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(54) Improved tubular lock.

(57) Tubular lock, which comprises a number of lower pin-tumblers (1) provided with flanges (11) in association with the same number of lower pin holes (41), each with a recess (411) so as to make the lock very difficult to pick and to offer a high degree of security under ordinary circumstances.

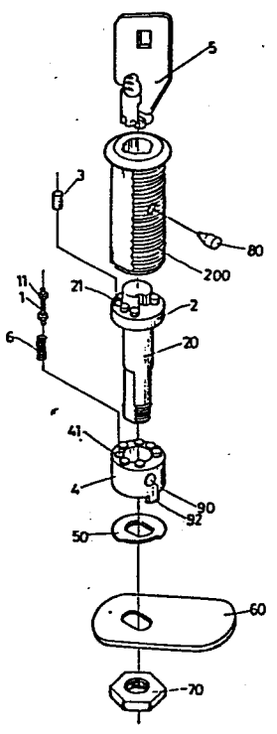

FIG. 1

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IMPROVED TUBULAR LOCK

Most tubular locks in the market are easy to pick because of:

The known tubular lock as shown in Fig. 10 and Fig. 11 comprises a housing 1 in which a plurality of upper pin-tumblers C, a bolt B, an upper plug D, a plurality of springs G, and a lower plug E are mounted. Each upper pin-tumbler C has a length different from the others; the same is tru to the lower pin-tumblers H. The upper pin-tumblers C are inserted into upper pin holes D of the upper plug A which is fixed to the bolt a. The lower pin-tumblers H together with the springs G are inserted into lower pin holes F of the lower plug E. The number of the upper pin-tumblers C is equal to the number of the lower pin-tumblers H and is also equal to the number of the springs G. The bolt B extends through the upper plug A, the lower plug E, a blocking plate K and is screwed into a nut T. Each lower pin-tumbler H is aligned with each upper pin-tumbler C and extends from the lower plug E into each upper pin hole D. The combination of the upper plug A, the bolt B and the lower plug E are installed into the housing 1 and fixed by means of a pin (Y) inserted into the lower plug E. The pin-tumblers are spring-loaded so that they are always in the locking position except when the proper key is inserted.

As shown in Fig. 12, a correct key J is inserted into the known lock to lower the upper pin-tumblers C which in turn press down the lower pin-tumblers H to the correct height so as to enable the upper plug A to turn, thus allowing the upper plug A to revolve and release the bolt B.

Fig. 14, Fig. 15 and Fig. 16 and 17 illustrate the use of the pick tools; first, insert each pin R of the pick as shown in Fig. 17 into each upper pin hole D to lower the upper pin-tumblers C, which in turn push the lower pin-tumblers H to the bottom of the lower pin holes D. Then, turn the pick tool clockwise and counterclockwise alternately, thereby slightly rotating the upper plug A clockwise and counterclockwise alternately. The reason why the upper plug A can slightly be rotated clockwise and counterclockwise is that the diameter of the upper pin-tumbler C must be smaller than that of the upper pin hole D. Since the lower pin-tumblers H are spring loaded, they will go upwards until their tops are in contact with the bottom surface of the upper plug A while the upper plug A is slightly rotated clockwise and counterclockwise, i.e. the lower pin-tumblers H are lifted to the correct height. Thus the upper plug A is allowed to revolve and the bolt B is released.

Fig. 18, illustrates the use of the pick tool shown in Fig. 9 to pick the known lock. First, slightly insert the pick tool shown in Fig. 9 into the upper plug A, and at the same time turn it clockwise and counterclockwise alternately. Thus the upper plug A is rotated clockwise and counterclociwise alternately. In consequence, the lower pin-tumblers H will go downward until their tops are in contact with the bottom surface of the upper plug A while the upper plug A is being slightly rotated clockwise and counterclockwise, i.e. the lower pin-tumblers H are lowered to the correct height. Thus the upper plug A is allowed to revolve and the bolt B is released.

As stated, the known tubular lock is easy to pick and should be improved.

The present invention relates to a tubular lock, and more particularly to one comprising a number of lower pin-tumblers having flanges in association with the same number of lower pin holes provided with recesses, making the lock very difficult to pick and offering a high degree of security under ordinary circumstances.

The object of the present invention is to provide an improved tubular lock which is difficult to pick and to offer a high degree of security under ordinary circumstances.

The other objects of the present invention may be gained by following the detailed description and the drawings attached.

Fig. 1 is a perspective and exploded view of a preferred embodiment of the present invention.

Fig. 2 is a sectional view of the preferred embodiment of the present invention.

Fig. 3 is an enlarged perspective and fragmentary view of the lower plug shown in Fig. 1.

Fig. 4 is a sectional view of the present invention showing proper key being inserted into the tubular lock according to the preferred embodiment of the present invention.

Fig. 5 is an end-view of Fig. 4.

Fig. 6 shows the sizes of the lower pin-tumbler and the lower pin hole.

Fig. 7 is a sectional view showing why it is impossible to use the pick tool shown in Fig. 17 to pick the lock constructed according to the present invention.

Fig. 8 is a sectional view showing the failure of

of another picking method.

Fig. 9 is a perspective view of a pick tool.

Fig. 10 is a perspective and exploded view of a known tubular lock.

Fig. 11 is a sectional view of the known tubular lock shown in Fig. 10.

Fig. 12 is a sectional view showing that the correct key has been inserted into the known tubular lock.

Fig. 13 is an end view of Fig. 12.

Fig. 14 shows how to pick a known lock.

Fig. 14, Fig. 15 and Fig. 16 show how to use the pick tool shown in Fig. 17 to pick a known lock.

Fig. 17 is a perspective and exploded view of another pick tool;

Fig. 18 shows how to use the pick tool shown in Fig. 9 to pick a known lock.

Referring to Fig. 1 and Fig. 2, there is shown the present invention comprising a housing 200 in which a plurality of upper pin-tumblers 3. A bolt 20, an upper plug 2, a plurality of lower pin-tumblers 1, a plurality of springs 6, and a lower plug 4 are mounted. Each upper pin-tumbler 3 has length different from the others, and the same is true to the lower pin-tumblers. The upper pin-tumblers 3 are inserted into upper pin holes 21 of the upper plug 2. The upper plug 2 is fixed to the bolt 20. Each lower pin-tumbler 1 is provided with two flanges 11. The lower pin-tumblers 1 together with the springs 6 are inserted into lower pin holes 41 of the lower plug 4. The number of the upper pin-tumblers 3 is equal to the number of the lower pin-tumblers 1 and is also equal to the

number of the springs 6. The bolt 20 extends through the upper plug 2, the lower plug 4, a blocking plate 50 and a locking plate 60, and is screwed into a nut 70. Each lower pin-tumbler 1 is aligned with each upper pin-tumbler 3 and extends from the lower plug 4 into each upper pin hole 21. The combination of the upper plug 2, the bolt 2, and the lower plug 4 are installed into the housing 200 and fixed by means of inserting a pin 80 into the lower plug 4. The pin-tumblers are spring-loaded so that they are always in the locking position except when the proper key is inserted.

Referring to Fig. 3, there is shown a recess 411 at the upper part of each pin hole 41 of the lower plug 4. The depth of each recess 411 is different from the others.

Referring to Fig. 4, there is shown a proper key 5 being inserted into the lock according to the preferred embodiment of the present invention to lower the upper pin-tumblers 3 which in turn press down the lower pin-tumblers 1 to the correct height so as to allow the upper plug 2 to revolve and release the bolt 20.

Referring to Fig. 6, there is shown the height of the flange 11 being A, then the depth of the recess 411 is A + 0.1A, and the length of the upper end 12 is 2A; let the depth of the lower pin hole 41 be B, then the diameter of the recess 411 is 1.2B.

Fig. 7 shows why it is impossible to use the pick tool shown in Fig. 17 to pick the lock according to the present invention. Each pin R of the pick tool shown in Fig. 17 is inserted into each upper pin hole 21 to lower the upper pin-tumblers 3 which in turn push the lower pin-tumblers 41 to the bottom of the lower pin holes 41. Then, turn the pick tool clockwise

and counterclockwise alternately, thereby slightly rotating the upper plug 2 clockwise and counterclockwise alternately. The reason why the upper plug 2 can slightly be rotated clockwise and counterclockwise is that the diameter of the upper pin-tumbler 3 must be smaller than that of the upper pin hole 21. Since the lower pin-tumblers 4 are spring-loaded, they will go upwards until the flanges 11 are in contact with the bottom surface 22 of the upper plug 2 while the upper plug 2 is being slightly rotated clockwise and counterclockwise. As a result, the upper ends 12 of the lower pin-tumblers 1 will go into the pin holes 21 of the upper plug 2. In other words, the rotation of the upper plug 2 is prevented by the lower pin-tumblers 1, i.e. it is impossible to pick the lock according to the present invention.

Fig. 8 shows why it is impossible to use another pick tool shown in Fig. 9 to pick the lock according to the present invention. The pick tool shown in Fig. 9 is first slightly inserted into the upper plug 2, and at the same time is turned clockwise and counterclockwise alternately. Thus the upper plug 2 is slightly rotated clockwise and counter clockwise alternately. In consequence, the lower pin-tumblers 1 will go downward until the flange 11 of the lower pin-tumbler is in contact with the recess 411. In ther words, the rotation of the upper plug 2 is prevented by the upper ends 12 of the lower pin-tumblers 1, i.e. it is impossible to pick the lock according to the present invention. Nevertheless, once the flange 11 at the upper part of the lower pin-tumbler 1 goes into the lower pin hole 41. The upper pin-tumblers 1

will go into the recess 411 too, so that the rotation of the upper plug 2 is prevented by the upper pin-tumblers 1.

Consequently, it is impossible to pick the lock according to the present invention no matter what kind of picking method is used.

In order to increase the safety of the present invention, the height of each flange 11 may be different one another and the same is true to the recesses.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore considered in all respects as illustrative and not restrictive, the scope of the invention is indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalent of the claims are therefore deemed to be embraced therein.

CLAIM:

1. An improved lock comprising:

a housing;

a bolt;

an upper plug having a plurality of upper pin holes and being fixed on said bolt;

a lower plug having a plurality of lower pin holes;

a plurality of lower pin-tumblers each of is provided with two flanges and is inserted into said lower pin holes;

a plurality of springs inserted into said lower pin holes and being used to lift the lower pin-tumblers to the locking position.

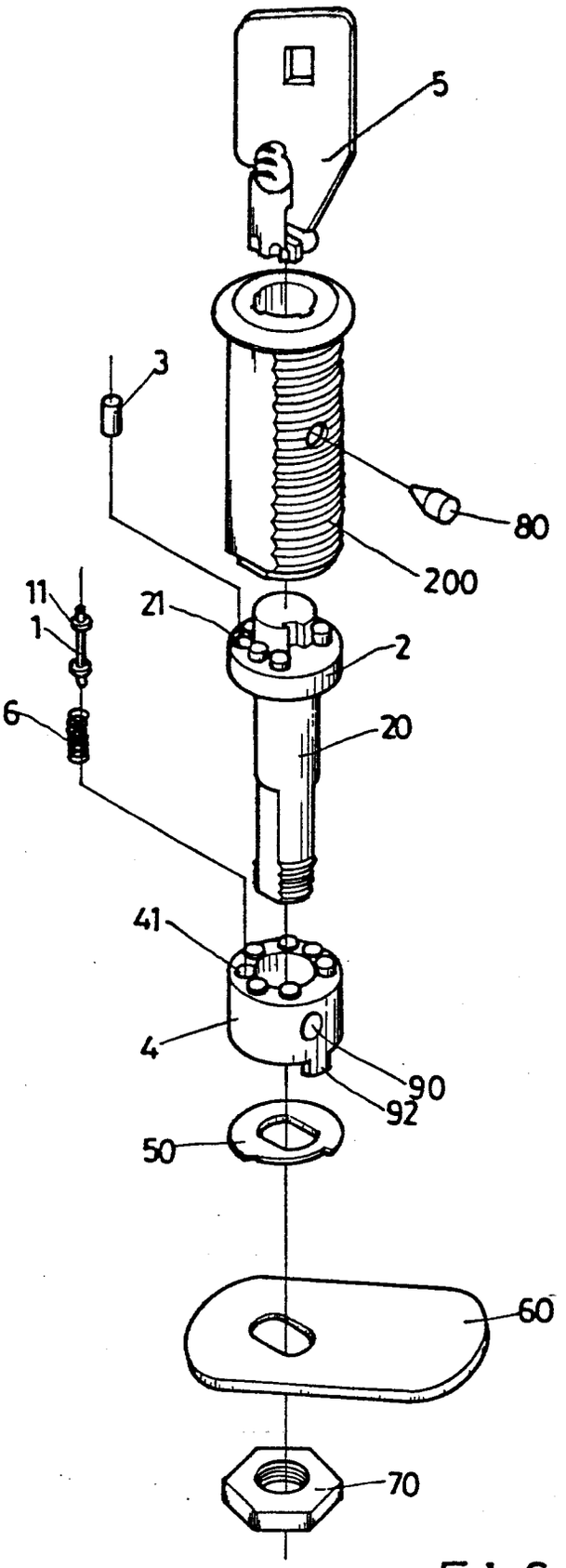

FIG. 1

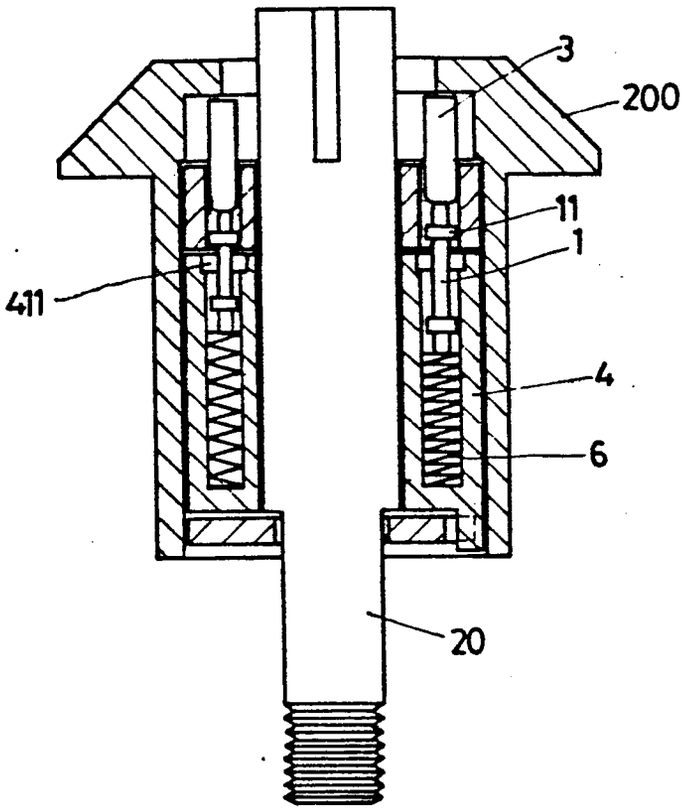

FIG. 2

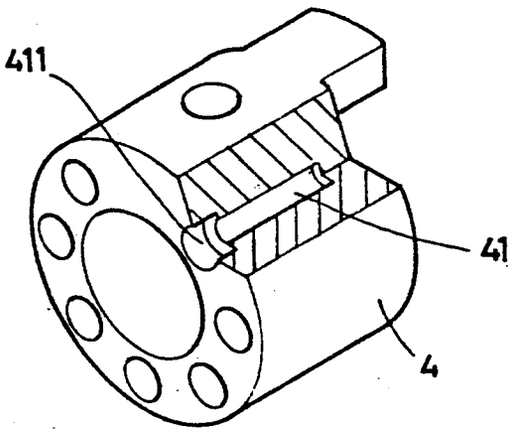

FIG. 3

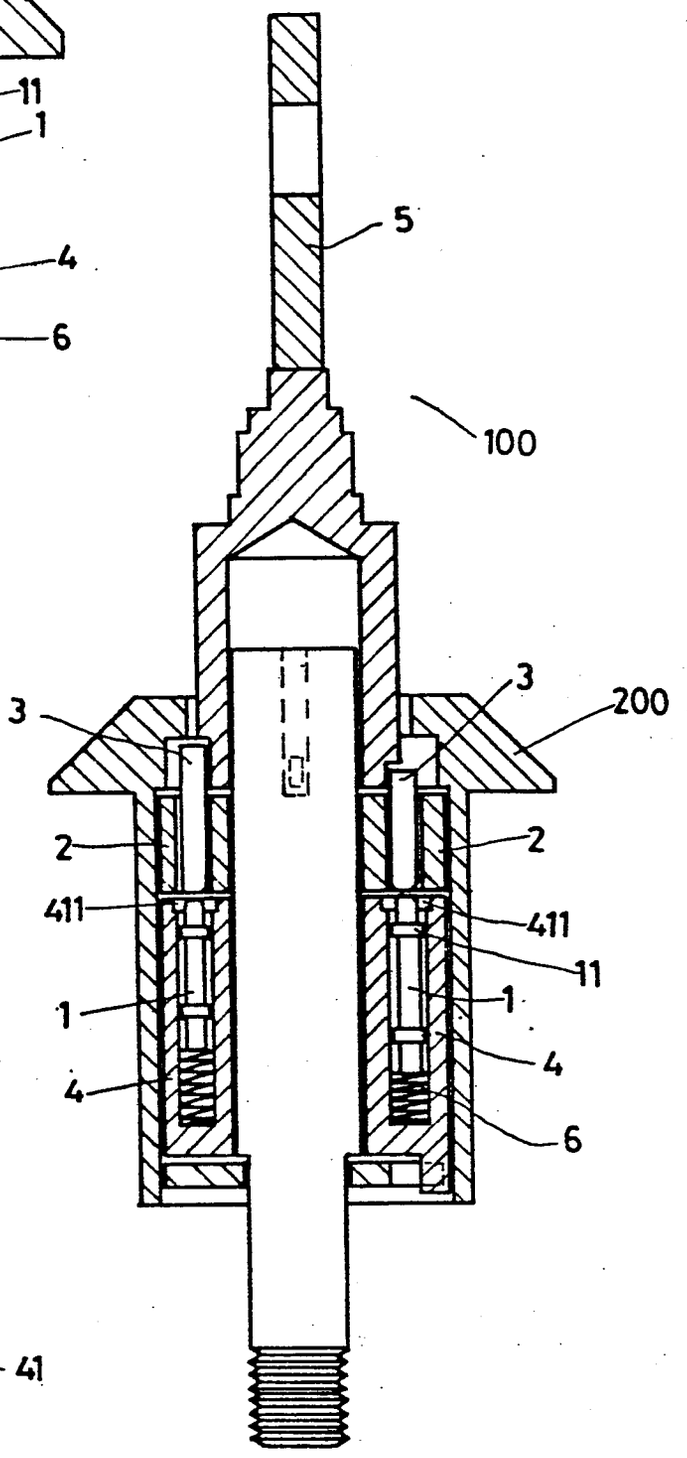

FIG. 4

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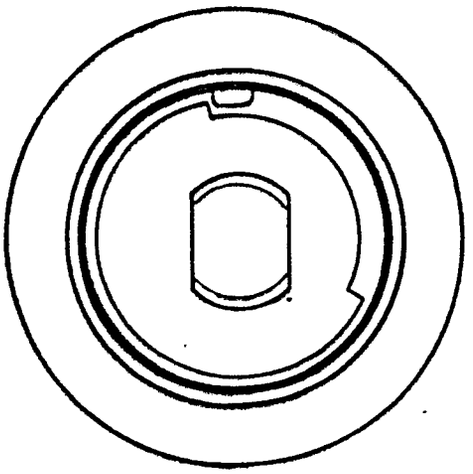

FIG. 5

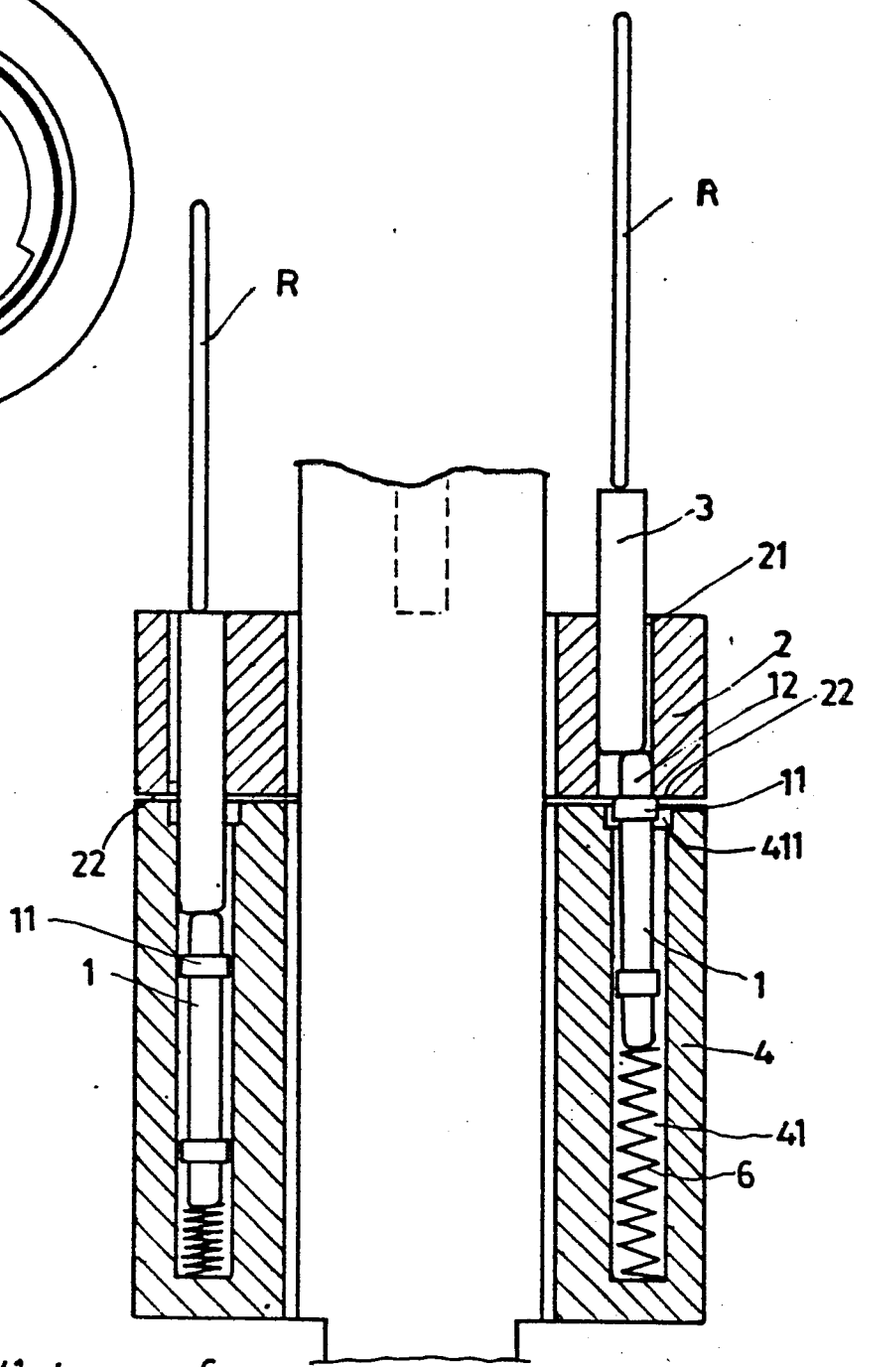

FIG. 7

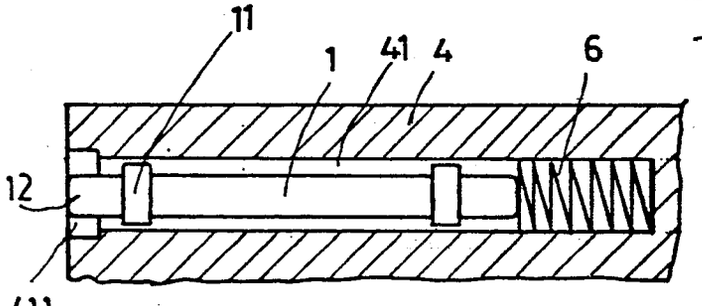

FIG. 6

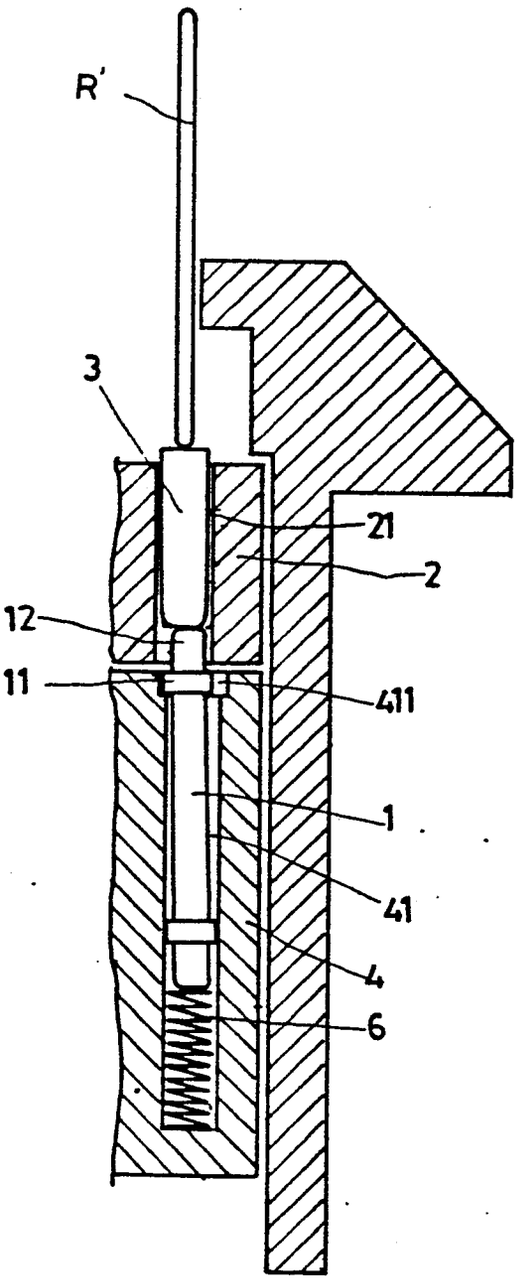

FIG. 8

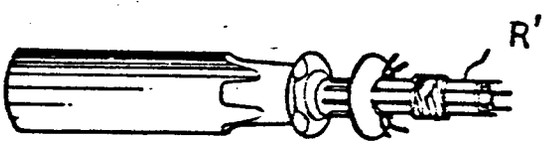

FIG. 9

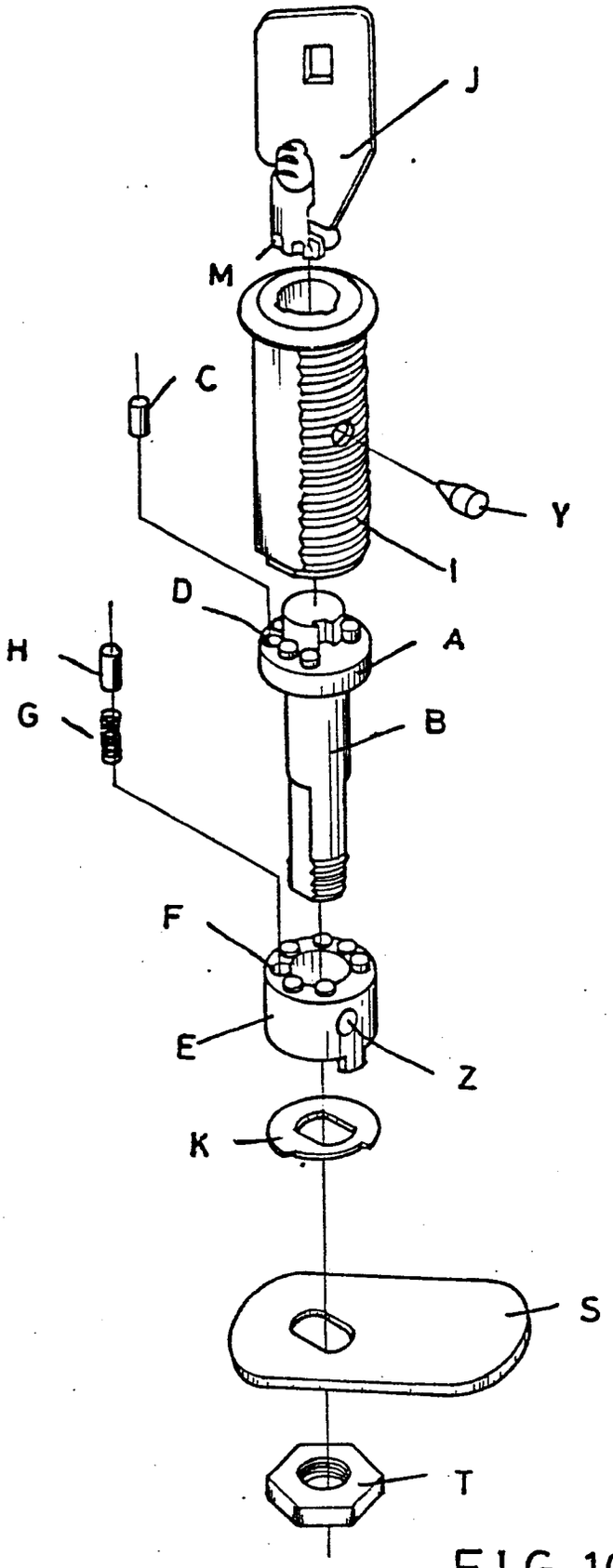

FIG. 10

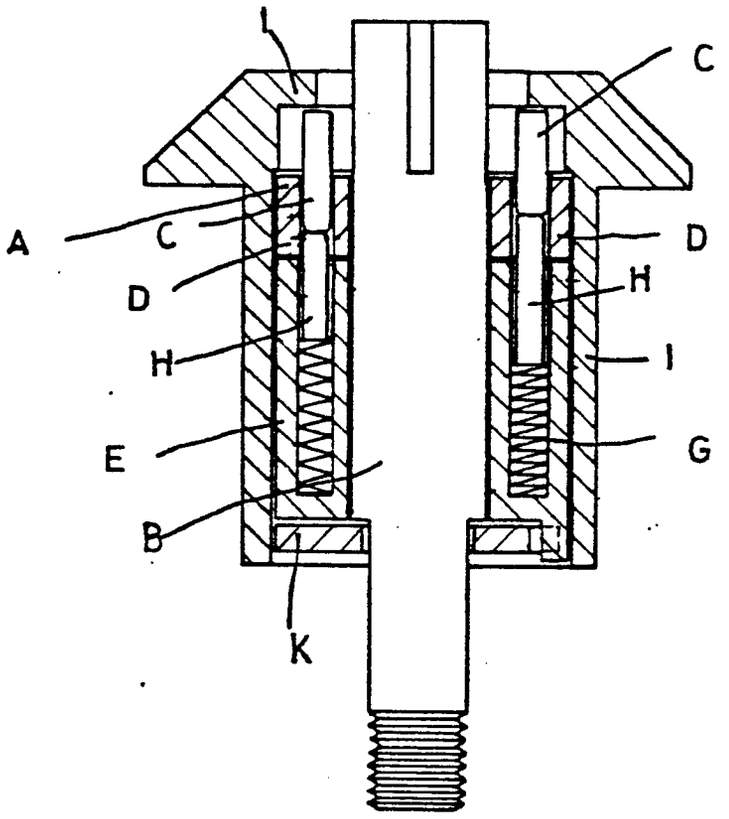

FIG. 11

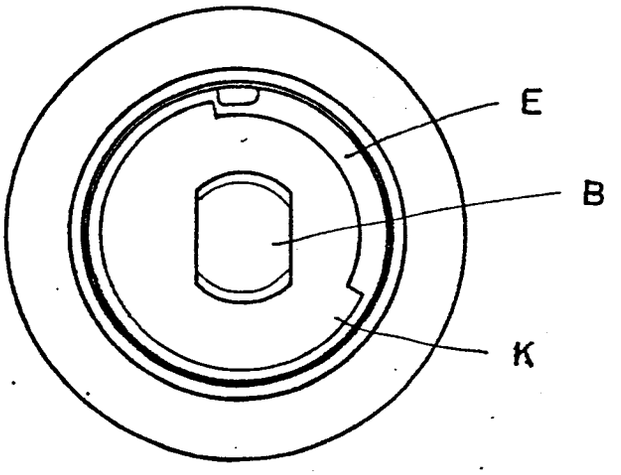

FIG. 13

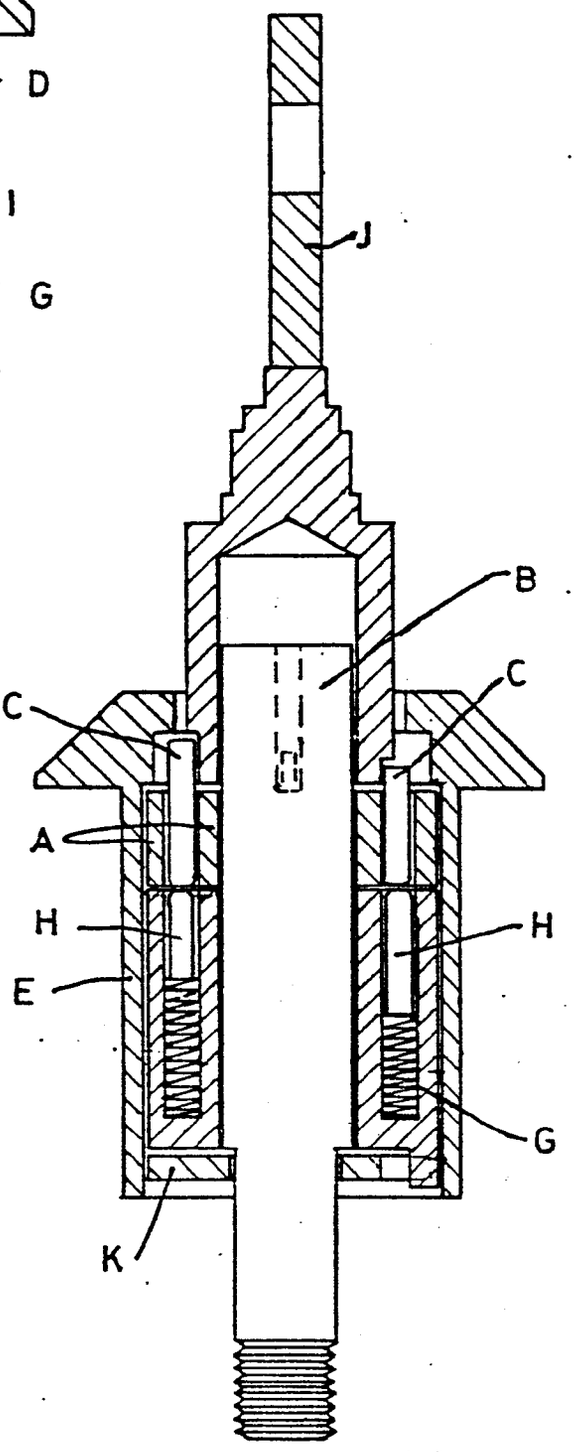

FIG. 12

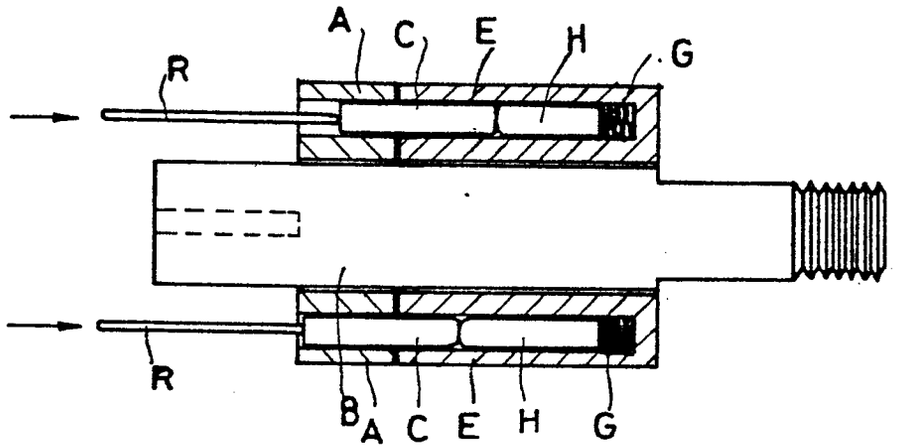

FIG. 14

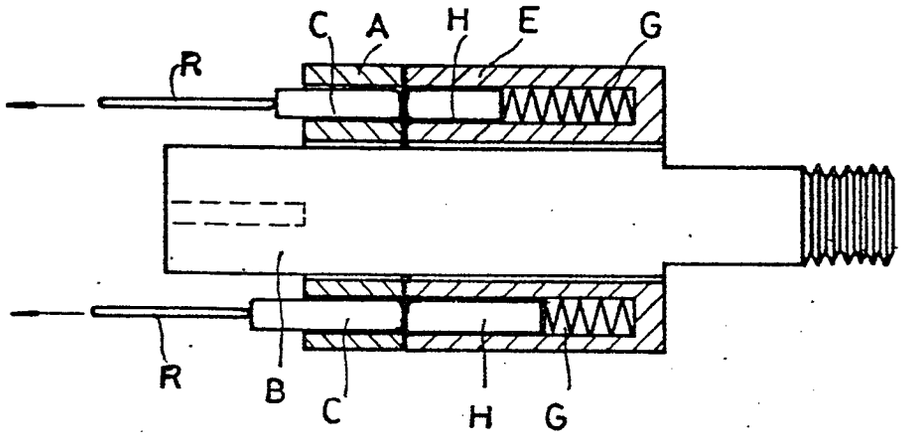

FIG. 15

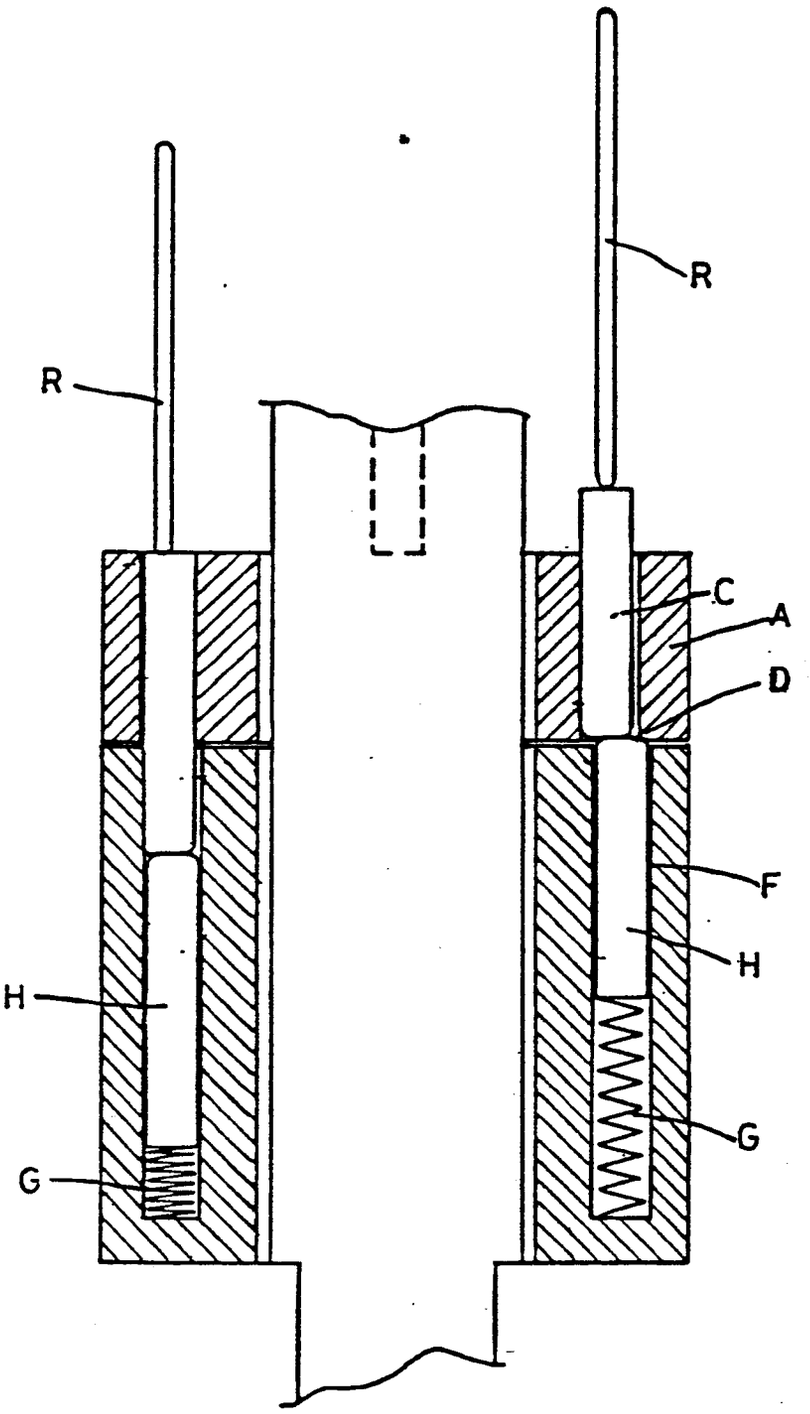

FIG. 16

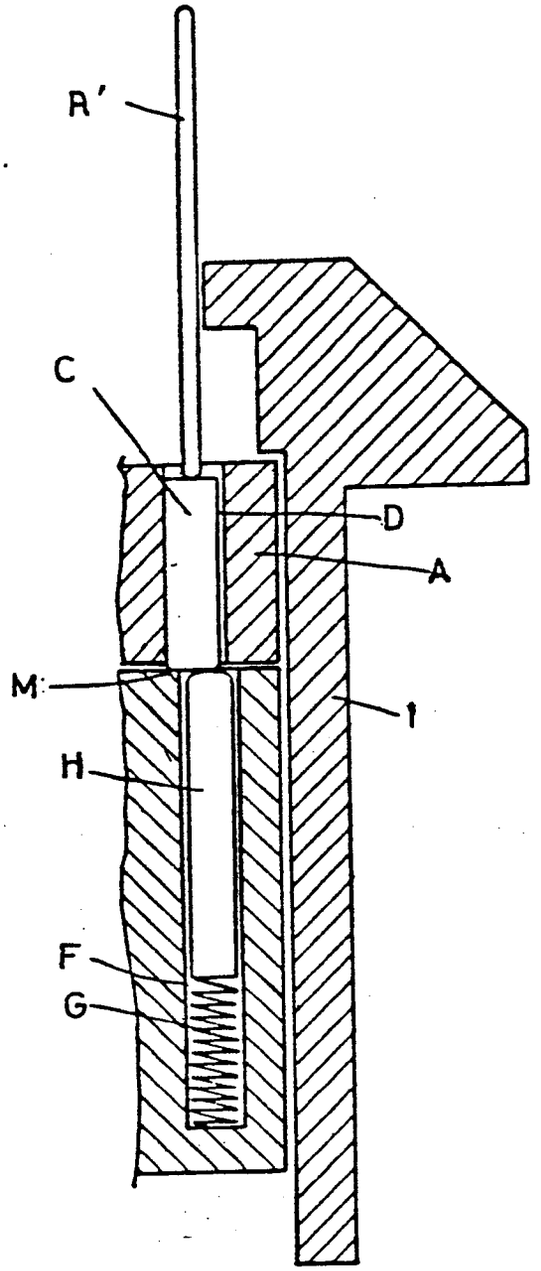

FIG. 18

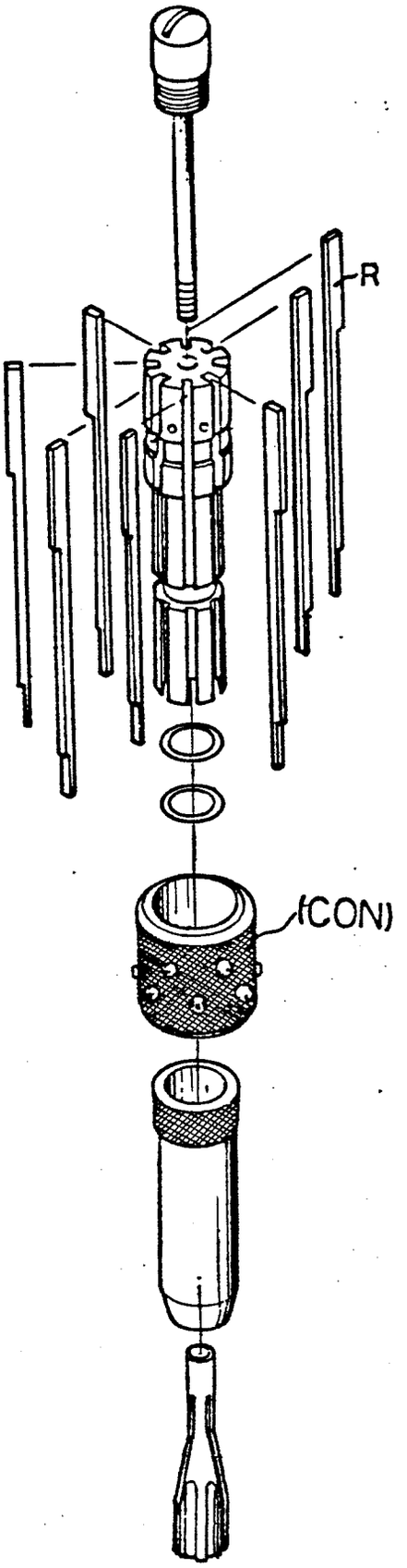

FIG. 17

European Patent Office

EUROPEAN SEARCH REPORT

0139796
Application number

EP 83 30 6515

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. ³)
X	GB-A- 940 428 (LOWE & FLETCHER LTD.) * Complete document *	1	E 05 B 27/08
A	DE-U-1 876 907 (FA. W. KARRENBERG) * Figures 1-4 *		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

E 05 B 21/00
E 05 B 27/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	07-06-1984	KRABEL A.W.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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