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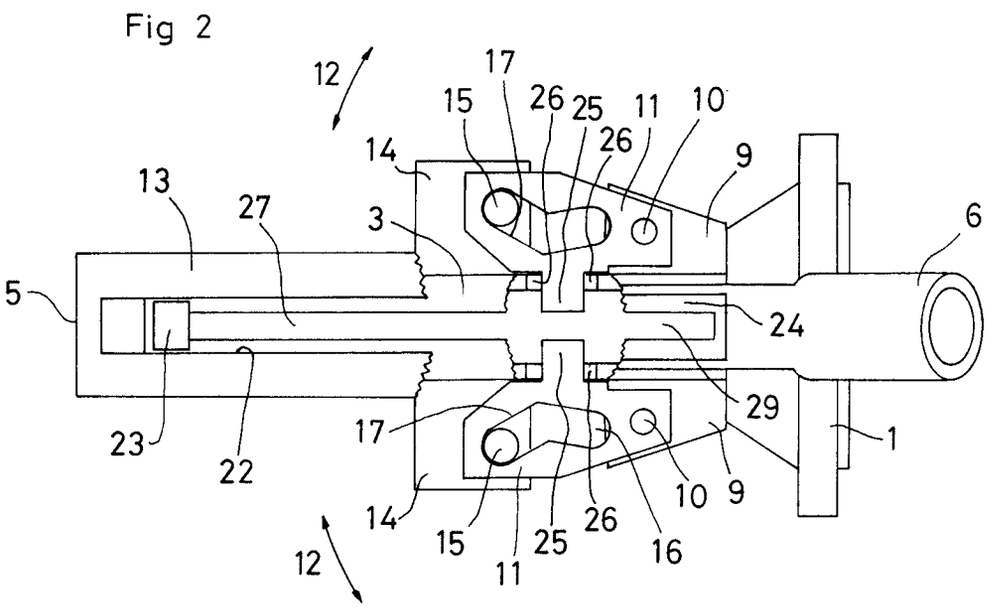
(54) Device for a nailing machine.

(57) A nail gun has a channel (3) to which a nail is fed in order thence to be shot into an object by means of a driver (4). A retainer member is located in the channel (3) and retains the nail prior to firing. The retainer member consists of two heels (25) insertable in opposing directions through the wall of the channel (3) via openings (26) and grasping the nail. The heels (25) are disposed on pivotal jaws (11) which, via pins (15) and curved grooves (16) are connected to a sleeve (13) axially displaceably disposed about the channel (3) in such a manner that retraction of the sleeve (13) entails withdrawal of the heels from the channel (3). The sleeve (13) is also connected to the safety mechanism of the nail gun such that firing of the gun is only possible after withdrawal of the heels (25) from the channel (3).

Fig 2



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TECHNICAL FIELD

The present invention relates to an apparatus in a nail gun or the like of the type which has a channel to which a nail, screw or similar object is fed in order thence to be driven into the object which is to be nailed, by means of a driver in the nail gun, the channel being provided with retainer members for positionally fixing the nail.

BACKGROUND ART

Nail guns of the type mentioned by way of introduction are previously known in the art. In these nail guns, use has been made of various types of passive retainers for positionally fixing the nail in the channel before the nail gun is fired, so that, for example, the nail does not drop out if the nail gun is pointed with the muzzle facing downwards. Such retainers may have comprised numerous variations of pretensioned or spring-loaded gripping devices or springs which extend partly into the channel and there cooperate with the nail. When firing takes place, the intention is that these springs or gripping devices are, against their pretensioning of the nail or the driver driving the nail, to be moved aside so that the nail and possibly also the driver may pass for driving home the nail.

In practical operation of such prior art nail guns, it has proved that the service life of such resiliently yieldable retainers is extremely short. The impact against or speed of movement imparted to the retainer members when these are urged aside with great force by the nail or the driver are sufficient rapidly to wear out the retainer members.

Corresponding designs and constructions have also been relevant in applications in similar contexts such as in screwdriver guns, automatic rivet guns etc.

PROBLEM STRUCTURE

The present invention has for its object to devise an apparatus of the type mentioned by way of introduction, the apparatus being designed in such a manner as to obviate the above-mentioned problems. Thus, the present invention has for its object to realize an apparatus which provides for a positive withdrawal of the retainer members in the channel accommodating the nail immediately before the nail gun is fired. The present invention is also intended to realize a simple and reliable apparatus which may be manufactured at low cost.

SOLUTION

The object forming the basis of the present invention will be attained if the apparatus is characterized in that the retainer members comprise at least one but preferably two gripping devices which, in a rest position, are located at least partly inserted in the channel in order there to cooperate with the nail for positional fixing, and which, in an activated position, are located outside the channel for release of the nail, the gripping devices being connected to or synchronized with a safety or discharge mechanism in the nail gun in order to be switched to activated position immediately prior to firing of the nail gun.

One preferred embodiment of the present invention is also suitably characterized in that the channel has opposing openings in its defining wall, the gripping devices being insertable towards one another through these openings, that the gripping devices are disposed each on one pivotal jaw, that the jaws are pivotal under the action of a shiftable sleeve disposed about the channel such that the gripping devices are switched to activated positions when the sleeve is retracted inwardly towards the nail gun.

The preferred embodiment is further suitably characterized in that the sleeve is provided with drive means which are located in grooves in the jaws, the grooves having obliquely directed portions so that their ends located most distally from the nail gun are at greater mutual spaced apart relationship than their other portions.

Further advantages will be achieved if the apparatus according to the present invention is also given one or more of the characterizing features as set forth in appended Claims 4 to 6.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

Fig. 1 is a side elevation of the apparatus according to the present invention; and

Fig. 2 is a top plan view of the apparatus according to the present invention, certain parts having been dismantled/cut away in order to illustrate interior components.

DESCRIPTION OF PREFERRED EMBODIMENT

In its most generic form, the present invention implies that the retainer members are provided with mechanical, pneumatic, hydraulic, electric or similar drive means which realize an active and positive

withdrawal of the retainer members - so that the nail is released - immediately prior to firing of the nail gun, these drive means being suitably connected so as to be activated by the safety or discharge mechanism of the nail gun.

This fundamental principle may naturally also be applied to screwdriver guns, automatic rivet guns and similar types of equipment.

Referring to the Drawings, in Fig. 1 reference numeral 1 relates to a mounting flange by means of which the apparatus according to the present invention is secured on a nail gun of conventional type. The nail gun is provided with drive means (not shown in detail on the Drawing) which are movable in accordance with the double-headed arrow 2 into a tubular channel 3 connecting to the mounting flange 1. On driving home of a nail, the nail is located interiorly in the channel 3 and the head of the nail is struck by the driver whose dimensions and position may be intimated via the broken lines 4. On firing of the nail gun, the driver 4 thus moves at high speed and with great force in a direction to the left in Fig. 1, in such instance shooting the nail ahead of it out of the apparatus so that the nail departs from the apparatus at its muzzle or discharge end 5.

The apparatus has a connection 6 for the supply of loose nails which are thus fed singly via a hose (not shown) which is fixed in the connection 6. A nail guide 7, which will be described in greater detail below, connects to the left-hand end of the connection 6 in Fig. 1. A dismountable guide hood 8 is further connected to the nail guide 7, the purpose of the hood being to lead down the forward end of the nail to the firing position in the channel 3. In such instance, the purpose of the nail guide 7 is to hold the head of the nail and lead the head from the direction of insertion via the connection 6 obliquely downwards to the axial position in the channel 3.

Permanent anchorage lugs 9 are disposed on opposing sides of the channel 3 and in association with the mounting flange 1. A pivot shaft 10 extends through the two anchorage lugs 9 aside the channel 3, the shaft being transversely directed in relation to the longitudinal direction of the channel 3 and serving for the pivotal securement of a jaw 11 on either side of the channel 3. As a result of the above-described design and construction with anchorage lugs 9 and pivot shafts 10, it will be perceived that both of the jaws 11 are pivotal in a diametric plane to the channel 3 towards and away from one another. This pivoting action is illustrated in Fig. 2 by means of the arrows 12.

At the discharge end 5 of the channel, there is disposed an actuator which is, on application of the discharge end of the nail gun to a workpiece, displaceable or movable in towards the nail gun. The actuator is operative, on its movement towards the nail gun, to achieve switching of the retainer members to their positions withdrawn from the channel 3. Ideally, the actuator is also included in or connected to the safety or discharge mechanism of the nail gun.

Surrounding the channel 3, there is provided a sleeve 13 which is displaceable in its longitudinal direction and along the channel, which constitutes the above-mentioned actuator, and which has, at its end located at the nail gun, opposing pairs of securement lugs 14. Between each pair of securement lugs 14, there extends a pin or driver 15 (vertical in Fig. 1) which is disposed in a groove 16 in each jaw 11. The portions 17 of the grooves 16 located most distally from the nail gun are obliquely directed in such a manner that their ends located most distally from the nail gun are at greater spaced apart relationship than is the case for the portions of the grooves located more proximally to the nail gun. As a result of this oblique arrangement of the grooves, the drive means 15 will, if these are displaced in a direction to the right in Fig. 2, pivot both of the jaws 11 away from one another so that they are removed from the channel 3.

The above-described arrangement with the grooves 16 and drive means 15 constitutes a mechanical drive arrangement for the retainer members, the drive arrangement consisting of a positively operating cam surface and dog device.

The above-mentioned grooves 16 are further provided with portions located more proximal the nail gun, these portions being, after partial retraction of the sleeve 13 and, consequential pivoting of the jaws 11 away from one another, approximately parallel with the channel 3 so that a continued retraction of the sleeve 13 may take place without the jaws being influenced in either direction. It should be observed that, during this movement, the jaws are, however, locked in their outwardly pivoted positions outside the inner cross section of the channel 3.

On its underside, the sleeve 13 has an operating rod 18 with a spring anchorage 19. In addition, the mounting flange 1 has a spring anchorage 20, a compression spring 21 being disposed between these spring anchorages and striving to displace the sleeve 13 in a direction away the nail gun, i.e. in a direction to the left in Fig. 1. The operating rod 18 is connected to the safety mechanism of the nail gun in such a manner that, when the sleeve 13 is retracted in a direction towards the nail gun, the nail gun is armed so as to make possible discharge of a nail. In this instance, the pattern of movement is adapted in such a manner that the first portion of the retraction movement of the sleeve 13 realizes maximum opening of the jaws 11 away from one

another, while the subsequent retraction of the sleeve 13 realizes arming and possibly also firing of the nail gun.

So as not to obstruct the movements of the sleeve 13, a longitudinal groove 22 is provided in its upper side, whereby the channel 3 is exposed. The lower edge portion of the guide hood 8 is accommodated in this groove and thus, with its lower side, abuts against the upper side of the channel 3. The channel 3 is provided with a locking heel 23 for securing the forward end of the guide hood 8, the heel also restricting the movement of the sleeve 13 in a direction to the right in the Figures.

A seat 24 is correspondingly provided on the nail guide 7 for cooperation with the guide hood 8 so that this held in the correct position. Furthermore, the guide hood may be secured by means of of a screw (not shown on the Drawing).

The above-described retainer members are disposed on the jaws 11 on their mutually facing sides, in the form of projecting heels 25 which extend from opposing sides through apertures 26 in the wall of the channel 3 into the free space of the channel. The distance between the heels 25 is adapted so as to permit passage of the nail shaft, but not the head of the nail, see Fig. 2. It will also be apparent from this Figure that the sleeve 13 has, in its upper side, a longitudinal groove 27 which is of approximately the same width as the distance between the heels 25 when these are located inserted in the channel 3.

The nail guide 7 has interiorly strip-shaped guides 28, which are intimated by broken lines in Fig. 1 and which form therebetween a groove 29 which is suitably of the same width as the distance between the heels 25 and the width of the groove 27.

On loading of a nail via the connection 6, the nail arrives tip-first in a direction as illustrated by the arrow 30 in Fig. 1. In this instance, the tip of the nail will pass through the groove 29 so that the nail will, with the greater part of its length, home interiorly in the guide hood 8. Thereafter, the head of the nail strikes both of the guides 28 and the head is led obliquely downwards along the guides in order finally to assume a position behind (the right-hand side of Fig. 2) the heels 25. In this instance, the shaft of the nail will also have passed through the guide hood 8 which has an inner width (at right angles to the plane of the drawing paper of Fig. 1) which is approximately equal to the width of the groove 27, and down through the groove 27 into the channel 3 so that the nail thereafter lies axially centered in the channel, with its head on the right-hand side of the heels 25 in Fig. 2. In this position, the nail is positionally fixed in a direction to the left in Fig. 2 by cooperation with the heels 25, and in a direction to the right by cooperation with the driver 4 (not shown).

When one firing cycle is to be completed, the nail gun is pressed with its nose against the workpiece, whereafter the sleeve 13 is retracted or cocked in towards the nail gun. At this point, the pins 15 will be displaced along the oblique portions 17 of the grooves 16 so that the jaws 11 are pivoted away from one another, and thereby also the heels 25 are drawn out of the channel 3. When this pivoting has been completed, the nail is not prevented from moving in a direction to the left in the Figures, since the heels are, in this position, located outside the cross section of the channel. by now, the pins 15 will have entered into the portions of the grooves 16 located most proximal the nail gun and can continue to move in these grooves in a direction to the right in the Figures, so that an arming of the gun takes place by the action of the operating rod 18. After arming, the gun is fired and the nail is driven out of the channel 3 and into the workpiece. When the pressure against the sleeve 13 is subsequently released, the spring 21 forces the sleeve back in a direction to the left in the Figures, for which reason the jaws 11 are once again pivoted towards one another with the heels into the cross section of the channel 3. In this position, a new nail may be loaded via the connection 6 and home in a positionally determined location for discharge in the channel 3.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

According to the present invention, it is not necessary that the actuator be designed as the above-described sleeve 13. As an alternative to the sleeve, use may be made of a rod (possibly two) shiftably guided along the channel 3. Such a rod may, in its end facing towards the nail gun, be provided with a fork which carries the drivers, i.e. the pins 15.

In another alternative, the actuator may be designed to operate an electric contact, a pneumatic or hydraulic valve etc., which in turn controls the operation of the drive means working the retainer members. Such a contact or valve may, naturally, also be connected to the safety or discharge mechanism of the nail gun.

According to the present invention, it is also possible to dispose the retainer members and their drive means quite separate from the safety and discharge mechanism, in which event it is, however, necessary to ensure that the function of these systems (mechanisms) be synchronized so that the retainer members are located in their activated positions (withdrawn from the channel 3) before firing of the nail gun can take place. In this alter-

native, the apparatus according to the present invention may, thus, comprise two systems which are wholly or partly parallel to one another.

In the above-described embodiments, the jaws 11 with the heels 25 have been described as being placed relatively far into the channel 3 in a direction from the muzzle or discharge end 5, whereby engagement took place against the nail head. However, according to the present invention, the jaws 11 may be placed closer to the muzzle so that the engagement from the heels 25 is effected against the nail shaft. In the embodiments above, the heels 25 extend but partly into the cross section of the channel 3 so that space is left for the nail shaft.

According to the present invention, the jaws 11 with the heels 25 may also be placed at the muzzle or discharge end 5 in order there to engage with the end of the nail. In this case, the heels 25 extend further into the cross section of the channel, possibly so far that the heels meet one another or wholly cover the cross section of the channel.

The present invention may be further modified without departing from the spirit and scope of the appended Claims.

Claims

1. An apparatus in a nail gun or the like, and of the type which has a channel (3) to which a nail, screw or similar object is fed in order thence to be driven into that object which is to be nailed, by means of a driver (4) in the nail gun, said channel being provided with retainer members for positional fixing of the nail, **characterized in that** the retainer members comprise at least one, but preferably two gripping devices (25) which, in a rest position, are located at least partly inserted in the channel (3) in order there to cooperate with the nail for positional fixing, and which, in an activated position, are located outside the channel (3) for release of the nail, the gripping devices (25) being connected (18) to or synchronized with a safety or discharge mechanism in the nail gun in order to be switched to activated position immediately prior to firing of the nail gun.

2. The apparatus as claimed in Claim 1, **characterized in that** the channel (3) is provided with opposing openings (26) in its defining wall, the gripping devices (25) being insertable towards one another through these openings; **that** the gripping devices are each disposed on their pivotal jaw (11); **that** the jaws are pivotal under the action of a shiftable sleeve (13) disposed about the channel (13) such that the gripping devices are switched to the activated positions when the sleeve is retracted inwardly towards the nail gun.

3. The apparatus as claimed in Claim 2, **characterized in that** the sleeve (13) is provided with drive means (15) which are located in grooves (16) in the jaws (11), the grooves having obliquely directed portions (17), such that their ends located most distally from the nail gun are at greater mutually spaced apart relationship than their remaining parts.

4. The apparatus as claimed in Claim 3, **characterized in that** the grooves (16) have, in association with their obliquely directed portions (17), inner portions which extend towards the nail gun; **that** the inner portions are substantially parallel with the channel (3) when the gripping devices (25) have been switched to the activated positions, whereby the sleeve (13) is further displaceable towards the nail gun, with the gripping devices retained in the activated positions, arming of the nail gun being arranged to take place during said further displacement.

5. The apparatus as claimed in any one of Claims 2 to 4, **characterized in that** the sleeve (13) is disposed to operate the safety mechanism of the nail gun.

6. The apparatus as claimed in any one of Claims 2 to 5, **characterized in that** the sleeve (13) is spring-loaded away from the nail gun.

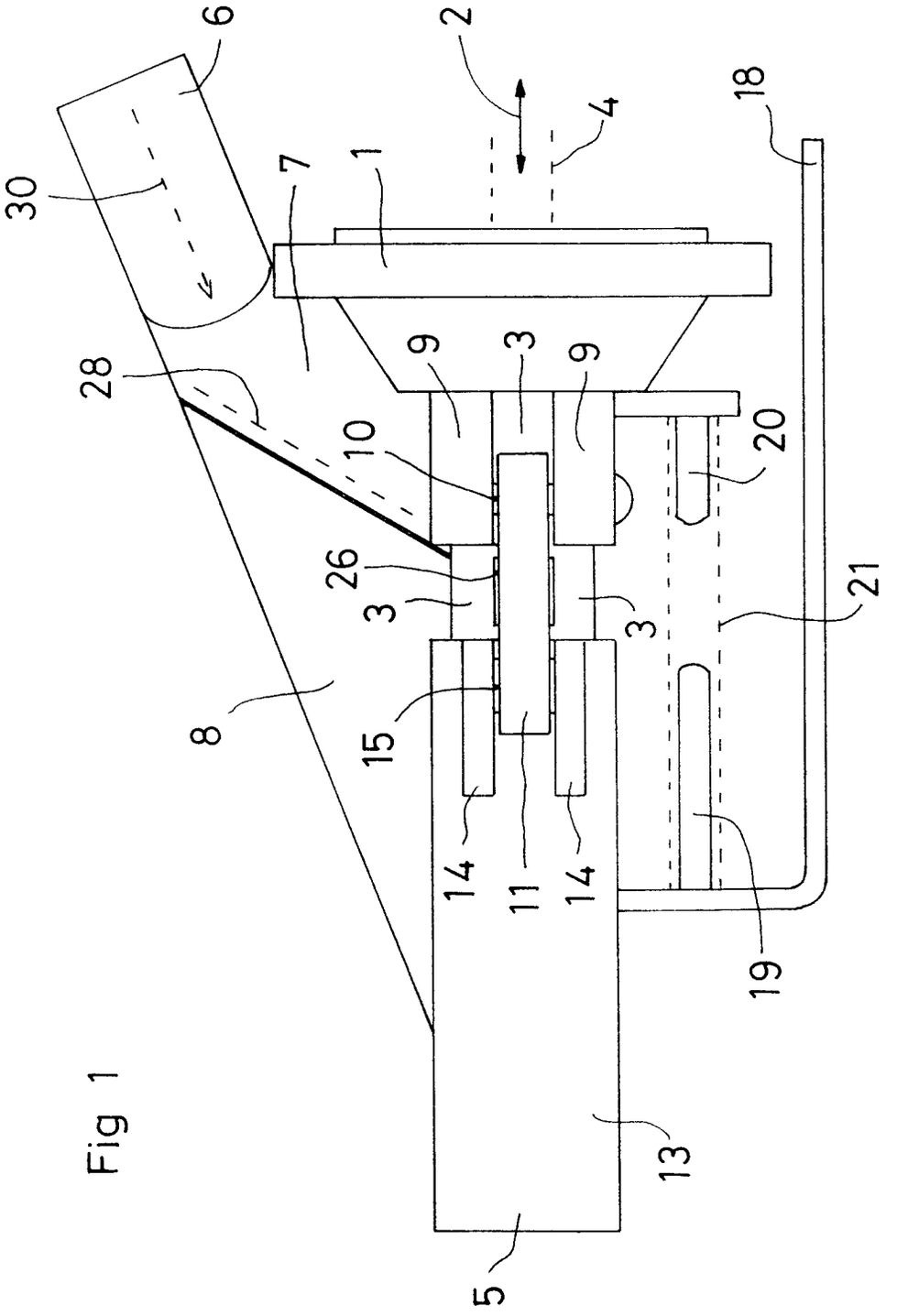

Fig 1

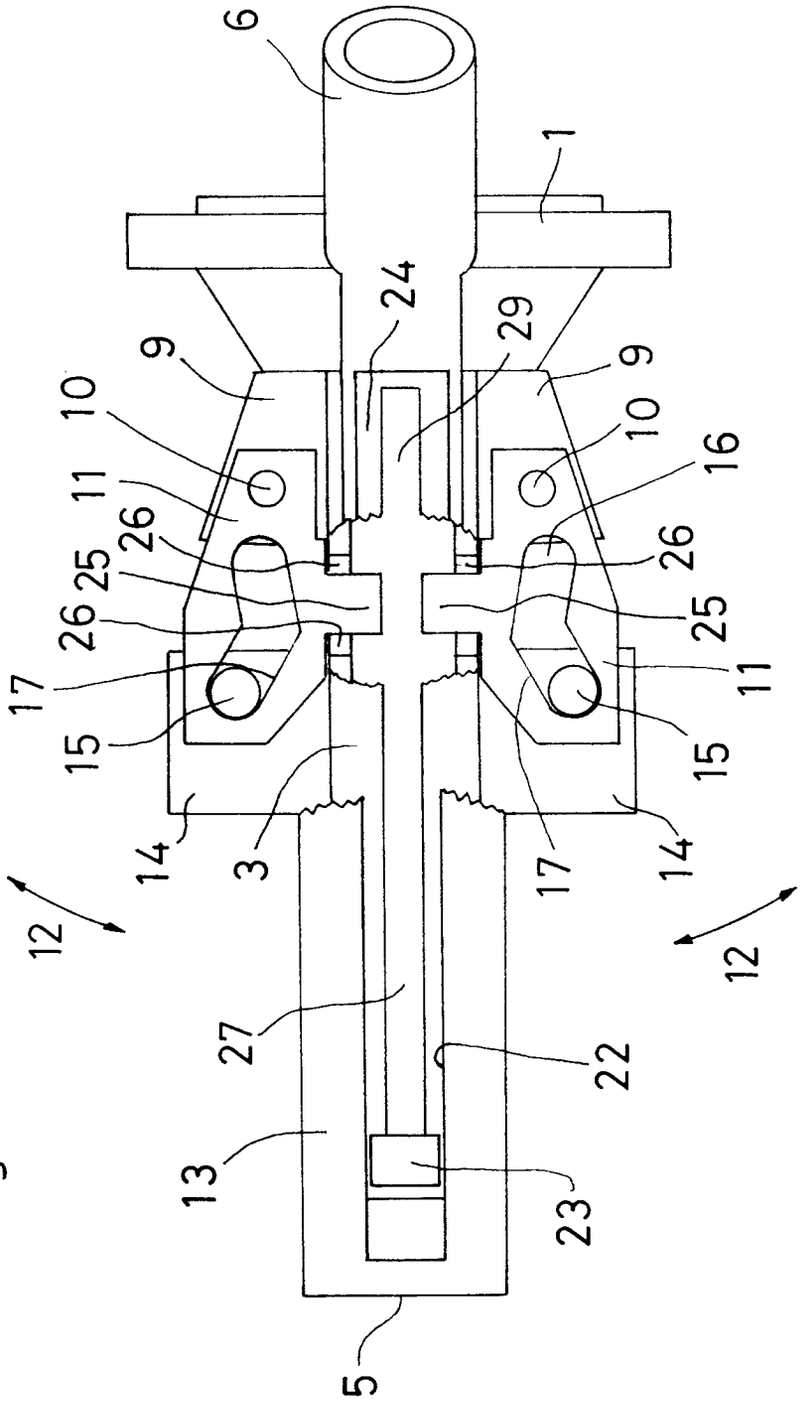
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Fig 2

European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 92201076.4

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.4)
X	GB-A-1 223 133 (KURT REICH ET AL) *Page 2, line 4 - line 15; page 2, line 60 - line 83; figures 4, 5*	1,2,5,6	B 25 C 1/00
A	DE-B-1 172 194 (FA. KARL M. REICH) *Whole document*	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 25 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	26-06-1992	LUNDSTRÖM M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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