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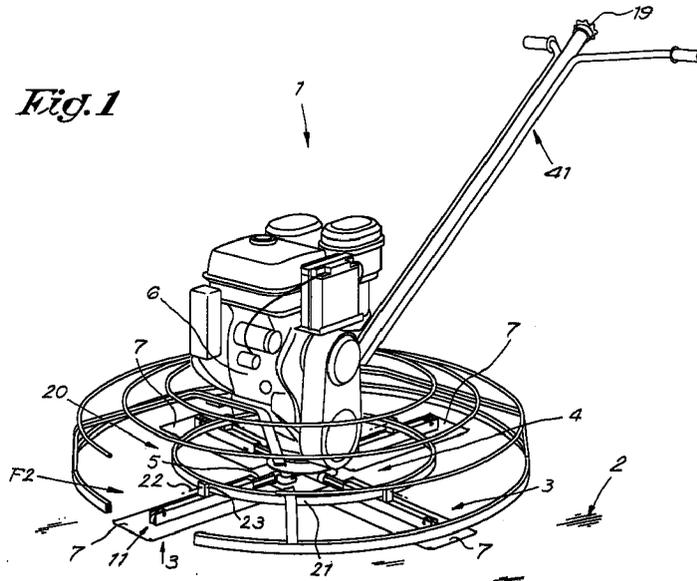
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(54) Device for the finishing of floors and blade which can be utilized therewith

(57) Device for the finishing of floors, of the type which is provided with blades (3) which are attached on a rotor (4), which can be driven by means of a motor (6) in such a manner that the blades (3) can be moved over a floor (2), whereby it is provided with one or more blades (3) which at least are composed of a plate (7)

and a strip (8) attached thereupon for fixation at the rotor (4), characterized in that each plate (7) concerned and the strip (8) belonging thereto are connected to each other at least by means of a glue connection.



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Description

This invention relates to a device for the finishing of floors and also to a blade, more particularly a finishing blade, which can be utilized therewith.

More particularly, the invention relates to a device of the type which is provided with blades which are attached on a rotor, which can be driven by means of a motor in such a manner that the blades can be moved over a floor. Examples for such devices are described, amongst others, in the U.S. Patents No. 3.296.946, 3.331.290, 3.675.544 and 3.791.754.

Thereby, the blades usually are fixed exchangeably on the rotor, either by means of classical bolts, or by means of special couplings which allow a rapid exchange of the blades.

Such devices, also called mechanical or rotating trowels, are, as known, used for the levelling and/or polishing of floor layers, particularly floor layers consisting of a settable material, such as concrete, mortar and similar, and/or for processing materials, such as quartz grains and similar, into such floor layers.

In the embodiments known up to the present, the blades consist of a plate which is fixed upon a strip or lath by means of screws or rivets, whereby the whole unit formed by such plate and the lath fixed thereupon, hereafter named blade, is attached at the rotor by means of bolts which engage in this strip or lath.

The invention aims at a device for finishing floors of the aforementioned type which is improved in respect to the known embodiments, and at a blade which allows to realize the aforementioned device.

To this aim, the invention provides a device for the finishing of floors, of the type which is provided with blades which are attached on a rotor, which can be driven by means of a motor in such a manner that the blades can be moved over a floor, whereby it is provided with one or more blades which at least are composed of a plate and a strip attached thereupon for fixation at the rotor, characterized in that each plate concerned and the strip belonging thereto are connected to each other at least by means of a glue connection.

By means of such glue connection, it is obtained, amongst others, that a particularly solid connection is created and that the blades concerned, depending on their form of embodiment, mostly can be produced in a simpler manner, with less difficult processings.

In a preferred form of embodiment, the blade, at its underside, shall be completely free of connection parts, which can easily be achieved due to the use of a glue connection. Due to the omission of such connection parts at the underside of the blade, a completely smooth underside of the blades can be guaranteed for, this on the contrary to the known matter of things, whereby first openings have to be punched into the blades, these openings have to be provided with chamfers and subsequently, bolts or rivets have to be provided. Hereby, it is noted that a welding connection, without connecting

parts passing through the plates, is excluded, as the blades mostly consist of hardened steel.

The aforementioned connection between the plates and each corresponding strip then shall consist preferably "substantially" of glue, this in order to exclude and/or minimize the use of other connection techniques and the disadvantages connected thereto.

According to the most preferred form of embodiment, the aforementioned connection "exclusively" shall consist of glue, with as a disadvantage that, in which manner whatsoever, any deformation at the blades as a result of mechanical connections is excluded, as, simply, such mechanical connections, with which connections by means of bolts, rivets, screws, welding and similar are intended, then are completely excluded.

Preferably, the glueing shall be performed over the complete or almost complete length of the aforementioned strip, and more particularly over the complete contact surface between the strip and the plate concerned. By making use of such a continuous glueing, the systematic one-after-the-other coming loose of the connection points, as this can occur with plates which are rivetted, is excluded.

Preferably, the blades shall be attached at the rotor by means of couplings, whereby by "couplings" in this case connections are understood which can be loosened, fastened respectively, by means of a simple operation, so to say, by the turn of a hand, this on the contrary to the classical connections using bolts.

Due to the combination of the characteristics, on one hand, that the blades comprise plates which are attached to the strip concerned by means of a glue connection, and, on the other hand, that the fixation to the rotor is performed by means of a coupling as intended here above, it is obtained that the plates are little or not subjected to internal strains, as bolt connections or similar, then, are no longer used, neither at the connection between the plates and the strips, nor at the coupling of the blades to the rotor, or as such bolt connections at least are limited to a strict minimum.

In a preferred form of embodiment, the couplings consist of quick change couplings and are also provided with actuation elements so that a fast operation is possible.

More particularly, it is preferred that the couplings concerned consist of coupling parts engaging behind each other which are provided at the blades and at the rotor, respectively. Such coupling parts allow for a fast and operationally reliable coupling which is little sensitive to soiling.

Preferably, the aforementioned couplings comprise operatable coupling parts which allow to remove the blades in the uncoupled position of the operatable coupling parts can be removed by a movement exclusively directed radially outward and/or inclined downward. Contrary to the embodiments described in US 3.296.946, US 3.331.290, and US 3.675.544, the blades, during loosening, no longer have to be slid radi-

ally inward first in order to be able to remove them, with as a disadvantage that possible contaminations, such as concrete residues which are situated next to the center of the rotor and which might prevent the sliding radially inward, now no longer can complicate the uncoupling. The operatable coupling parts preferably are situated next to the perimeter of the rotor.

According to a particular form of embodiment, the rotor of the device is provided with arms which can be swivelled by means of adjustment means, as a result of which the blades can be placed at a desired angle, and the device hereby is provided with a positive connection between the arms, in such a manner that an independent swivelling of the arms is excluded.

By using a positive connection between the arms, in other words, a connection which provides for a swivelling of the arms exclusively in a simultaneous manner, no unexpected movements of one of the blades can occur, as a result of which a better finishing quality of the floor can be guaranteed. Moreover, a more stable positioning of the device on the floor is obtained.

It is noted that the aforementioned two characteristics, namely the characteristic that use is made of coupling parts which allow that the blades can be removed by means of an exclusively radial, outwardly directed and/or downward directed movement, and the characteristic that a positive connection is provided between the swivellable blades, according to the invention may also be applied in devices which are provided with classical or other blades, in such a manner that the invention, in respect to these characteristics, is not limited to devices with blades the plates of which are glued onto the strips.

In consideration of the fact that the aforementioned blades can also be commercialized separately for being applied in existing devices, it is obvious that the invention also relates to blades whereby the connection between the plates and the strips, such as described in the foregoing, comprises a glue connection and preferably even exclusively consists of glue.

With the intention of better explaining the characteristics of the invention, several preferred forms of embodiment are described hereafter by means of example only, without any limitative character, with reference to the accompanying drawings, wherein:

figure 1 represents a device according to the invention;
 figure 2, on a larger scale, represents the portion which is indicated by arrow F2 in figure 1;
 figure 3 represents the portion from figure 2 in exploded view;
 figure 4 represents a view according to arrow F4 in figure 2;
 figure 5 represents a cross-section according to line V-V in figure 2;
 figure 6 represents a cross-section according to line VI-VI in figure 5;

figure 7 represents a variant of a blade according to the invention;

figure 8 represents a view according to arrow F8 in figure 7;

figures 9 and 10, at a larger scale, represent cross-sections according to lines IX-IX and X-X in figure 8;

figure 11 represents a variant of the portion which is represented in figure 5;

figure 12 represents a view according to arrow F12 in figure 11;

figure 13, in perspective, represents the portion which is indicated by arrow F13 in figure 11.

As is represented in the figures 1 to 6, the invention relates to a device 1 for the finishing of a floor 2 which is provided with blades 3, in this case four of them, which are attached on a rotor 4, more particularly on arms 5 which form part of this rotor 4, whereby this rotor 4 can be driven by means of a motor 6, in such a manner that the blades 3 can be moved over the floor 2, as a result of which a spreading or polishing movement can be realized by means of the blades 3.

The blades 3 each are composed of a plate 7 and a strip 8 in the shape of a lath, fixed thereupon, as clearly visible in figures 3, 5, and 6. Hereby, the strip 8 extends in the longitudinal direction of the plate 7 and is intended for being mounted under the rotor 4, according to the radial direction.

The particularity of the invention consists in that, as particularly visible in figure 5, the device 1 is provided with one or more blades 3, whereby the connection between the plate 7 and the strip 8 comprises a glue connection 9.

Preferably, even the connection, as explained in the introduction, exclusively consists of a glue connection, and the underside 10 of the plate 7 concerned is free of any kind of mechanical connection part, such as a bolt, screw, or rivet.

Furthermore, according to the invention it is preferred that the aforementioned blades 3 are fixed at the rotor 4 by means of couplings 11, more particularly quick change couplings.

As further represented, to this end preferably use is made of coupling parts 12-13 and 14-15 engaging behind each other, which are provided respectively at the blades 3 and at the rotor 4, more particularly at the arms 5.

Although, according to the invention, such coupling parts engaging behind each other can be realized in various variants, it is preferred that, as represented in figures 2 to 5, the coupling parts 12-13 provided at the blades 3 together define the shape of a dovetail, whereas the coupling parts 14-15 situated at the rotor 4 form seats for the coupling parts 12-13. Hereby, the dovetail is formed by inclined surfaces at the narrow edges of the strip 8.

At the underside, the arms 5 are provided with lon-

gitudinally extending groove-shaped seats 16, in which the blades 3 can be fixed by means of the strip 8. The couplings 11 thus form lockings with which the strips 8 are anchored in the seats 16.

In order to allow the attachment, respectively removal, of the blades 3, one of the coupling parts of the rotor 4, in this case the coupling part 14, is then fixed pivotable at the arm 5 concerned. Hereby, this coupling part can be moved between a locking position A, whereby the blade 3 is fixed to the rotor 4, and an unlocked position B which allows the attachment of the blade 3 at the rotor, respectively its removal therefrom. Hereby, the coupling part 14 shows the shape of a hook which can be swivelled around a turning axis 17.

It is noted that the movable and therefore operable coupling parts 14 preferably are situated in the proximity of the exterior perimeter of the rotor 4, whereas the fixed coupling parts 15 are situated next to the center of the rotor 4. As a result of this, the coupling parts 14 are always easily accessible.

It is obvious that, by the utilization of couplings 11 according to the invention, the blades 3 are easy to exchange. Hereby, the procedure is as follows. First, the blades 3 to be exchanged are loosened by disengaging the locked condition. To this end, the hook-shaped coupling part 14 is swivelled from position A into position B. As a result, the blade 3 can be removed freely, such by means of a movement directed radially outward.

The attachment of another blade 3 is performed by bringing it with the strip 8 into the seat 16, whereby the coupling part 13 engages behind the coupling part 15, and subsequently swivelling the coupling part 14 downward, in such a manner, that the latter engages behind the coupling part 12.

It is noted that usually each coupling part 14 automatically remains closed while rotating, as the blade 3 cooperating therewith exerts an outwardly directed force as a result of the occurring centrifugal forces. This, however, does not exclude the eventual provision of the couplings 11 with elastic means, such as the schematically represented spring 18, which forces the coupling part 14 concerned towards the locking position A.

According to a particular characteristic of the invention which may or may not be combined with the aforementioned characteristics but may also be applied separately in other devices for the finishing of floors, provision is made of arms 5 which can be swivelled by means of adjustment means 19, in such a manner that the blades 3 can be placed at a desired angle, with the particularity that a positive connection 20 is realized between these arms 5.

This positive connection 20 consists, as represented in figures 1 to 6, preferably of a ring-shaped element 21 which, by means of pivots 22, is attached at swivelling arms 23 which are fixedly attached to the arms 5 or made in one part therewith.

It is noted that the adjustment of the angle of the blades 3 takes place in a classical manner by means of

levers 24, attached at the arms 5, the swivelling of which is determined by a regulation disc 25 which can be moved upward and downward. It is obvious that this regulation disc 25 in itself does not form a positive connection, as it allows that the levers 24 can be swivelled downward individually.

In the figures 7 to 10, a variant is represented of the blade 3 represented at the bottom in figure 3. In this variant, corresponding to the invention, the plate 7 and the strip 8 are connected to each other exclusively by means of a glue connection. Apart therefrom, this blade 3 shows various particular characteristics which each offer certain advantages, which characteristics, either or not, can be applied in combination with each other.

A first of these additional characteristics consists in that the strip 8 has an enlarged contact surface 26, more particularly in that a foot 27 is formed at the strip 8 with a width B1 which is larger than the width B2 of the actual body 28 of the strip 8. Due to the enlarged contact surface 26, a good support against tilting is obtained, and a larger surface for glueing is obtained, whereas the body 28 of the strip can be kept relatively narrow and the weight thereof remains, in relation, low.

According to a second additional characteristic, under at least one, and preferably under both of the aforementioned coupling parts 12-13, a protruding part, 29-30 respectively, is formed, with which the contact surface 26 is enlarged in the longitudinal direction of the strip 8, in such a manner that, in comparison to continuous coupling parts 12-13, the underside of the strip 8 now extends over an additional distance D. As a result of this, of course, a glueing over a larger surface is possible.

It is noted that the strip 8 is glued to the plate 7 preferably over its entire underside. Of course, this is valid for the form of embodiment of figures 7-10 as well as for those of figures 5 and 6, as well as for other forms of embodiment, whereby the attachment at the rotor 4 is not performed by means of a coupling 11, but, for example, by means of bolts or similar.

According to a third additional characteristic, the strip 8, at one or more sides which are intended to come into contact with the arm 5, in this case, the upper side, is provided with recesses 31 which offer space to dirt accumulations, such that these latter cannot prevent that the strip 8 is completely pressed into the seat. These recesses 31 preferably consist of longitudinal grooves. Hereby, the contact surface between the upper side and the seat preferably is limited to a minimum.

In a preferred form of embodiment, for the strip 8 use shall be made of an extruded profile, as a result of which it can be produced at very low costs.

According to another preferred characteristic, the strip 8 is manufactured of a light-weight metal, more particularly aluminium, as a result of which the weight of the blades 3 remains relatively low, which is important for transportation.

In figures 11 to 13, a variant is represented

whereby the movable coupling part 14 can be shifted instead of swivelled. Hereby, this coupling part 14 forms part of an element 32 which is drawn towards the narrow end of the arm 5 by means of a spring 33. Hereby, this spring 33 is mounted between, on one hand, the head 34 of a bolt 35 which is screwed into the element 32 and, on the other hand, a tensioning screw 36 which is screwed into the free extremity of the arm 5 concerned. The functioning hereof can easily be deduced from the figures.

It is noted that the couplings 11, and more particularly the movable coupling part 14, preferably are provided with an actuation element. In the embodiment of figures 1 to 6, the latter consists of a part 37 of the hook-shaped coupling part 14 which can be gripped. In the embodiment of figures 11 to 13, this is formed by a part 38 of the element 32 which protrudes radially over the perimeter of the arm 5 and thereby provides a handle for loosening, respectively fastening a blade 3.

At the same time, it is noted that, according to a variant, the movable coupling parts 14 can be installed next to the center of the rotor 4.

According to a variant not represented, the couplings 11 can be provided with central operation means which, for example, are situated above the rotor 4.

The device 1 can of course be further equipped with various accessories. As represented, at the height of the seats which are formed by the coupling parts 15, lateral openings 39, allowing an easy removal of concrete remainders and similar, may be provided in the arms 5.

The front part of each of the arms 5, more particularly the block-shaped part 40 of the figures, does not necessarily have to be made in one part with the rest of the arms 5. This part 40 might, for example, also be made in the form of an intermediate part, whereby this intermediate part, on one hand, is provided with the aforementioned couplings, but, on the other hand, is fixed to the fixed parts of the arms 5 in a classical manner, by means of bolts.

It is obvious that various characteristics of the invention may be mutually combined as desired.

It is noted that in figure 1, a device 1 is represented which is moved and operated by means of a handle 41. It is, however, obvious that the invention may also be applied for other devices utilizing such a rotor, for example, devices which are provided with two rotors performing an overlapping movement, whereby a seat, on which an operator can get seated, is provided above these rotors.

The present invention is in no way limited to the forms of embodiment described by way of example only and represented in the figures, on the contrary may such device for the finishing of floors be realized in various forms and dimensions without leaving the scope of the invention.

Claims

1. Device for the finishing of floors, of the type which is provided with blades (3) which are attached on a rotor (4), which can be driven by means of a motor (6) in such a manner that the blades (3) can be moved over a floor (2), whereby it is provided with one or more blades (3) which at least are composed of a plate (7) and a strip (8) attached thereupon for fixation at the rotor (4), characterized in that each plate (7) concerned and the strip (8) belonging thereto are connected to each other at least by means of a glue connection.
2. Device according to claim 1, characterized in that each blade (3) concerned, at its underside, is completely free of connection parts.
3. Device according to claim 1 or 2, characterized in that the connection between the plate (7) and the corresponding strip (8) of the blades (3) concerned substantially consists of a glue connection (9).
4. Device according to claim 1 or 2, characterized in that the connection between the plate (7) and the corresponding strip (8) of the plates (3) concerned exclusively consists of a glue connection (9).
5. Device according to any of the preceding claims, characterized in that the glueing of the aforementioned glue connection (9) is performed over the entire or almost entire length of the aforementioned strip (8), and more particularly over the entire contact surface between the strip (8) and the plate (7) concerned.
6. Device according to any of the preceding claims, characterized in that the strip (8) is provided with an enlarged contact surface (26).
7. Device according to any of the preceding claims, characterized in that, at the narrow ends of the strips (8), coupling parts (12-13) in the shape of inclined surfaces are provided which together define a dovetail, and that under these coupling parts (12-13), protruding parts (29-30) are formed with which the contact surface (26) is enlarged in the longitudinal direction of the strip (8).
8. Device according to any of the preceding claims, characterized in that the strip (8), at one or more sides which are intended for coming into contact with the arm (5), is provided with recesses (31) which offer space for dirt accumulations.
9. Device according to any of the preceding claims, characterized in that each strip (8) concerned is formed of an extruded profile, preferably of alumin-

ium.

10. Device according to any of the preceding claims, characterized in that the blades (3) are attached at the rotor (4) by means of couplings (11), more particularly, operatable couplings (11). 5
11. Device according to claim 10, characterized in that the couplings (11) each are provided with an actuation element (37-38) which allows to mount the blades (3) on the rotor (4), detach them therefrom, respectively, without any tools. 10
12. Device according to claim 10 or 11, characterized in that the couplings (11) concerned consist of coupling parts (12-13-14-15) engaging behind each other which are provided at the blades (3) and at the rotor (4), respectively, and that the coupling parts (12-13) provided at the blades (3) together define the shape of a dovetail, whereas the coupling parts (14-15) situated at the rotor (4) form seats therefore, whereby the aforementioned dovetail is formed by inclined surfaces at the narrow edges of the strips (8) concerned. 15 20
13. Device according to claim 12, characterized in that the coupling parts (14-15) concerned of the rotor (4) each comprise a movable coupling part (14), more particularly a pivotable or shiftable coupling part (14), whereby this coupling part (14) can be moved between a locking position (A), whereby the blade (3) is fixed to the rotor (4), and an unlocked position (B) which allows the attachment of the blade (3) at the rotor (4), respectively its removal therefrom. 25 30 35
14. Device according to claim 13, characterized in that the couplings (11) concerned are provided with elastic means, such as a spring (18-33), which force the movable coupling part (14) towards the locking position (A). 40
15. Device according to any of the claims 10 to 14, characterized in that the aforementioned couplings (11) comprise operatable coupling parts (14) which allow for that the blades (3), in the uncoupled condition of the operatable coupling parts (14), can be removed from the rotor (4) by a movement exclusively directed radially outward and/or downward. 45 50
16. Device according to any of the preceding claims, whereby the blades (3) are fixed on arms (5) forming part of the rotor (4), whereby these arms (5) can be swivelled by means of adjustment means (19), in such a manner that the blades (3) can be placed at a desired angle, characterized in that a positive connection is realized between the arms (5), so that an independent swivelling of the arms (5) is 55

excluded.

17. Device according to claim 16, characterized in that the aforementioned connection consists of a ring-shaped element (21) which, by means of pivots (22), is attached at swivelling arms (23) which are fixedly attached at the aforementioned arms (5) or made in one piece therewith.
18. Device for the finishing of floors, of the type which is provided with blades (3) which are attached on a rotor (4), which can be driven by means of a motor (6), in such a manner that the blades (3) can be moved over a floor (2), whereby the blades (3) are fixed on arms (5) forming part of the rotor (4), and whereby these arms (5) can be swivelled by means of adjustment means (19), in such a manner that the blades (3) can be placed at a desired angle, characterized in that the device (1) is provided with a positive connection between the arms (5), in such a manner that an independent swivelling of the arms (5) is excluded, whereby the aforementioned connection preferably consists of a ring-shaped element (21) which, by means of pivots (22), is attached at swivelling arms (23) which are fixedly attached at the aforementioned arms (5). 25
19. Device for the finishing of floors, of the type which is provided with blades (3) which are attached on a rotor (4), which can be driven by means of a motor (6), in such a manner that the blades (3) can be moved over a floor (2), whereby the blades (3), by means of couplings (11), are fixed on arms (5) forming part of the rotor (4), characterized in that the aforementioned couplings (11) comprise operatable coupling parts (14) which allow for that the blades (3), in the uncoupled condition of the operatable coupling parts (14), can be removed from the rotor (4) by a movement exclusively directed radially outward and/or downward. 30 35 40
20. Blade, more particularly finishing blade, of the type which is intended for attachment under a rotor (4), in such a manner that such blade (3) can be moved rotatably over a floor (2) or floor layer, whereby this blade (3) at least consists of a plate (7) and a strip (8) fixed thereupon, whereby this strip (8) allows the attachment of the blade (3) at the rotor (4), characterized in that the plate (7) and the strip (8) are attached to each other exclusively by means of a glue connection (9). 45 50 55

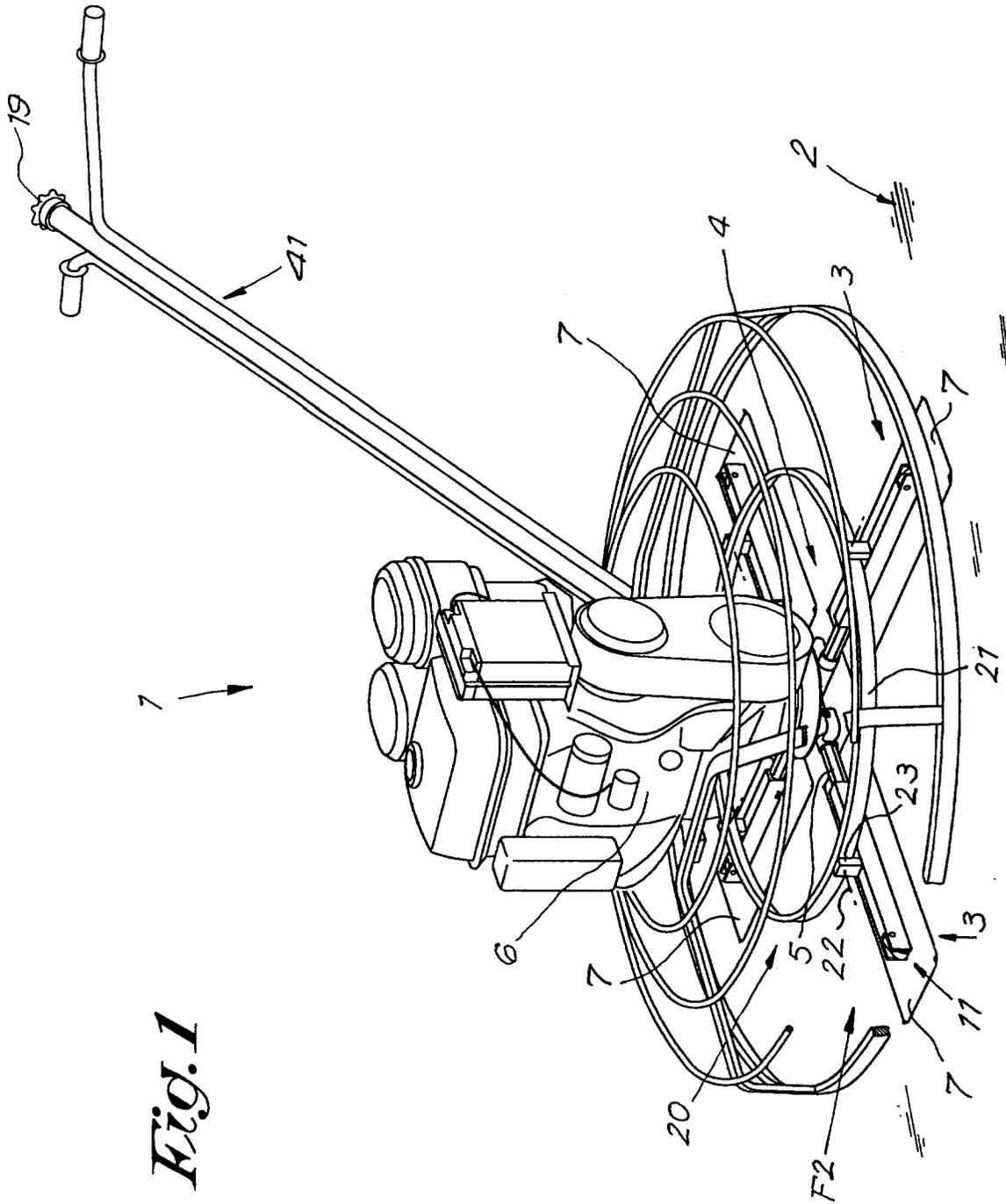


Fig. 1

Fig. 2

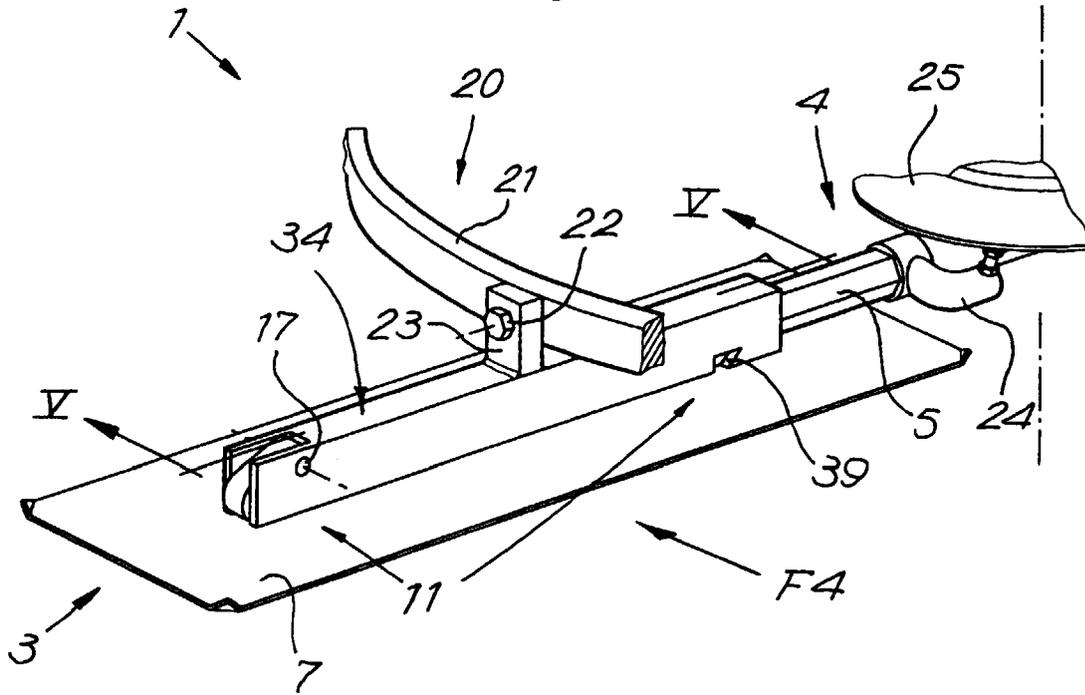
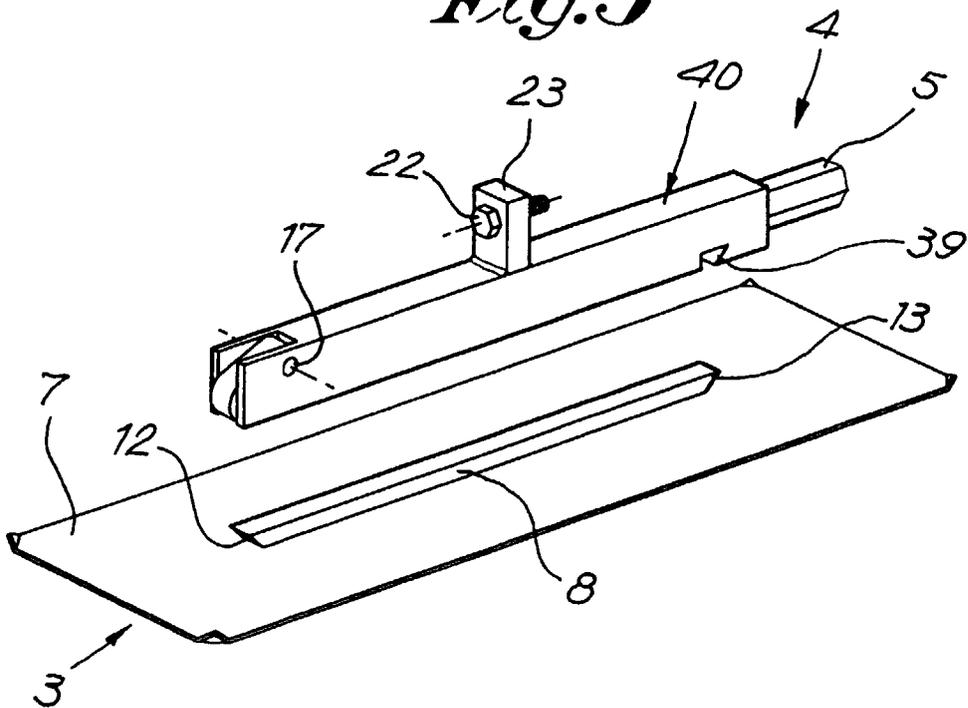
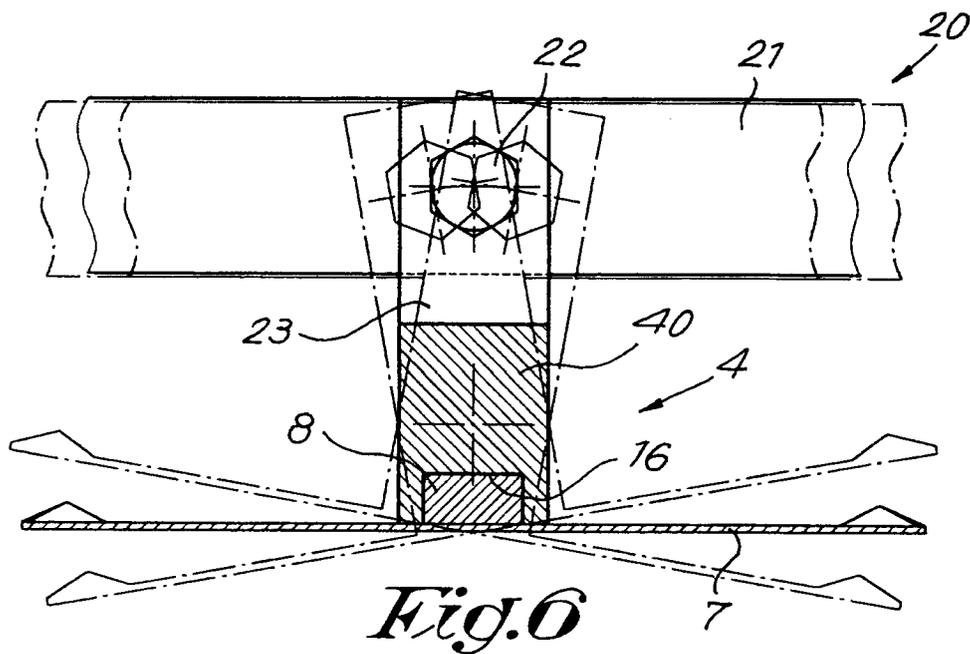
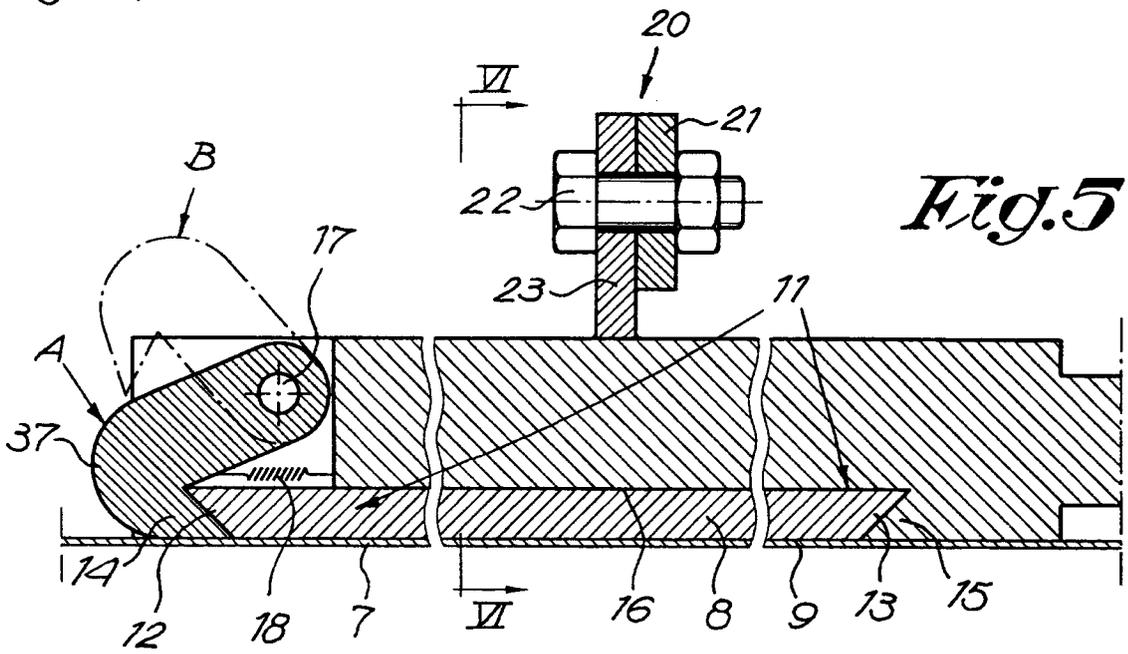
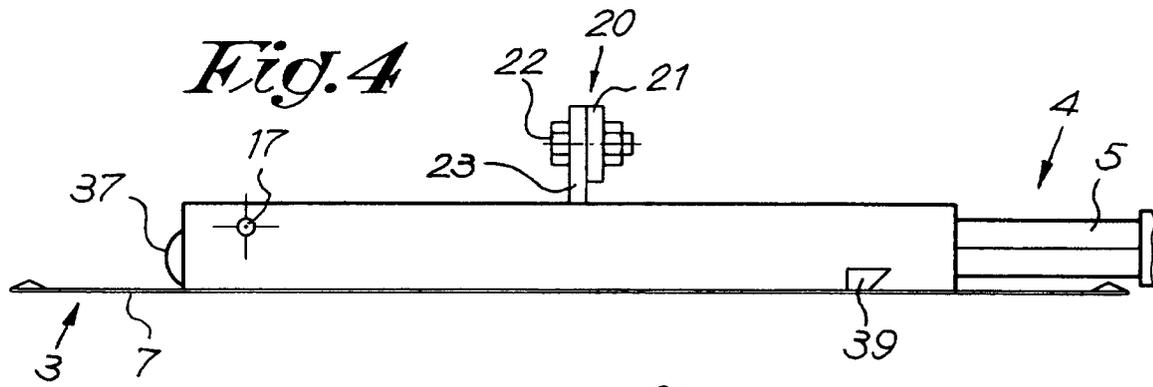
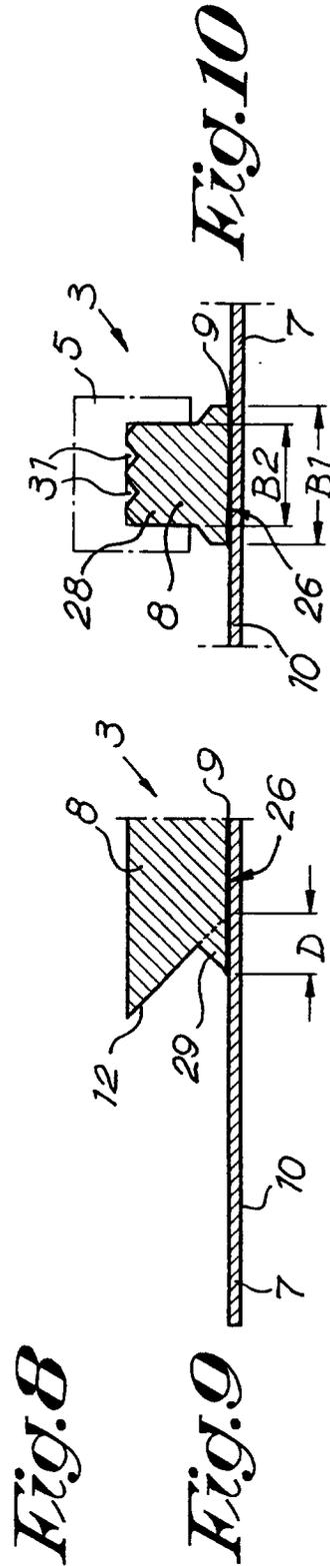
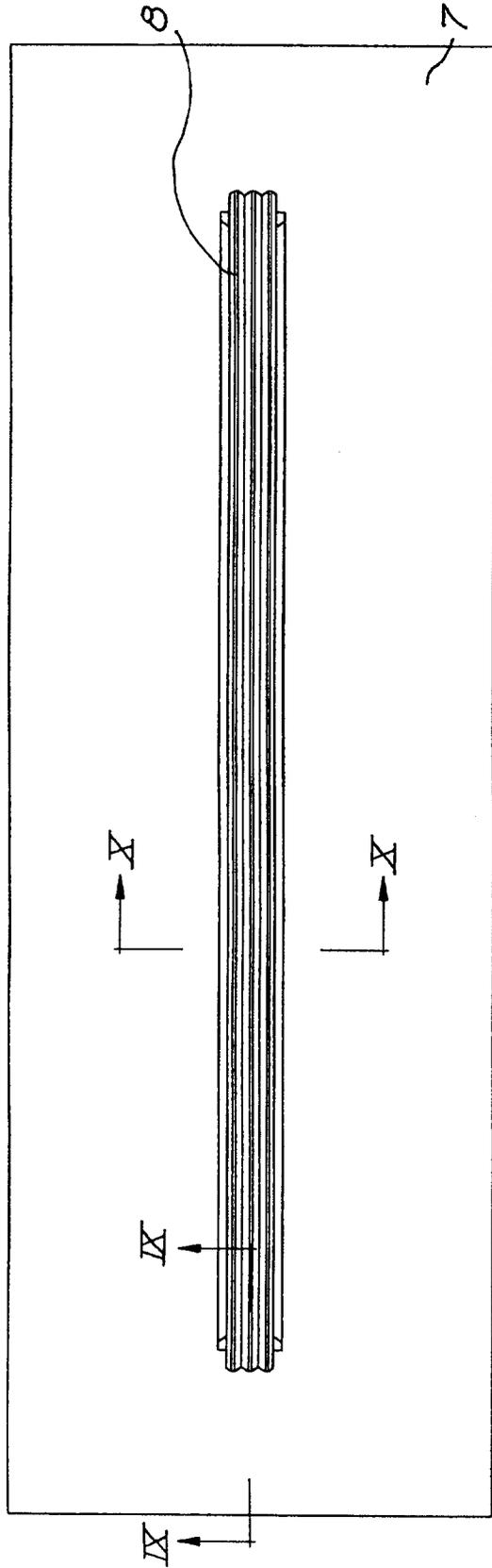
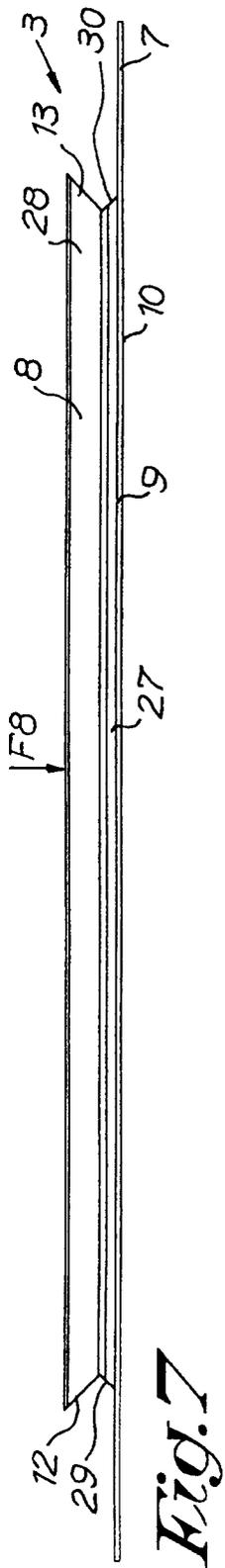
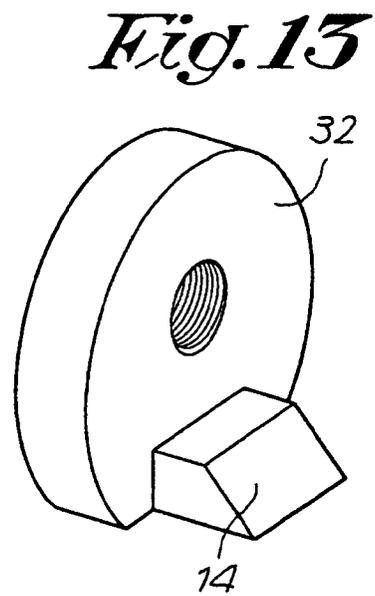
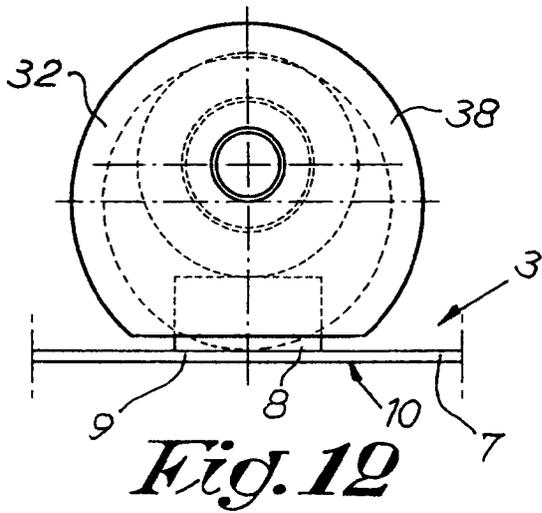
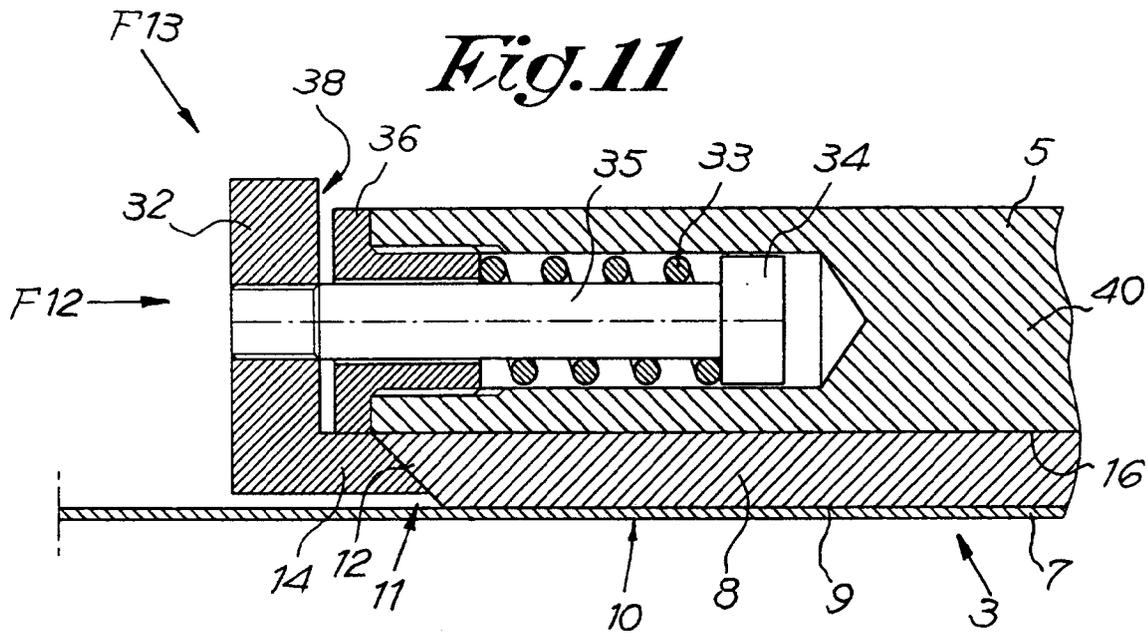


Fig. 3











European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 20 2016

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.6)
X	US 4 196 235 A (LINDQVIST ET AL.) 1 April 1980	1-5,9	E04F21/24
Y	* column 1, line 39 - column 4, line 4; figures 1-6 *	7,10	
A	---	17,18,20	
D,Y	US 3 331 290 A (HARDING) 18 July 1967 * column 2, line 31 - column 4, line 44; figures 1-14 *	7,10	
A	---	1,11,12, 14,16	
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D,A	US 3 296 946 A (CAGNO) 10 January 1967 * column 2, line 25 - column 4, line 18; figures 1-5 *	1,7,11, 12,14, 16,18-20	
D,A	US 3 791 754 A (ZOUCHIL F) 12 February 1974 * column 2, line 64 - column 6, line 16; figures 1-5 *	1,16-19	TECHNICAL FIELDS SEARCHED (Int.Cl.6) E04F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 September 1998	Examiner Ayiter, J
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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