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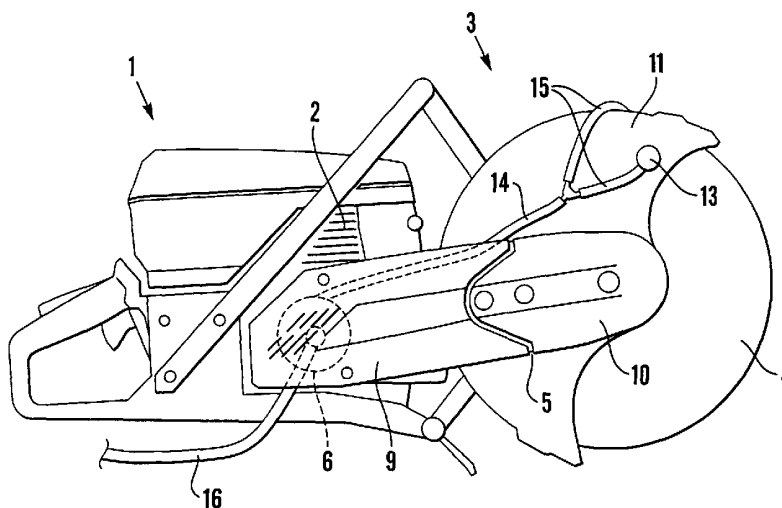
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(54) Title: WATER PUMP AT A PORTABLE CUTTING MACHINE



(57) Abstract: The invention concerns a portable cutting machine (1), comprising a cutter unit (3) with a rotatable cutter member (4) in the form of a cutter disc or a saw disc, a cutter shaft for the rotation of the cutter member, a guard in the form of a protective housing (11) for said cutter member, at least one water nozzle (12) provided in the protective housing for the generation of one or more water jets in the space defined by the protective housing, said one or more water jets essentially laying the dust which is generated during the cutting operation and cooling the cutter member, the machine further comprising a power unit (2) and a first power transmission (7) between the power unit and the cutter shaft. The machine is characterized in that a water pump (20) is provided in or on the cutter unit (3) or inside a casing (9), which covers at least parts of said power transmission, and that the pump is powered directly by members belonging to said first power transmission or by the cutter shaft or indirectly by said members belonging to said first power transmission or by the cutter shaft.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Water pump at a portable cutting machine.

TECHNICAL FIELD

The invention concerns a portable cutting machine, comprising a cutter unit with a
5 rotatable cutter member in the form of a cutter disc or a saw disc, a cutter shaft for the
rotation of the cutter member, a guard in the form of a protective housing for said cutter
member, at least one water nozzle provided in the protective housing for the generation
of one or more water jets in the space defined by the protective housing, said one or
more water jets essentially laying the dust which is generated during the cutting
10 operation and cooling the cutter member, the machine further comprising a power unit
and a first power transmission between the power unit and the cutter shaft.

BACKGROUND OF THE INVENTION

A wet cutter system is known, according to which the operator carries a unit comprising
15 a small tank and an electrical water pump in a harness on his back. The unit also may
stand on the ground. The system has the advantage that it can operate with a low
consumption of water. However, it can not operate with petrol-powered cutting
machines without access to electricity supply.

20 Combustion engine powered cutting machines has a great advantage over other types of
cutting machines because they can operate without access to electricity supply.

BRIEF DISCLOSURE OF THE INVENTION

In view of the above background, the invention aims at providing an integrated portable
25 cutting machine which combines the advantage of the portable cutting machine which is
defined in the above preamble with the advantage of powering the cutting machine by
means of a combustion engine. The water supply can be satisfied by conveying water to
the working site in a small can or other vessel in the case the cutting machine is
equipped for the supply of only a minimum of water for laying dust and for cooling the
30 cutter member. As an alternative, water can be supplied from a possibly available water
mains or from a stream, lake, well or the like, in the case a water supply of that type is
available near the working site. According to said latter alternatives, the water supply to
the nozzle in the protective housing may be more plentiful.

35 Further features and aspects of the invention, as well as advantages thereof, will be
apparent from the appending patent claims and from the description of conceivable
embodiments.

BRIEF DESCRIPTION OF DRAWINGS

In the following description of some conceivable embodiments of the machine according to the invention, reference will be made to the accompanying drawings, in which

- Fig. 1-4 are side views of the machine according to some embodiments thereof,
Fig. 5 shows how the water supply can be satisfied when a non-self-priming type of pump is employed, and
10 Fig. 6 shows a nozzle of a type which can be included in the machine.

DESCRIPTION OF SOME CONCEIVABLE EMBODIMENTS

- In Fig. 1-4 a cutting machine is generally designated by the reference numeral 1. The power unit of the machine comprises a preferably petrol-powered combustion engine 2.
15 A cutter unit is designated 3. Said unit comprises a rotatable cutter member 4 in the form of a cutter disc or a saw disc, which is rotated by a not shown cutter shaft, which extends through the centre of the cutter member. The cutter member is secured to the cutter shaft between inner- and outer washers of the type referred to as flange washers, which are not shown in the drawings. The cutter shaft is mounted in a pair of ball
20 bearings in bearing housings on a tool carrier 5, which extends forwards from a crank-case. The engine has a crank-shaft which drives a driving belt, which is designated 7 in Fig. 3, via a centrifugal clutch 6 and a rear driving wheel connected to a centrifugal clutch casing. The driving belt in turn drives a front belt pulley, which is designated 8 in Fig. 3, which belt pulley is non-rotatably connected to the cutter shaft and provided to
25 rotate said cutter shaft and hence the cutter member 4. The driving belt 7 is covered by a clutch casing 9 and by a front belt protection 10.

- The rear part of the cutter member 4 is covered by a guard in the form of a protective housing 11. In the protective housing 11 there are provided a nozzle 12 on each side of
30 the cutter member 4. The nozzles 12 may be designed e.g. as will be described with reference to Fig. 6. Connections to the nozzles 12, on the outside of the housing 11, are designated 13. From a pump, which can be mounted at different locations in the machine according to the different embodiments which will be described in the following, a main connection conduit 14 extends. Branch conduits are designated 15
35 and a water supply conduit (suction conduit) to the pump is designated 16.

According to the embodiment which is shown in Fig. 1, the pump is mounted on and is provided to be powered by the not shown crank-shaft of the engine 2. The pump in this case is hidden behind the centrifugal clutch 6.

5 In the embodiment according to Fig. 2, the pump, which is designated 20 in all the embodiments, is located inside of the clutch casing 9, more particularly inside of a projection 21 of the clutch casing which projects downwards. The pump 20 in this case is driven by the crank-shaft, e.g. via a worm gear or via a gear wheel inside the centrifugal clutch; alternatively via a very small belt transmission between the crank
10 shaft and a driving shaft of the pump.

According to the embodiment shown in Fig. 3, the pump 20 instead is located in the front belt protection 10 and is powered by the driving belt 7 via a third belt pulley 22 between the rear driving wheel and the front belt pulley 8. The third belt pulley 22 is
15 driven by the driving belt 20 and is in this case integrated with a belt stretcher provided for the driving belt 7.

In the embodiment according to Fig. 4, the pump 20 is located in an upwards-rearwards directed projection 24 of the front driving belt casing 10. In this case, the front belt
20 pulley 8 is designed as a double belt pulley. Alternatively, two separate belt pulleys are provided on the cutter shaft. This second belt pulley, or the second groove of the double belt pulley, respectively, in this case drives the pump 20 via an auxiliary driving belt 25.

It is also conceivable, according to an embodiment which is not illustrated in any
25 drawing, that the pump is provided in the front belt protection 10 and is driven via a gear wheel or worm gear located between the said ball bearings on the cutter shaft. This provides a more compact solution than the embodiment which is shown in Fig. 4, where the pump is driven via an auxiliary driving belt 25. According to still another alternative the pump is provided in the protective housing 11 inside the said inner flange washer.

30 According to still another alternative the pump is integrated in the front belt protection 10 via a driving member engaged to the front belt pulley 8 or to a central nut by means of which the belt pulley is secured to the cutter shaft such that the rotational centre of a impeller in the pump is coaxial with the rotational centre of drive shaft.

35 When a not self priming (self-sucking) pump 20 is employed, the suction conduit 16, i.e. the water supply conduit, may be provided with a manually powered booster pump

30, Fig. 5, in the form of a rubber bellows, for initiating the pumping. The branched conduits 15 have not been shown in this embodiment and a nozzle 12 is shown only schematically. A pair of non return valves in the connections to the rubber bellows 30 are designated 18 and are also shown at a larger scale in the same drawing.

5

Filter materials 27 are included in the nozzles 12. In order to make it possible to employ nozzles 12 of a standard type suitable for cutting machines of various capacity, which may require different quantities of water for laying the produced dust and/or for cooling larger or smaller cutter members, the nozzles may be provided with a turnable plate 28, Fig. 6, having a plurality of openings 29A, 29B, 29C with different dimensions. By turning the plate 28, the openings 29A-29C can be registered such that they will communicate with members in the nozzle 12 for the supply of water.

10

The pump 20 preferably is a low pressure type suction pump, developing a pressure of 2-4 bar of the discharged water.

15

PATENT CLAIMS

1. Portable cutting machine (1), comprising a cutter unit (3) with a rotatable cutter member (4) in the form of a cutter disc or a saw disc, a cutter shaft for the rotation of the cutter member, a guard in the form of a protective housing (11) for said cutter member, at least one water nozzle (12) provided in the protective housing for the generation of one or more water jets in the space defined by the protective housing, said one or more water jets essentially laying the dust which is generated during the cutting operation and cooling the cutter member, the machine further comprising a power unit (2) and a first power transmission (7) between the power unit and the cutter shaft, characterized in that a water pump (20) is provided in or on the cutter unit (3) or inside a casing (9), which covers at least parts of said power transmission, and that the pump is powered directly by members belonging to said first power transmission or by the cutter shaft or indirectly by said members belonging to said first power transmission or by the cutter shaft.
2. Cutting machine according to claim 1, characterized in that said power transmission comprises a first driving belt (7) and a first belt pulley (8) or a first groove on a double belt pulley on the cutter shaft, and that the pump is driven via a second belt pulley or a second groove on said double belt pulley via a second driving belt (25).
3. Cutting machine according to claim 2, characterized in that the pump is mounted in a front belt protection included in the cutter unit.
4. Cutting machine according to claim 1, characterized in that the cutter shaft is journaled in at least two ball bearings in a carrier for the cutter member and that the pump (20) is driven via a gear wheel or a worm gear, which is mounted between ball bearings on the cutter shaft.
5. Cutting machine according to claim 1, wherein the cutter member is mounted between an inner- and an outer flange washer, characterized in that the pump is mounted inside the inner flange washer and is driven by the cutter shaft.
6. Cutting machine according to claim 1, characterized in that the pump is provided in a front belt protection and is driven via a driving member connected to a belt pulley for driving the cutter member or to a nut which secures the belt pulley on the cutter shaft.

7. Cutting machine according to claim 1, wherein the cutter shaft is driven by the power unit via a driving belt (7) between a rear driving wheel and a front belt pulley (8),
c h a r a c t e r i z e d in that the pump is driven via a belt pulley mounted between the rear driving wheel and the front belt pulley (8).
- 5
8. Cutting machine according to claim 7, c h a r a c t e r i z e d in that the pump is integrated with said belt pulley which is provided between the rear driving wheel and the front belt pulley.
- 10
9. Cutting machine according to claim 1, wherein the power unit comprises a crank-shaft, which drives a driving belt (7) included in said first powered transmission via a centrifugal clutch which is covered by a clutch casing (9), c h a r a c t e r i z e d in that the pump (20) is provided inside the clutch casing.
- 15
10. Cutting machine according to claim 9, c h a r a c t e r i z e d in that the pump is driven from the crank-shaft via a worm gear or via a belt transmission.

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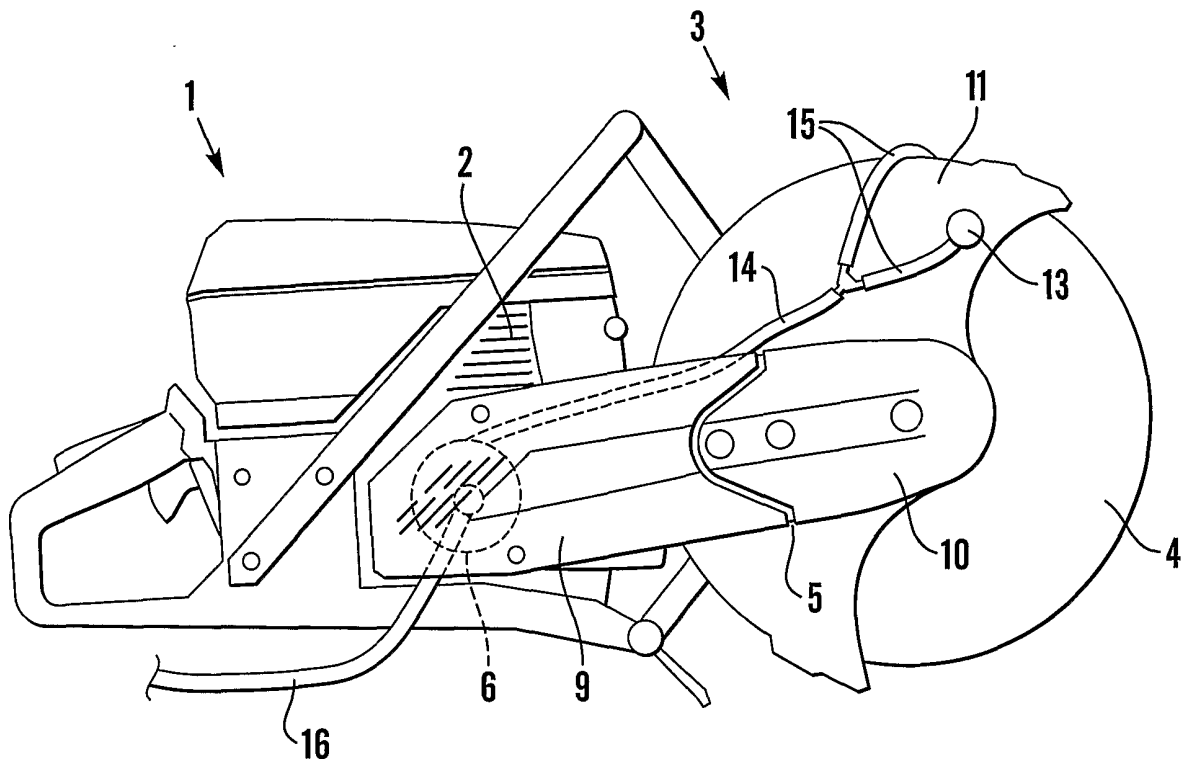


Fig. 1

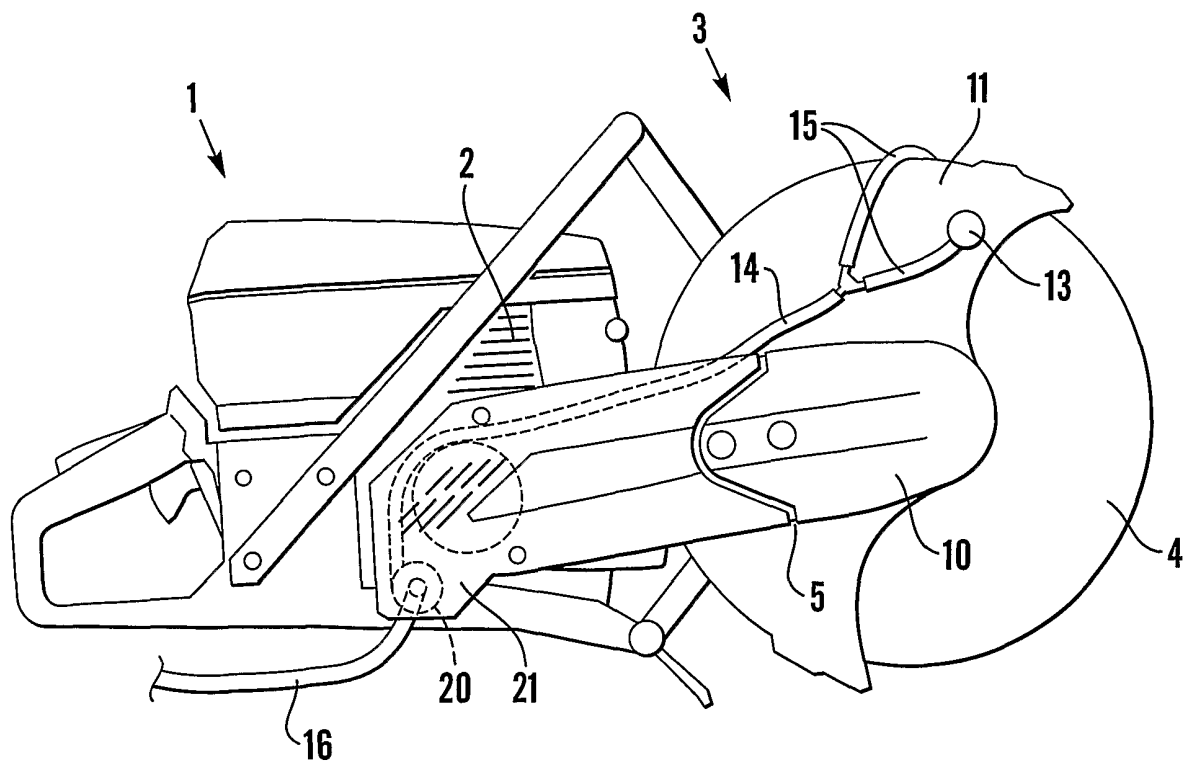


Fig. 2

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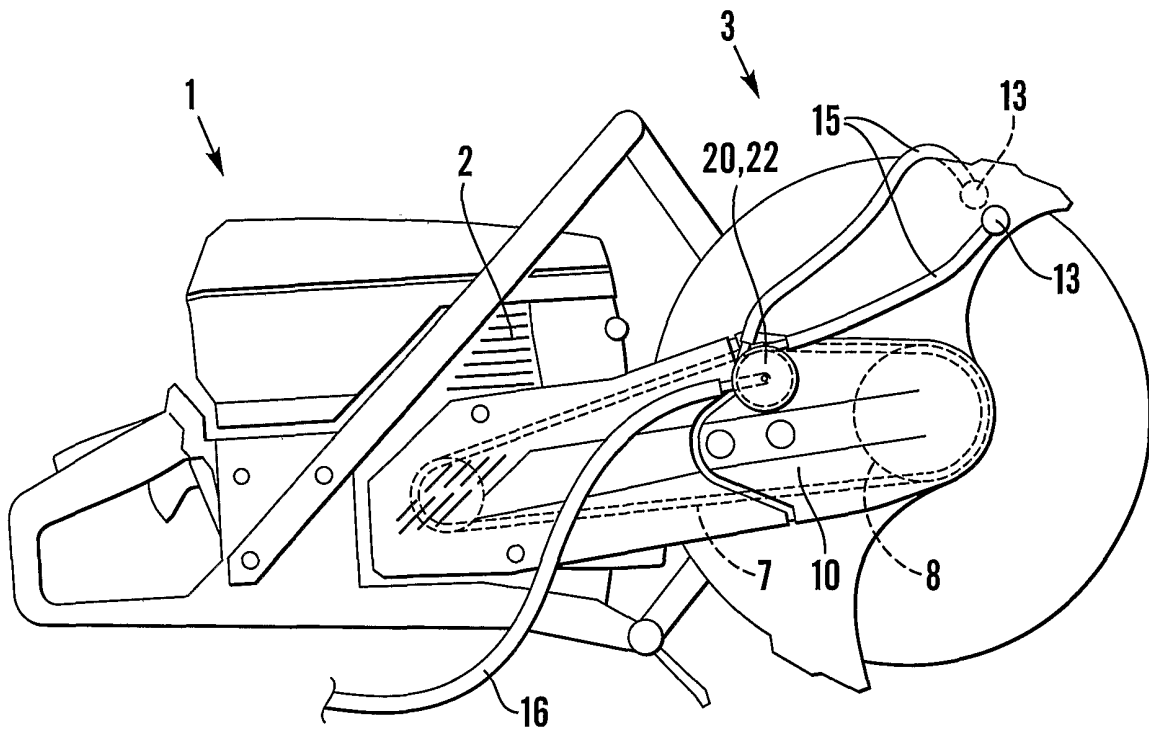


Fig.3

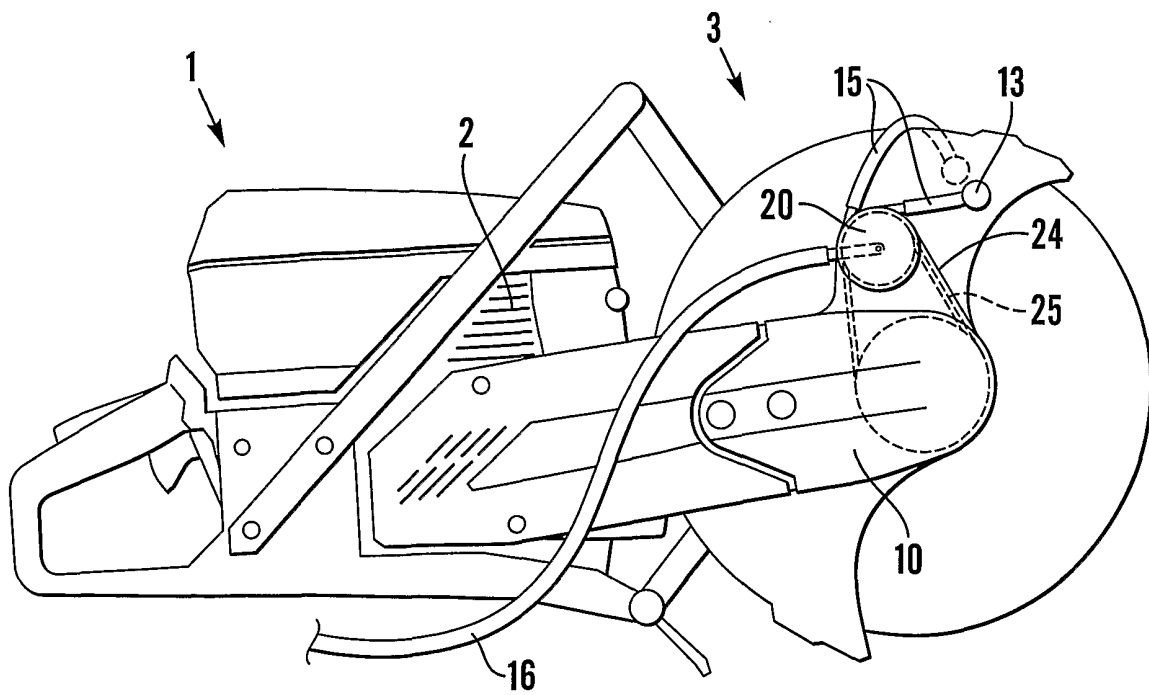


Fig.4

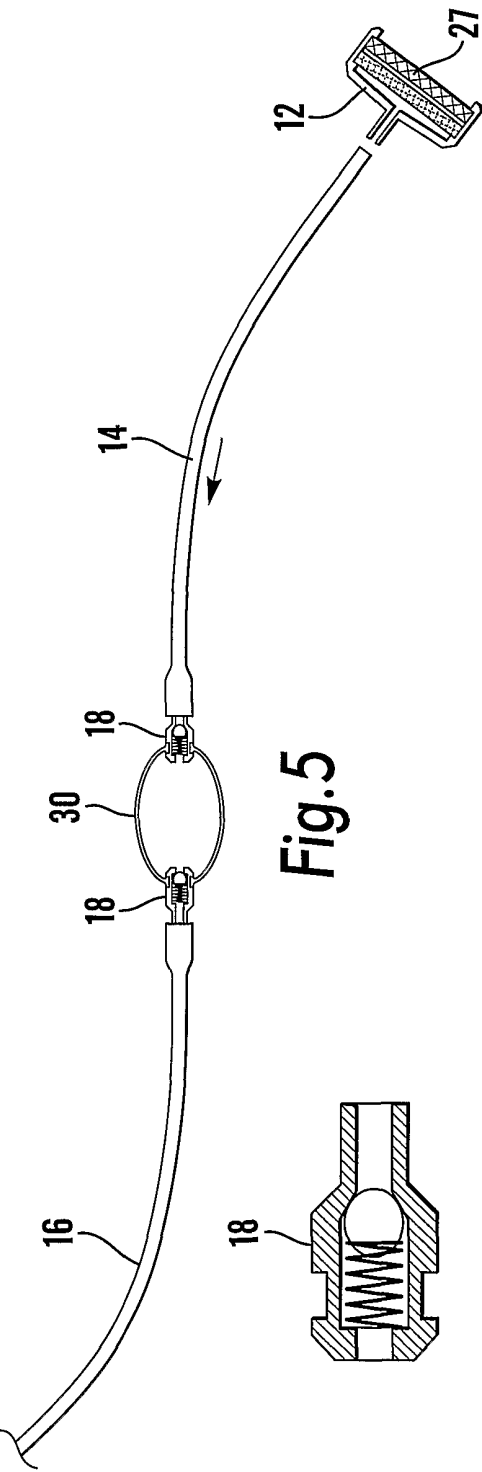


Fig. 5

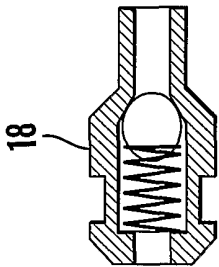


Fig. 5a

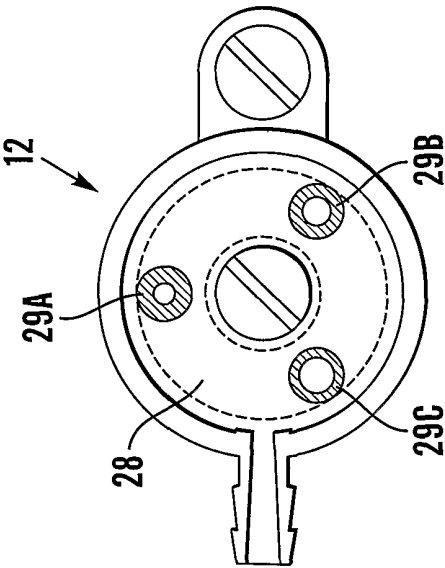


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/02674

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B27B 9/00, B24B 27/08, B23D 47/00

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)

IPC7: B27B, B24B, B23D

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 0005032 A1 (NAKI TECHNOLOGIES LTD.), 3 February 2000 (03.02.00) -- -----	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Information on patent family members

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