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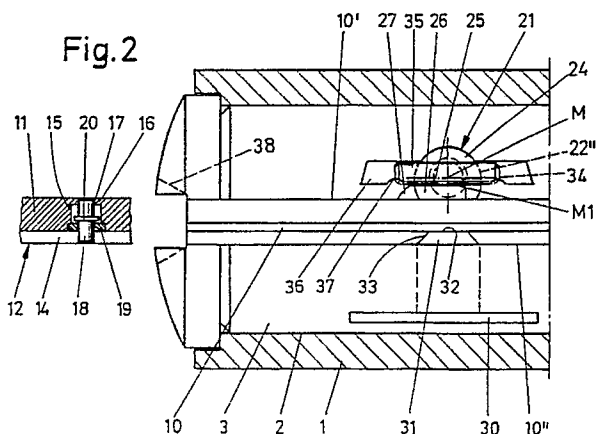
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(54) **Key.**

(57) A key for use with a locking device comprises a profiled key blade provided with a row of V-cuts on one narrow edge and has a control element (18) accommodated for transverse movement in a bore (15) extending transversely of the key blade and opening into the opposite wide faces thereof, such that when the element is urged, an engagement of one portion thereof, in one direction so that said one end portion lies flush with one of the wide faces of

the key blade, an opposite portion thereof projects outwardly beyond the other wide face of the key blade. The bore has a portion of enlarged diameter and the control element is in the form of a pin disposed in said bore and having a collar (10) freely movable in the enlarged diameter portion thereof between an end face forming the bottom of said portion and a retaining ring (11) arranged at the open end of the bore.



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KEY

This invention is concerned with a key for use with a locking device.

There is described in DE-A 3424307 a locking device comprising a lock of the cylinder type wherein the cylinder has a housing in which a cylinder plug is rotatably accommodated, together with a plurality of tumblers, the plug having a profiled keyway into which said tumblers extend in the rest condition of the cylinder, wherein an additional tumbler is provided which is mounted for sliding movement in a bore the longitudinal axis of which is parallel to but offset from the longitudinal central plane of the keyway, and further wherein an abutment is also provided in the keyway in the region of the additional tumbler but spaced therefrom, the locking device being adapted for use with a key having a profiled blade corresponding to the keyway and having mounted in the blade, for sliding transverse movement therein, a control element which is urged by engagement of one end portion thereof with the abutment into a condition in which an opposite end portion thereof projects outwardly from the key blade, said projecting end portion serving to operate the additional tumbler.

The additional tumbler (in fact in this case there are two) is movable in its bore through a distance which cannot exceed the heightwise dimension of the control element of the key and indeed in the particular case is movable through a stroke which is substantially smaller than such dimension. In this regard, it has to be considered that for moving the tumbler some form of camming surface or run-up slope has to be provided on the control member and clearly the heightwise distance over which such run-up slope extends cannot exceed the overall height of the control element. What is more, the run-up slope may not exceed a certain angle of inclination if jamming of the key during insertion is to be avoided.

In the aforementioned specification, therefore, a key is provided comprising a longitudinal groove along one wide face of the key blade.

More particularly, in order to enhance the stroke through which the additional tumbler is moved, the control element has to be formed as large as possible while the additional tumbler(s) have a diameter as small as possible so as to be accommodated within the lengthwise surface of the control element provided adjacent the run-up slope. To form the additional tumbler thin, however, is disadvantageous in that it affords a weak locking function.

It is thus an object of the present invention to provide a key for a locking device in which the above disadvantages of the aforementioned disclo-

sure are reduced or substantially avoided.

It is a further object of the present invention to provide a key for use with a locking device as set out hereinbefore, which key is of simpler construction, requiring less customised parts, than was the case of the key in accordance with DE-A 3424307.

The present invention, provides a key for use with a locking device comprising a profiled key blade provided with a row of V-cuts on one narrow edge and having a control element accommodated for transverse movement in a bore extending transversely of the key blade and opening into the opposite wide faces thereof, such that when the element is urged, by engagement of one portion thereof, in one direction so that said one end portion lies flush with one of the wide faces of the key blade, an opposite portion thereof projects outwardly beyond the other wide face of the key blade, characterised in that the bore has a portion of enlarged diameter and the control element is in the form of a pin disposed in said bore and having a collar freely movable in the enlarged diameter portion thereof between an end face forming the bottom of said portion and a retaining ring arranged at the open end of the bore.

Locking devices for use with the key according to the present invention are described and claimed in our co-pending European Patent Application No. 86 303931.9 (Published Application No. 202949) of even date herewith.

In a key in accordance with the present invention, therefore, the bore has a portion of enlarged diameter and the control element is in the form of a pin disposed in said bore and having a collar freely movable in the enlarged diameter portion thereof between an end face forming the bottom of said portion and a retaining ring arranged at the open end of the bore.

It will be appreciated that in comparison with the key of the earlier case, a simple pin is now sufficient to actuate the additional tumbler, the pin being of course provided with a collar, which may be integral with the pin, by which, in combination with the bottom of the enlarged bore portion and the retaining ring, the pin is held captive in the bore.

Moreover, in such a key it is now possible, by the provision of a longitudinal groove along one of the wide faces of the key blade, to provide a pin which does not exceed the transverse dimension of the key blade, this being achieved in that the bore opens into the groove and further in that the length of the pin while it does not exceed the transverse dimension of the key blade, is such that, when the opposite end portion thereof is caused to project

outwardly as aforesaid, it extends beyond the outside dimension of the key.

A significant advantage of the key of the present invention resides in that, because the control element is in the form of a relatively small pin, the handling of the key by the user becomes more commodious and in particular the key does not exhibit projections of the type of the key of the earlier case, which projections are likely to snag in the users pocket or with the users apparel when being carried or handled by the user.

There now follows a detailed description, to be read with reference to the accompanying drawings, of a key in accordance with the present invention in combination with a locking device. It will be appreciated that the key and locking device have been selected for description merely to illustrate the invention by way of non-limiting example.

In the accompanying drawings:-

Fig. 1 is a view of the blade end of a flat key before insertion into a lock cylinder shown in elevation;

Fig. 2 is a horizontal section, on a very enlarged scale, through the lock cylinder housing and the associated key blade in the region of the control element before the key has been inserted into the hole;

Fig. 3 is a cross-section, along offset planes, through the lock cylinder when the key is not inserted;

Fig. 4 is a partial longitudinal section through the lock cylinder in the region of the additional tumbler;

Fig. 5 is a cross-section corresponding to Fig. 2, but with the key inserted;

Fig. 6 is a cross-section corresponding to Fig. 3, likewise with the key inserted;

Fig. 7 is an illustration corresponding to Fig. 4, wherein the additional tumbler is moved by the control pin when the key is inserted; and

Fig. 8 is a view in perspective, on a very enlarged scale, of the additional tumbler with the control element shown in chain-dot.

The lock cylinder has a profiled lock cylinder housing 1, in which a cylinder plug 3 is rotatably mounted in a longitudinal bore 2. The plug 3 is non-rotatably secured to a thrower ring 5 having a thrower 4.

In the lock cylinder housing 1 and the cylinder plug 3 are provided, in the longitudinal central plane of the lock cylinder, bores 6,7 which lie in alignment with one another and which receive tumblers 8 comprising plug pins 8' and housing pins (or drivers) 8". The housing pins are urged outwardly towards the pins 8' by compression springs 9.

A keyway 10 of profiled cross-section extends in the plug 3 in the axial longitudinal direction

thereof. The keyway 10 is adapted to the cross-section of the key blade 11 of a flat key 12. The one narrow edge of the key blade 11 is provided with a row of V-cuts 13 of different depths, which cooperate with the tumbler pins 8 and operate them, when the key is inserted, so tha. the joint line between the plug pins 8' and housing pins 8" lies at the level of the plug rotation line F (see Fig. 6).

The key blade 11 has profile longitudinal grooves on both wide sides, corresponding to the transverse profiling of the keyway. A counter-sunk recess 15 extends from the bottom of a central one of the profiled longitudinal grooves 14, which is wider than the other grooves, and extends almost up to the opposite wide side of the key. At the bottom 16 of the countersink is a central bore 17 through which the control element 18 in the form of a pin extends. A retaining ring 19 is disposed at the open end of the recess 15 and serves to guide the control pin 18. The control pin 18 is restrained in the transverse direction by a central collar 20, which fixedly projects from the control element and is freely movable between the annular area of countersink bottom 16 and the retaining ring 19. The latter is pressed into the key blade and thus ensures the non-releasable mounting of the control element 18. The length of the control element 18 corresponds to the transverse dimension, i.e. thickness of the key blade 11 (see especially Fig. 2).

In a region between two tumbler pins 8 extends an additional tumbler 21 which is movable in a bore 22 opening into one side of the keyway 10 and extending parallel to the key insertion plane. More particularly, the additional tumbler 21 comprises a stem 23 and head 24, the latter being axially offset from the stem 23. The centre point M of the stem 23 is thus at a greater distance from the keyway than the centre point M 1 of the head 24. The additional tumbler 21 is secured against rotation by guiding the stem 23 in a bore section 22', which is axially offset from a bore section 22" of larger cross-section in which the head 24 is movable. The head is flattened on the side facing the keyway 10 so as to lie flush with the side wall 10' of the keyway. Adjacent the flattened surface is formed a run-up slope 26 which extends up to a side wall portion 25 of the head. The run-up slope 26 increases in the direction of key insertion. Adjacent the bore 22, at the key entry side thereof, and running thereinto, is formed a recess 27 extending into the side wall 10' of the keyway. A projection or spigot 34 projects from the head 24 in opposed relationship with the stem 23 and cooperates with a stroke-limiting abutment in the form of a pin 35 inset in the outer surface of the cylinder plug 3. To this end, the cylinder plug 3 has a groove 36 intersecting the bore 22 and running in the longitudinal direction of the cylinder plug 3, the depth of

the groove corresponding approximately to the diameter of the stroke-limiting pin 35. Lateral recesses 37 in the groove 36 ensure the correct location of the stroke-limiting pin 35.

The stem 23 of the additional tumbler 21 cooperates with a housing tumbler 29, which is guided in a bore 28 of the lock cylinder housing 1. The tumbler 29 is secured against rotation as a consequence of its being offset from the longitudinal central plane of the lock cylinder. This tumbler 29 is also acted upon by a compression spring (not shown) so that, when the key is withdrawn, the position as shown in Fig. 3 pertains, wherein the tumbler 29 projects with its end facing the cylinder plug into the bore section 22', brings the tumbler 21 into abutment with the stroke-limiting pin 35, and provided additional security against rotation.

In opposed relationship with the head 24 there extends on the other side of the keyway 10 a slot 30 which lies transversely of the keyway and into which an abutment in the form of an insert 31 is fixedly inserted. The end of this insert 31 projects into the keyway beyond the corresponding side wall 10" of the keyway. The edge projecting into the keyway 10 provides a surface 32 for actuating the control element 18, the side of said surface 32 facing the keyway insertion direction forming a roof-shaped slope 33. This surface lies at the level of the profiled longitudinal groove 14 of the key and projects therein when the key is inserted.

The distance x between the side wall 25 of the head 24 and the opposite surface 32 of the insert 31 corresponds to the amount y of the dimension extending transversely of the key 12.

The entry area of the keyway 10 is provided with funnel-shaped tapering guide surfaces 34 which guide the control element 18, if projecting, into the keyway.

The mode of operation is as follows: When the flat key 12 is inserted into the keyway 10, its V-cuts 13 operate the tumbler pins 8. The control element 18 is guided through the keyway (see chain dotted illustration in Fig. 5). Upon engagement of one end portion of the pin 18 with the roof-shaped slope 33 of the insert 31, the control element 18 is shifted transversely in the direction of the run-up slope 26 of the additional tumbler 21. The recess 27 disposed in front of slope 33 receives the opposite end portion of the pin 18 during this transverse motion, so that the control element 18 reaches the chain-dotted position in accordance with Fig. 4, but at this stage no shifting of the additional tumbler 21 has taken place. This position corresponds to the end position of the transverse displacement of the control element 18. When the key is inserted further, the run-up slope 26 is engaged by the end portion of the control element 18 which projects beyond the wide side of

the key, and a corresponding downward displacement of the additional tumbler takes place. This downward motion ends when the key has been completely inserted. At this stage the control element 18 is then disposed with its projecting end on the end face of the head 24, the stem 23 thereof has forced the housing tumbler 29 out of the cylinder plug 3, and the joint line between the additional tumbler 21 and the housing tumbler 29 lies on the plug rotation line, as do also the joint lines between the other tumblers 8 in the longitudinal central plane. The cylinder plug 3 can then be rotated by means of the flat key 12. After the key has been withdrawn, all the tumblers return to their initial position shown in Fig. 3, thus preventing a rotating movement of the plug 3 inside the lock cylinder housing 1.

It will be appreciated that the diameter of the projecting end portion of the pin 18 is substantially less than the lengthwise dimension of the run-up 26 formed on the additional tumbler 21 (see e.g. Fig. 7), while the amount by which said projecting end portion projects beyond the wide face of the key 12 is not greater than the transverse dimension of said run-up slope 26 (see e.g. Fig. 6).

It will also be appreciated that the key 12 is made from a key blank exhibiting the longitudinal grooves and the bore with the pin 18 held captive therein as aforesaid.

Claims

1. A key for use with a locking device comprising a profiled key blade (11) provided with a row of V-cuts (13) on one narrow edge and having a control element (18) accommodated for transverse movement in a bore (15) extending transversely of the key blade (11) and opening into the opposite wide faces thereof, such that when the element (18) is urged, by engagement of one portion thereof, in one direction so that said one end portion lies flush with one of the wide faces of the key blade (11), an opposite portion thereof projects outwardly beyond the other wide face of the key blade (11), characterised in that the bore (15) has a portion of enlarged diameter and the control element (18) is in the form of a pin (18) disposed in said bore (15) and having a collar (20) freely movable in the enlarged diameter portion thereof between an end face (16) forming the bottom of said portion and a retaining ring (19) arranged at the open end of the bore (15).

2. A key according to Claim 1 comprising a longitudinal groove (14) along one wide face of the key blade (11) characterised in that the bore (15) opens into said groove (14) and in that the length of the pin (18) does not exceed the transverse dimension (y) of the key blade (11) but is such that, when the

opposite end portion thereof is caused to project outwardly as aforesaid, it extends beyond the outside dimension of the key blade (11).

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Fig.1

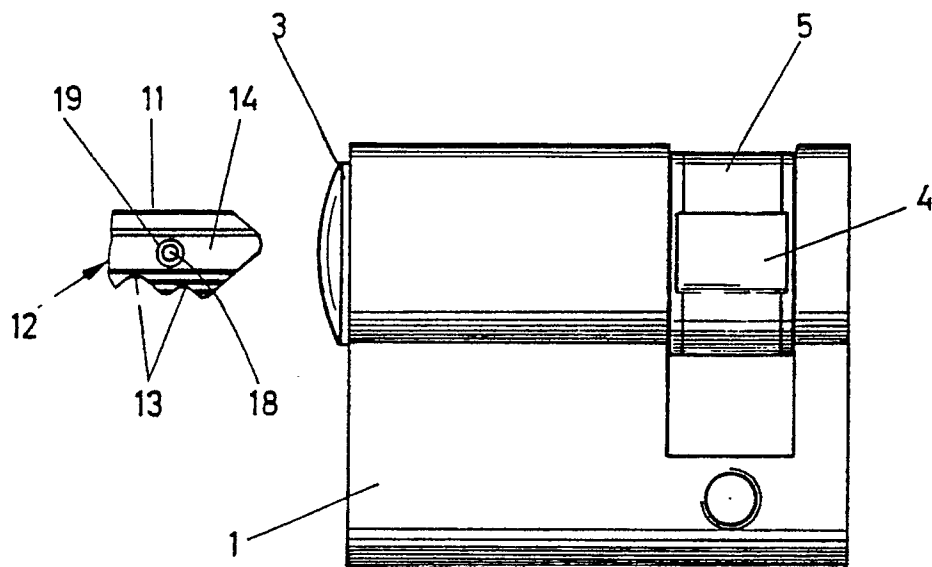


Fig.2

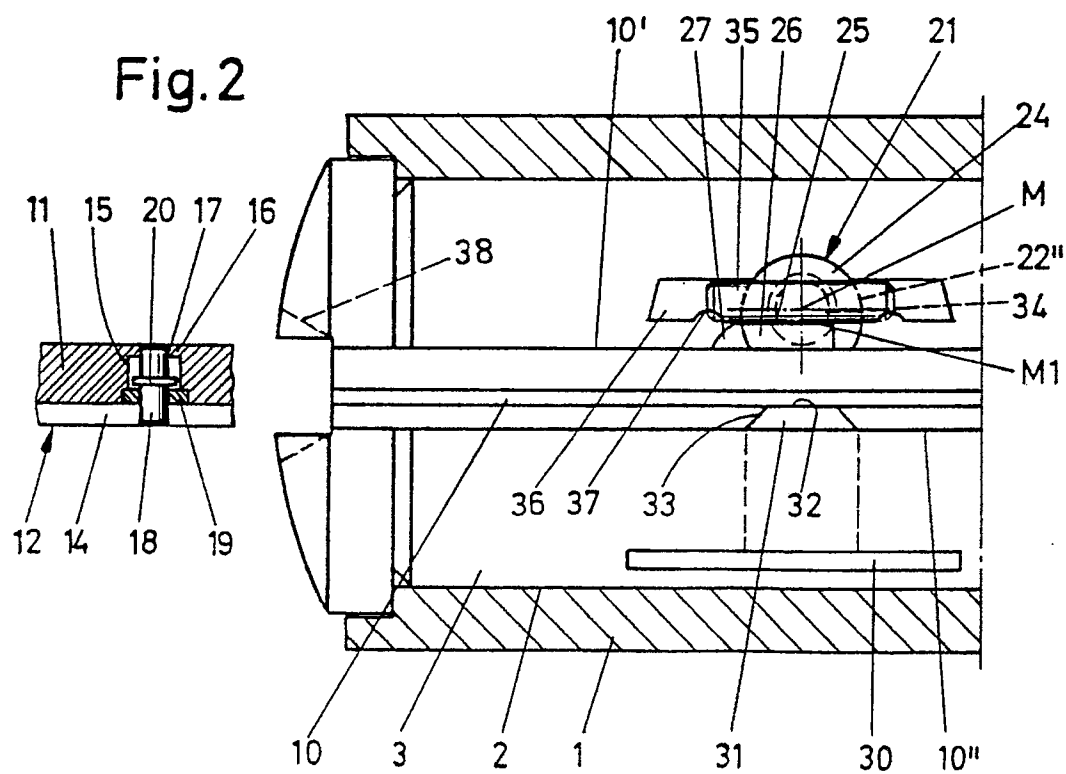


Fig. 3

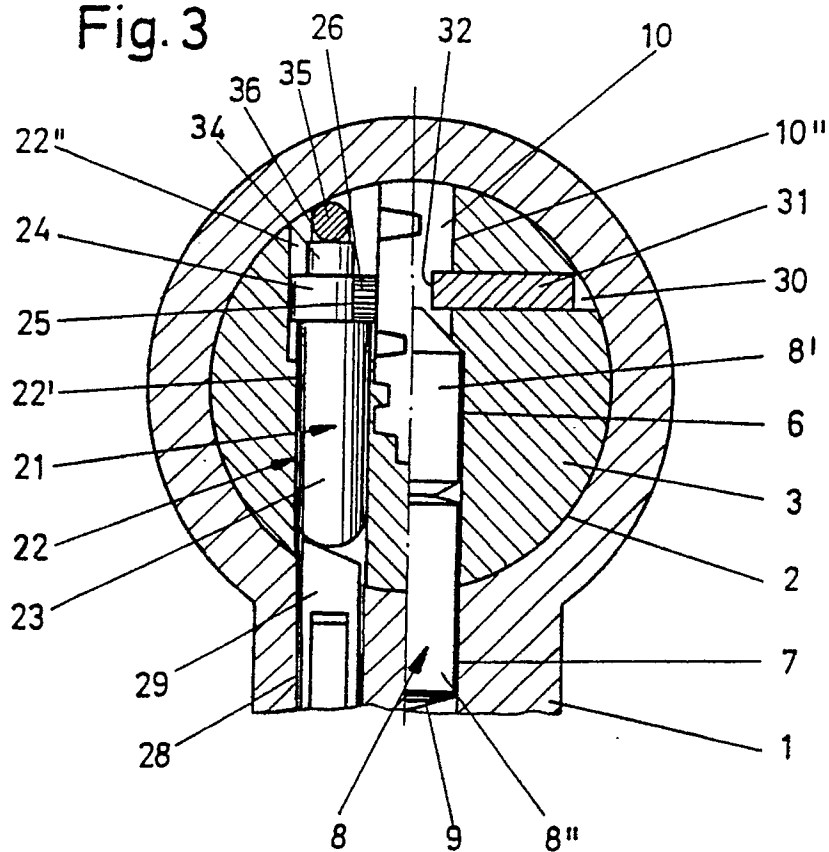


Fig. 4

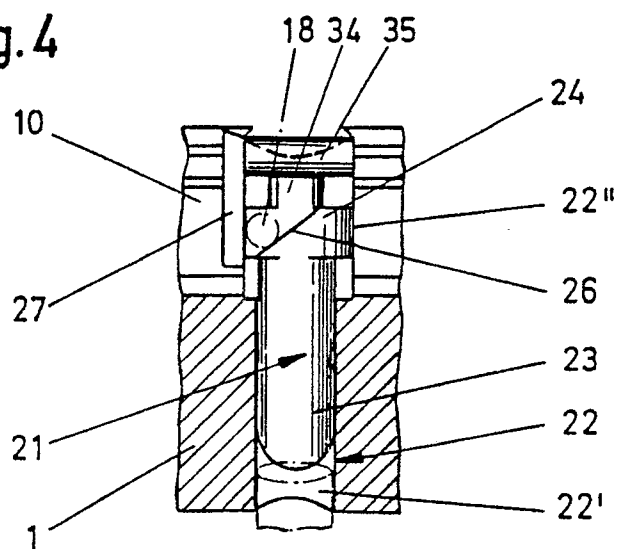
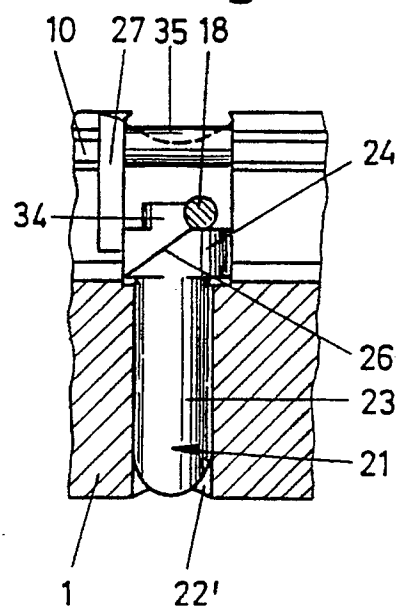
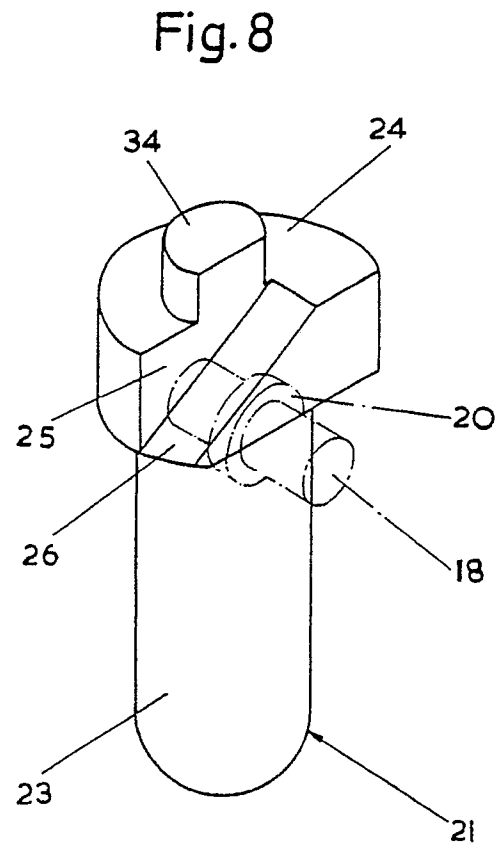
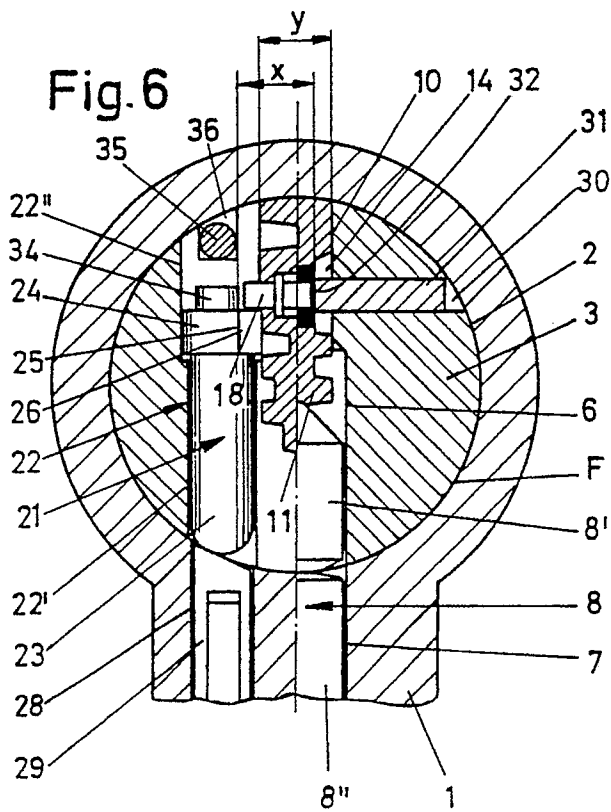
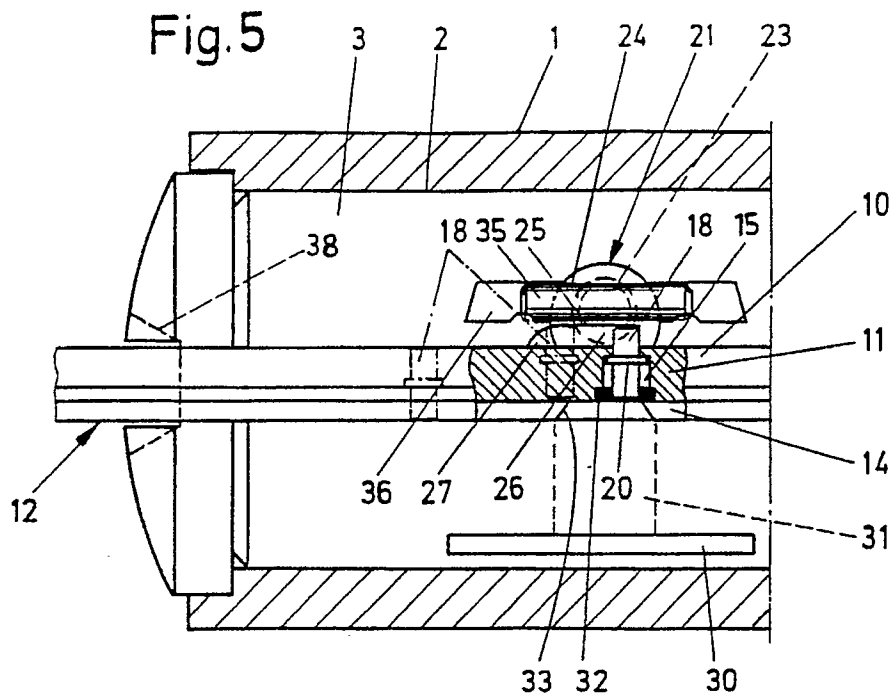


Fig. 7







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EUROPEAN SEARCH REPORT

Application Number

EP 90 12 3201

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.5)
X	FR-A-2 492 872 (VACHETTE) * Figure 5 * -----	1,2	E 05 B 27/00 E 05 B 19/08
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E 05 B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 18 January 91	Examiner VAN BOGAERT J.A.M.M.
CATEGORY OF CITED DOCUMENTS 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 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			