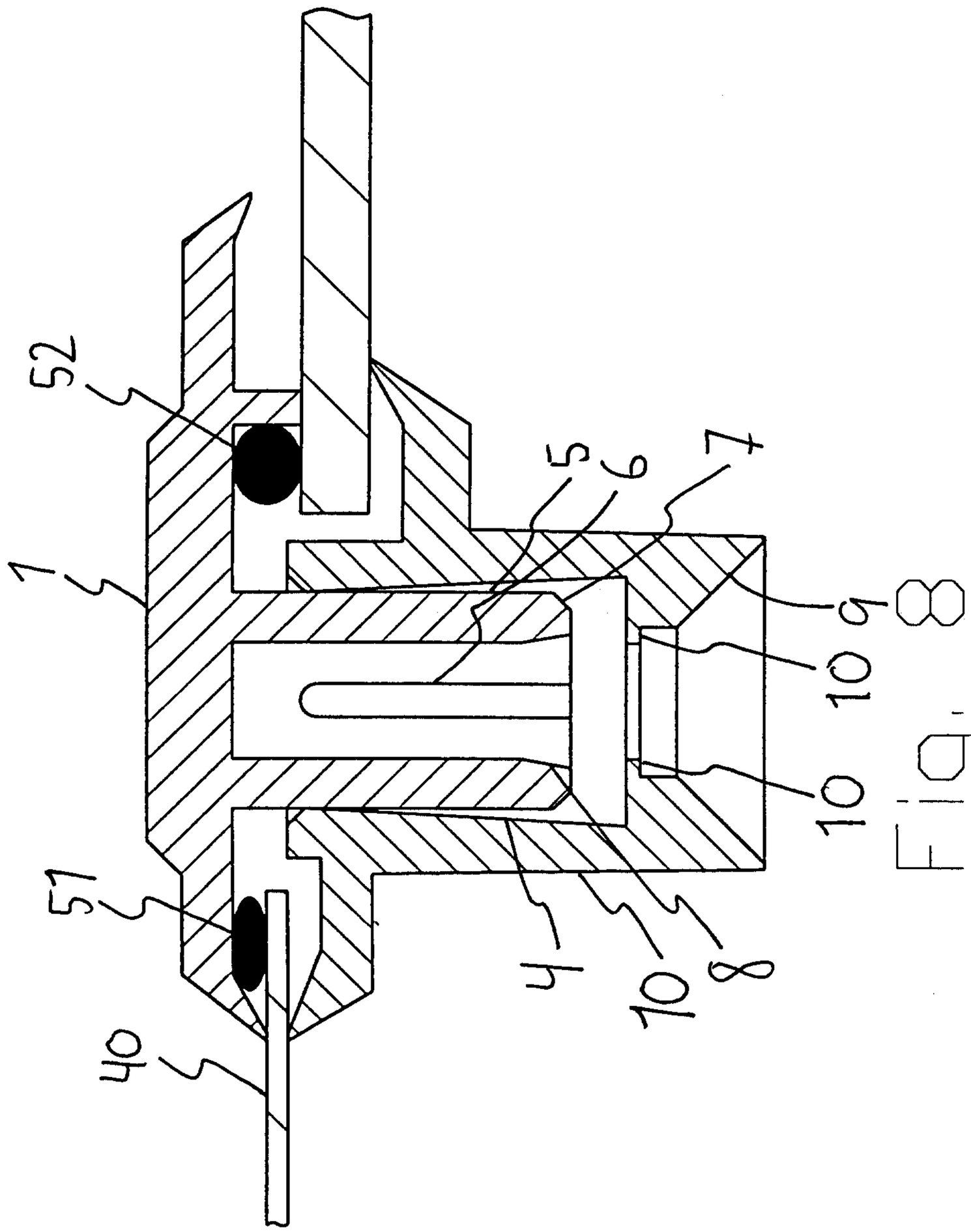
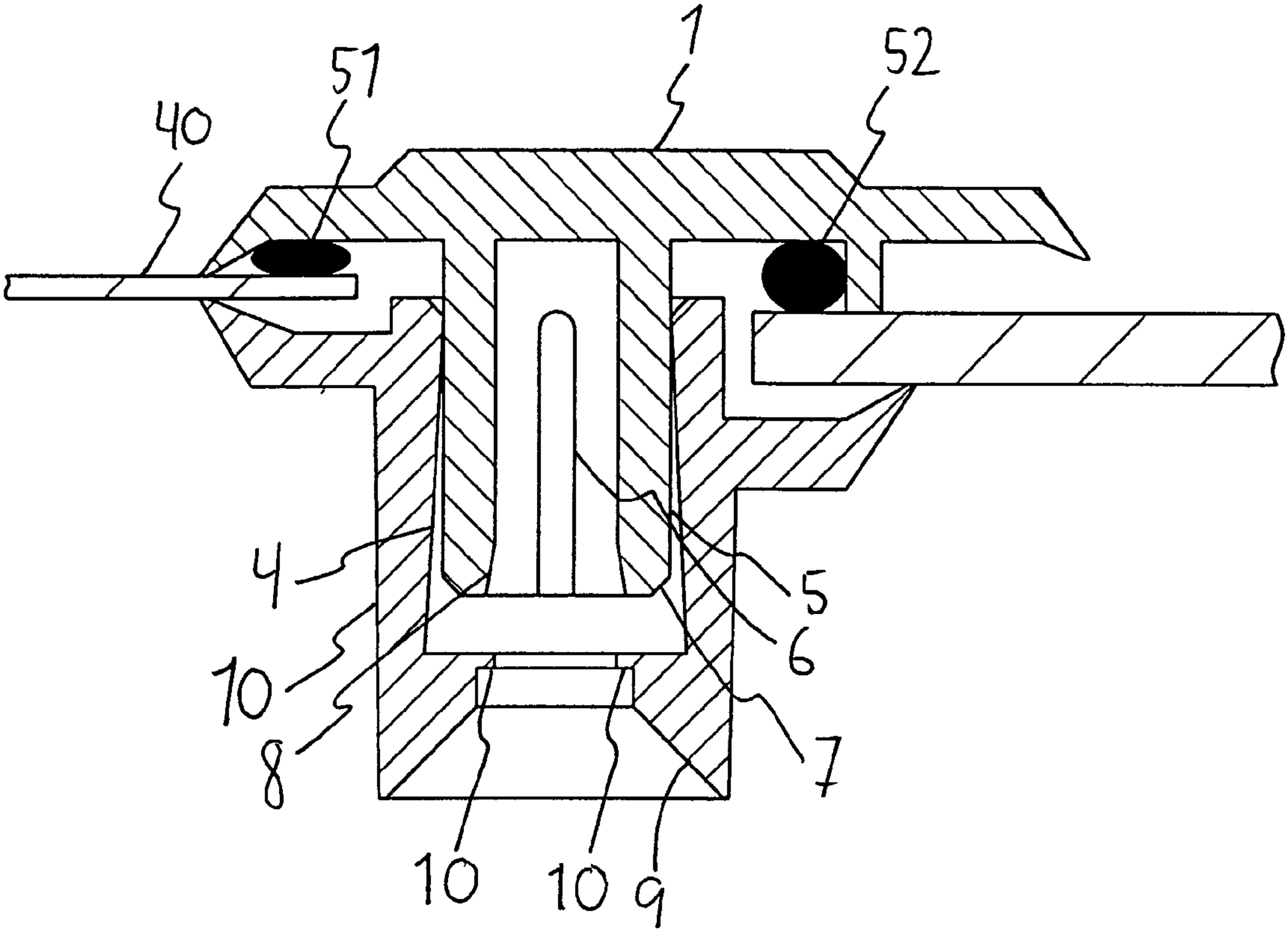


Fig. 1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