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(54) Coupling mechanism for double cylinder locks.

(57) A coupling mechanism for a double cylinder lock comprising a coupling element extending between the inner end faces of the two cylinder cores in the form of two coupling bodies mounted on a central spindle having flanks projecting from the surface, the end sections of which facing away from each other are in positive engagement with the adjacent cylinder core to the locking member boss, which surrounds the coupling element and has at least one coupling engagement aperture. The flanks of the coupling bodies are moveable into the discs spring loaded against one another, the periphery of which are of the same shape as the coupling engagement aperture (16) and which discs (17, 18) are disposed to be displaceable in relation to the centre wall (10) of the boss.

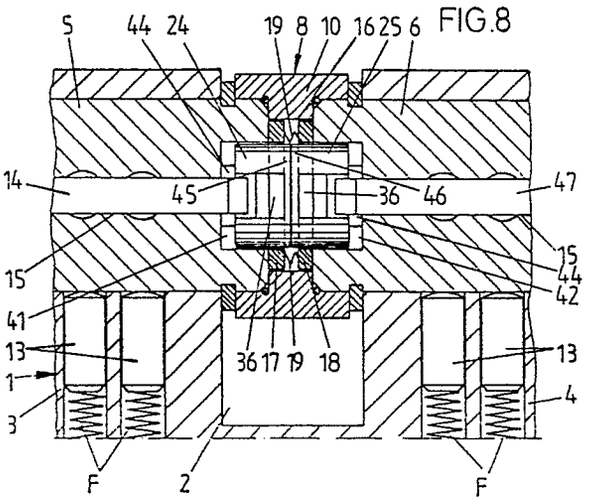

FIG.8

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COUPLING MECHANISM FOR DOUBLE CYLINDER LOCKS

This invention is concerned with a coupling mechanism for a double cylinder lock of the type which comprises a coupling element extending between the inner end faces of the two cylinder cores.

Such a coupling mechanism is known from the DE-PS 2,133,782, in which a central spindle of the same material extends from one coupling body. The one coupling body is provided at its end with diametrically opposed projections, whilst the other coupling body has a bore provided with appropriate slots in order to be able to combine the two coupling bodies by way of a bayonet assembly. If a key is inserted on one side of the double cylinder lock and it is turned then it is impossible for the cylinder to be locked from the other side of the cylinder lock. This construction also does not allow the use of emergency keys, which have for example longitudinally-extending slots for arranging the tumblers. Admittedly, the tumblers could be arranged and the cylinder core be turned afterwards by means of such an emergency key. However displacement of the coupling element is not possible, even if the cylinder cores align with one another. The emergency key is not in fact able to displace the coupling body facing it so that its flanks can engage with the boss of the locking member.

Lockability from both sides is made possible by the coupling mechanism known from DE-PS 1,678,025. Its coupling element comprises two coupling bodies designed in the shape of a T, such that the webs are asymmetrically arranged and both webs, with their side flanks lying opposite each other, bring about the coupling engagement with the boss centre wall of the locking ward boss. However, it is often desired that operation by a key on the outside, in particular, should not be possible, if the key is in the lock on the inside of the door and is turned. In order to satisfy the customers' requirements the cylinder lock manufacturer thus has to produce and keep in stock differently designed coupling mechanisms, involving costlier stock-keeping and higher production costs. There is another disadvantage to this design which is that with this coupling mechanism the coupling element is engaged by the point of the key, which results in mechanical weakening, with regard to the transfer of force.

The object of the present invention is to provide a coupling mechanism for a double cylinder lock of the type described which can be used in different ways while maintaining its design and structure and in which engagement by the point of the key is avoided.

The present invention provides a coupling mechanism for a double cylinder lock comprising a coupling element extending between the inner faces of the two cylinder cores in the form of two coupling bodies mounted on a central spindle having flanks projecting from the surface, the end sections of which facing away from each other are in positive engagement with the adjacent cylinder cores for transferring the rotary motion of the cylinder core to the locking member boss, which surrounds the coupling element and has at least one coupling engagement aperture characterised in that the flanks of the coupling bodies are movable into the discs spring loaded against one another, the periphery of which are of the same shape as the coupling engagement aperture and which discs are disposed to be displaceable in relation to the centre wall of the boss.

As a result of this design, a coupling mechanism of the type described is produced which is suitable for a wider range of application, without making any changes to the basic structural design. Contrary to the prior art the flanks of the coupling bodies do not come directly into coupled engagement with the centre wall of the boss, but can be positively inserted into the two discs spring loaded against one another, which on their part are disposed to be displaceable in the coupling engagement aperture of the centre wall of the boss. In this way it is possible to permit the lock to be operated from both sides, even if there is a key in the lock on one side which key has been turned, by making the discs of an appropriate thickness. If the coupling mechanism is designed as a so-called emergency coupling, then this can be achieved by designing the discs to have such a thickness, that there is no longer any displacement of the discs by the key. The appropriate emergency key then has to be provided with longitudinal slots, so that the emergency throw is equal to at least half of the thickness of the centre wall of the boss. It is, however, also possible to make the discs of such a thickness, that there is still a certain movement of the discs towards one another. The slots for the emergency key then do not need be designed to be quite so long. They can thus be shorter than half of the thickness of the centre wall of the boss. There is a further advantage in that the coupling element does not have to be taken along by the key tip. Consequently the coupling mechanism can be used in cylinder locks, in which the keys have slots on their narrow edge or on their broadside. Apart from that, the boss of the locking member is secured against twisting, even if there is no key in the lock. In addition, the cylinder core ends facing

each other do not need to be altered for the coupling mechanism to be used as a standard coupling, emergency coupling or a coupling lockable on both sides. To obtain a simple structural design, the plan form of the discs, in compliance with the rectangular shape, is designed so that two opposite narrow edges extend convexly. For the deflection of the discs under the action of a spring the two supporting means provided in opposite corner areas are sufficient to ensure that tilting which would affect the displacement cannot occur, if the key tip acts off-centre on the coupling element. With a key inserted into the cylinder lock and turned from one side, the two coupling bodies which are longitudinally displaceable on the pin are deflected by the spring lying concentric with the pin, in order to make it possible to use the other key to displace the coupling body facing that other key after appropriately rotating the cylinder core. Reliable location of the spring is ensured by designing it as a compression spring, the end coils of which are located in annular grooves of the inner faces of the coupling body, facing each other. Appropriate dimensioning of the depth of both annular grooves allows for the discs to be moved as far as into flat abutment with one another. In the closed-up position, the pin does not project beyond the outer end faces of the coupling bodies, which has the advantage of allowing manipulation with the front end of a flat key, which has notches for arranging the tumbler pins on its broadsides. If the pin is designed as a steel needle, the advantage results of tolerance-freer guidance of the coupling bodies on the steel needle. The end sections of the steel needle, with enlarged cross section lie protected within the cup-shaped recesses. They also lie against the recess wall spaced a short distance therefrom. The end sections of the steel needles may be a stop collar at one end and a circular spring clip at the other end. Furthermore, the enlargements can be formed when the steel needle is severed. The cup-shaped recesses then provide an engagement area for the appropriate severing tool. By not riveting the end sections the steel needle itself is not subjected to any kind of deformation which might affect the seating of the coupling bodies, so that maximum mobility of the coupling bodies is constantly ensured despite some tolerance. Advantages from the point of view of assembly technology are obtained by providing stops on the inner side of the boss for the deflection of the discs. This permits installation of the locking member boss into the coupling mechanism as a prefabricated constructional unit. In a simple way the stops are formed by circlips inserted into annular grooves of the locking member boss. One circlip will generally be sufficient, provided that a fixed stop is provided. If the coupling mechanism is to be converted to an emergency coupling, then this can also be attained by a centre disc arranged between the discs. The two outer discs can then remain unaltered. This centre disc does not however affect the deflection of the two outer discs towards one another. When a centre disc is not used, the deflection property of the discs and the spring loading of the coupling bodies towards each other can be induced by a common flat spring, which can be made economically by die cutting. After the die-cutting operation, the flat springs produced have at their edge, deflected tongues for abutting against the discs and, occupying a middle position, deflected flaps for resting against the coupling bodies. The deflection has to be such that the tongues and flaps are pointing in opposite directions to one another to result in a uniform abutment. In order to make the flat spring unrotatable within the centre wall of the boss, its plan form is comparable with that of a disc. Further, it is possible to form the flat spring by a twisted strip of flat spring. This then serves exclusively to deflect the discs. The coupling bodies are here to be additionally supported by springloading against each other. There is a further possibility for the deflection of the discs, in which four separate compression springs are provided to be seated in the corner areas of the discs. The corresponding countersunk holes in these corner areas of the discs allow the discs to lie flat against each other under the effect of a compressive load. Even if, by the action of the key tip, the opposite coupling body with its flanks has been brought out of engagement with the corresponding disc, the inner centering collar still projects into the disc. A threading effect is thus attained, so that axial displacement of the coupling bodies can easily be accomplished at all times.

A number of exemplary embodiments of the invention will now be described by way of illustration by means of the Figures 1 to 14 of the accompanying drawings, in which

Figure 1 represents a double cylinder lock, partially in elevation, partially in section, provided with the coupling mechanism according to the first specific embodiment with the key inserted on one side;

Figure 2 represents components of the coupling mechanism in exploded perspective representation;

Figure 3 represents a longitudinal section through the assembled coupling mechanism fitted in the locking member boss;

Figure 4 represents a horizontal section through the double cylinder lock, with the key inserted into the lock;

Figure 5 represents the sectional view according to line V-V in Figure 1;

Figure 7 represents a view corresponding to Figure 1, in which the key inserted on the LH side is turned and a key is inserted from the other side of the cylinder lock;

Figure 8 represents the view corresponding to Figure 7, in which the coupling bodies have been brought into alignment with each other by means of the key inserted and turned from the RH side of the double cylinder lock;

Figure 9 represents a longitudinal section through the locking member boss comprising the coupling mechanism according to the second specific embodiment;

Figure 10 represents in perspective single representation a spring forming tongues and flaps;

Figure 11 represents a view corresponding to Figure 9, in which the discs are of a greater thickness;

Figure 12 represents a longitudinal section through the locking member boss comprising discs of normal thickness, which accommodate a centre disc between them;

Figure 13 represents a view corresponding to Figure 7, in which the coupling mechanism is designed as an emergency coupling with the key inserted and turned on the one side and with the emergency key inserted from the opposite side and

Figure 14 represents a section resembling Figure 13, in which the coupling bodies have been brought into axial alignment with each other by means of the emergency key, in which both are in engagement with the discs assigned to them.

The double cylinder lock is designed to be the same for all coupling mechanisms. It comprises a housing 1 having a central cut-out 2, though which the two housing half-members 3 and 4 are formed. In the areas of the housing half-members 3, 4 of larger cross-section, are rotatably mounted the two cylinder cores 5, 6 which are axially aligned with each other and are of equal size.

A locking member boss 8 bearing a locking ward 7 extends in the cut-out. A coupling mechanism 9 is assigned to the locking member boss according to the first exemplary embodiment illustrated in Figures 1 to 8 in order to be able to couple the cylinder plugs 5, 6 to the locking member boss 8.

The two ends of the cylinder plugs 5, 6 facing each other, which extend up to the centre wall 10 of the boss, support the locking member boss 8, c.f. in particular Figures 4 and 7. The circlips 11 known per se on both sides of the locking member boss 8 are used to ensure axial locking in position of the cylinder plugs 5, 6 in the housing half-members 3 or 4. The double cylinder lock comprises a row of pin tumblers in each housing half member 3, 4. Each pin tumbler is made up of a core pin 12 and a housing pin 13, which are guided in corresponding location holes of the cylinder core and housing. The housing pins 12 are impinged by respective pin springs 14 (sic F) in the direction of the cylinder core. The pin tumblers are then displaced so that the separating line T between the core pins and the housing pins does not lie on the sliding line of the cylinder cores. The cylinder cores are thus prevented from turning. By means of a key 14 illustrated in Figure 1, which penetrates a vertically oriented keyway 15 of the cylinder plug 5, the pin tumblers are aligned so that the separating line T between the housing pins and core pins lies at the level of the sliding joint of the cylinder core thus allowing the latter to be turned.

The centre wall 10 of the boss is provided centrally with a coupling engagement aperture 16, in which two discs 17, 18 which are spring biased towards each other are displaceably fitted. The plan form of the discs and accordingly also the coupling engagement aperture 16 are designed in a rectangular shape 50 that two opposite narrow edges 17', 18' extend convexly towards each other. The respective narrow edges are in alignment with the circumference of the cylinder plugs 5, 6. For the deflection of the discs, four single compression springs 19 which are seated in the corner areas of the discs 17, 18 are provided. Their end coils are resting in diameter-conforming countersunk holes 20 of the discs 17, 18. The single compression springs 19 and countersunk holes are dimensioned so that the discs 17, 18 are able flatly to abut each other.

In order that the discs 17, 18 remain in the coupling engagement aperture 16 before assembly of the locking member boss 8, the inner side of the boss is provided with stops for the deflection of the discs. These are formed on the embodiment according to the example by circlips 22 inserted into annular grooves 21 of the locking member boss 8. In the position of the discs 17, 18 restricted by the stop, their outer end faces are thus flush with the corresponding end faces of the centre wall 10 of the boss.

The coupling mechanism 9 comprises a coupling element 23 assigned to the locking member boss 8, which is displaceable along its axis at the level of the cylinder cores 5, 6. The coupling element is made up of two coupling bodies 25 and 25 of similar shape, which are mounted on a central pin 26. The latter is designed in form of a steel needle, the diameter of which is smaller than half of the length of the bores 27, 28 of the coupling bodies 24, 25 departing from the end faces facing each other. According to standard manufacturing tolerances, the coupling bodies 24, 25 thus rest on the pin 26 substantially free from any play. The length of the bores 27, 28 is determined by the fact

that the end section facing the cylinder core is designed to be cup-shaped. The well length t amounts to approximately half of the axial length of the coupling body 24, 25. The coupling bodies 24, 25 are urged to deflect by a spring 29 designed as a compression spring lying concentric with the pin 26. The concentric location of the compression spring 29 relative to the pin 26 is assured by its end coils entering into annular grooves 30, 31 of the coupling bodies end faces, facing each other. In addition the length of the compression spring 29 is approximately equal to the total of the depth of the two annular grooves 30, 31 when the spring coils are completely compressed.

In order that the coupling bodies 24, 25 are not moved beyond a certain extent by the compression spring 29, the pin 26 in the form of a steel needle has enlargements 32, 33 at its ends, which locate against the inside of the cup-shaped recesses 34, 35. The deflected coupling bodies abut against these enlargements by their cup-shaped bottoms 24″, 25″. The enlargement 32 here represents a collar of identical material to the steel needle 26, whilst the other enlargement 33 is formed by an inserted circlip 33. It is, however, also possible to produce the englarements 32, 33 by a severing tool, whereby the respective ends may be shaped like a screwdriver blade. The largest size of such an enlargement is thereby greater than the diameter of the bore 27, 28 so that the coupling bodies are fixed in their outer position.

The length of the steel needle or pin 26 is such that it is shorter than the combined length of the coupling bodies 24, 25. When the end faces of the coupling bodies 24, 25 abut, the pin 26 thus does not project beyond the outer end faces of the coupling bodies.

Two diametrically opposed flanks 36, 37 project from the circumference of each coupling body 24, 25, designed such that the flank 36 is of smaller width than the flank 37. These flanks 36, 37 are movable into shape-conformed slots 38, 39 of the discs 17, 18, which slots 38, 39 depart from a central opening 40, to allow the cylindrical portion of the coupling bodies 24, 25 to be entered. The daylight gap between two opposite flanks of the coupling bodies 24, 25 is smaller than the thickness of the centre wall of the boss.

The ends of the cylinder cores 5, 6 facing each other are provided with location bores 41, 42, into which the corresponding end sections 24′, 25′ of the coupling bodies can enter. For the admission of the flanks, width-confirming slots 43, 44 are milled into the location bores 41, 42 as shown in particular in Figure 6. The coupling bodies are coupled in this way with the ends of the cylinder core facing them.

The flanks 36, 37 project from the inner end faces of the coupling bodies 24, 25 facing each other spaced therefrom by a certain distance, so that a centering collar 45, 46 on the inside is left there for the engagement of the disc.

Furthermore, the flanks 36, 37 are provided with detent shoulders A. The shoulders A are disposed so that the flanks 36, 37 can engage into the discs 17, 18 to thickness of the discs. The flanks 36, 37, moreover, extend in the plane of the keyway 15. In order to ensure sufficient insertion of the key, the flanks 36 are provided with a bevel 36′.

According to the Figures 1 to 8 the coupling mechanism 9 is designed so that it allows locking from both sides, even if there is a key in the lock on the one side of the cylinder lock which has already been turned.

The cylinder lock is operated in the following way:

According to Figure 1 the coupling mechanism 9 takes up such a position, that the coupling body 24 on the LH side is coupled in positive engagement with the disc 17. It could however also be that the other coupling body 25 is in engagement with the other disc 18. If, in this position, the key 14 is inserted into the lock, then the pin tumblers are arranged by the indentations 14′ of the key such that their separating line T lies on the sliding joint of the cylinder core. It can now arise that the corresponding cylinder core 5 is turned by the key 14 through about 90 degrees. As a result of this, the corresponding coupling body 24 is taken along, which owing to the positive locking with the disc 17 also takes along the locking member boss 8. Along with it is also taken along the other disc 18, the slots 38, 39 of which do not then align with the flanks 36, 37 of the other coupling body 25. If a key 47 is now inserted from the opposite side of the double cylinder lock, then the key also arranges the pin tumblers. Further, its keytip displaces the coupling body 25, the flanks 36, 37 of which locate against the facing face of the disc 18 and displace the latter against the action of the spring into the postion taken up in Figure 7. The spring 29 is thereby also compressed. Its coils, however, enter into the annular grooves 30, 31 of the coupling bodies and are completely housed by them, so that the faces of the coupling bodies facing each other can come into contact with each other. The cylinder core 6 can now be turned by means of the key 47 while taking along the coupling body 25. As soon as the flanks 36, 37 of this coupling body 25 align with the appropriate slots 38, 39 of the disc 18, the compression springs 19 enter into action and displace the disc 18 into the postion taken up in Figure 8 while establishing the coupling connection between cylinder core 6 and the locking member boss 8. Upon further turning of

the key 47 the opposite cylinder core is turned via the coupling mechanism 9.

In the alternative embodiment shown in Figure 9, similar components are given the same reference numbers. A flat spring 48, which is formed by a twisted flat spring strip extends between the discs 17, 18. The plan form of this flat spring 48 is approximately equal to that of the discs 17, 18. The flat spring 48 has a central cut-out 49 to allow the coupling bodies to pass through.

A further alternatively-designed flat spring 50 is illustrated in Figure 10. Its plan form is also approximately equal to that of the discs. This flat spring 50 is provided at its edge with deflected tongues 51, 51′ for abutting the discs 17, 18 and is provided at a central position with deflected flaps 52, 52′ for resting against the coupling bodies. As can be seen from Figure 10, the tongues and flaps point towards each other in opposite directions. Diagonally-extending supporting means are formed by the tongues 51, 51′, which substantially inhibit tilting of the discs. Since diagonal support is sufficient, it is also feasible to use only two compression springs in diagonal disposition in place of four single compression springs 19 in the first specific embodiment.

According to Figure 11 the locking member boss 8 is equipped with discs 53, 54, which are of greater thickness than the discs 17, 18. The thickness of the centre wall of the boss has however remained the same. The extent of the axial displacement of the discs is reduced by this. This is done if an emergency coupling 9′ in accordance with Figures 13 and 14 is to be produced. Axial displacement of the discs 17, 18 can also be restricted by arranging a centre disc 56 between them in accordance with Figure 12. The centre disc is of approximately equal thickness to the two outer discs 17, 18 and is penetrated by the appropriate compression springs 19 acting on the discs 17, 18. The construction of the cylinder lock illustrated in Figures 13 and 14 is similar to that of the first exemplary embodiment. The mode of operation of the appropriate emergency coupling is as follows:

If the key 14 is inserted and turned in accordance with Figure 13, then the cylinder lock cannot be locked from the opposite side by a normally-designed key, which is the same as the key 14. Locking from the opposite side is only possible by using a specially designed emergency key 55, which comprises longitudinal indentations 55′. If the emergency key 55 is inserted in accordance with Figure 13, then its key tip displaces the facing coupling body 25, which in turn displaces the disc 54 up to the stop position on he other disc 53. Because of the longitudinal indentations 55′, the pin tumblers impinged by the emergency key 55 are duly aligned in this position. The cylinder core 6 can now be turned by the emergency key, so that the flanks 36, 37 are moved into alignment with the flanks of the other coupling body. They thus also align with the slots 38, 39 of the disc 54. The compression springs 19 holding the discs apart bring about a displacement of the disc 54 in the direction of the coupling body 25. Consequently the emergency key 55 can be pushed further into the lock. The position in accordance with Figure 14 can be achieved by use of the emergency key 55. Since the disc 54, after providing the aligning position is still subject to sliding movement, the length of the indentations may be reduced by this additional distance, so that relatively short indentations on the emergency key 55 may be provided.

Normal coupling could be produced by forming the discs of such a thickness, that their total thickness equals the thickness of the centre wall 10 of the boss. If this is the case, the corresponding single compression springs 19 can then be dispensed with.

The basic construction of the coupling mechanism is retained on all types of construction by employing the minimum number of components, which results in cost-effective manufacture and stock-keeping.

Claims

1. A coupling mechanism for a double cylinder lock comprising a coupling element extending between the inner faces of the two cylinder cores in the form of two coupling bodies mounted on a central spindle having flanks projecting from the surface, the end sections of which facing away from each other are in positive engagement with the adjacent cylinder cores for transferring the rotary motion of the cylinder core to the locking member boss, which surrounds the coupling element and has at least one coupling engagement aperture characterised in that the flanks (36, 37) of the coupling bodies (24, 25) are movable into the discs (17, 18 or 53, 54) spring loaded against one another, the periphery of which are of the same shape as the coupling engagement aperture (16) and which discs (17, 18) are disposed to be displaceable in relation to the centre wall (10) of the boss.

2. Coupling mechanism according to Claim 1, further characterised in that the plan form of the disc is rectangular in shape with two opposite narrow edges (17′, 18′) extending convexly.

3. Coupling mechanism according to one or more of the preceding claims, further characterised by at least two supporting means provided in opposite corner areas for the deflection of the discs due to spring action.

4. Coupling mechanism according to one or more of the preceding claims, further characterised in that the two coupling bodies (24, 25) rendered longitudinally displaceable on a pin (26) are deflected by a spring (29) lying concentric with the pin.

5. Coupling mechanism according to one or more of the preceding claims, further characterised in that the end coils of the spring (29) designed as a compression spring enter into annular grooves (30, 31) of the coupling body inner faces facing each other.

6. Coupling mechanism according to one or more of the preceding claims, further characterised in that the length of the compression spring (29) is approximately equal to the combined depth of the two annular grooves (30, 31), when the coils are completely compressed.

7. Coupling mechanism according to one or more of the preceding claims, further characterised in that the length of the pin (26) is less than the combined lengths of the coupling bodies (24, 25).

8. Coupling mechanism according to one or more of the preceding claims, further characterised in that the end sections (24′, 25′) facing the cylinder core (5, 6) of each coupling body (24, 25) are designed to be cup-shaped, having a well depth (t) of approximately half the axis length of the coupling body and that the diameter of the pin (26) designed in form of a steel needle is smaller than half the length of its bore (27, 28).

9. Coupling mechanism according to one or more of the preceding claims, further characterised in that the inner side of the boss has stops for the deflection of the disc.

10. Coupling mechanism according to one or more of the preceding claims, further characterised in that the stops are formed by circlips (22) inserted into annular grooves (21) of the locking member boss (8).

11. Coupling mechanism according to one or more of the preceding claims, further characterised by a centre disc (56) lying between the discs (17, 18).

12. Coupling mechanism according to one or more of the preceding claims, further characterised in that the deflection of the discs (17, 18) and the spring loading of the coupling bodies (24, 25) towards one another is caused by a common flat spring (50).

13. Coupling mechanism according to one or more of the preceding claims, further characterised in that the flat spring (50) has at its edge deflected tongues (51, 51′) for abutting against the discs (17, 18) and deflected flaps (52, 52′) are provided in a central position for resting against the coupling bodies (24, 25).

14. Coupling mechanism according to one or more of the preceding claims, further characterised in that the tongues (51, 51′) and flaps (52, 52′) are pointing towards each other in opposite directions.

15. Coupling mechanism according to one or more of the preceding claims, further characterised in that the plan form of the flat spring (48, 50) is approximately equal to that of the discs (17, 18, 53, 54).

16. Coupling mechanism according to one or more of the preceding claims, further characterised in that the flat spring (48) is formed by a twisted strip of flat spring.

17. Coupling mechanism according to one or more of the preceding claims, further characterised by four separate compression springs (19) which are seated in the corner areas of the discs (17, 18).

18. Coupling mechanism according to one or more of the preceding claims, further characterised in that the coils of the separate compression springs (19) are locatable in countersunk holes (20) of the discs (17, 18, 53, 54).

19. Coupling mechanism according to one or more of the preceding claims, further characterised in that each coupling body is to be engaged with the discs (17, 18) by an inner centering collar (45, 46).

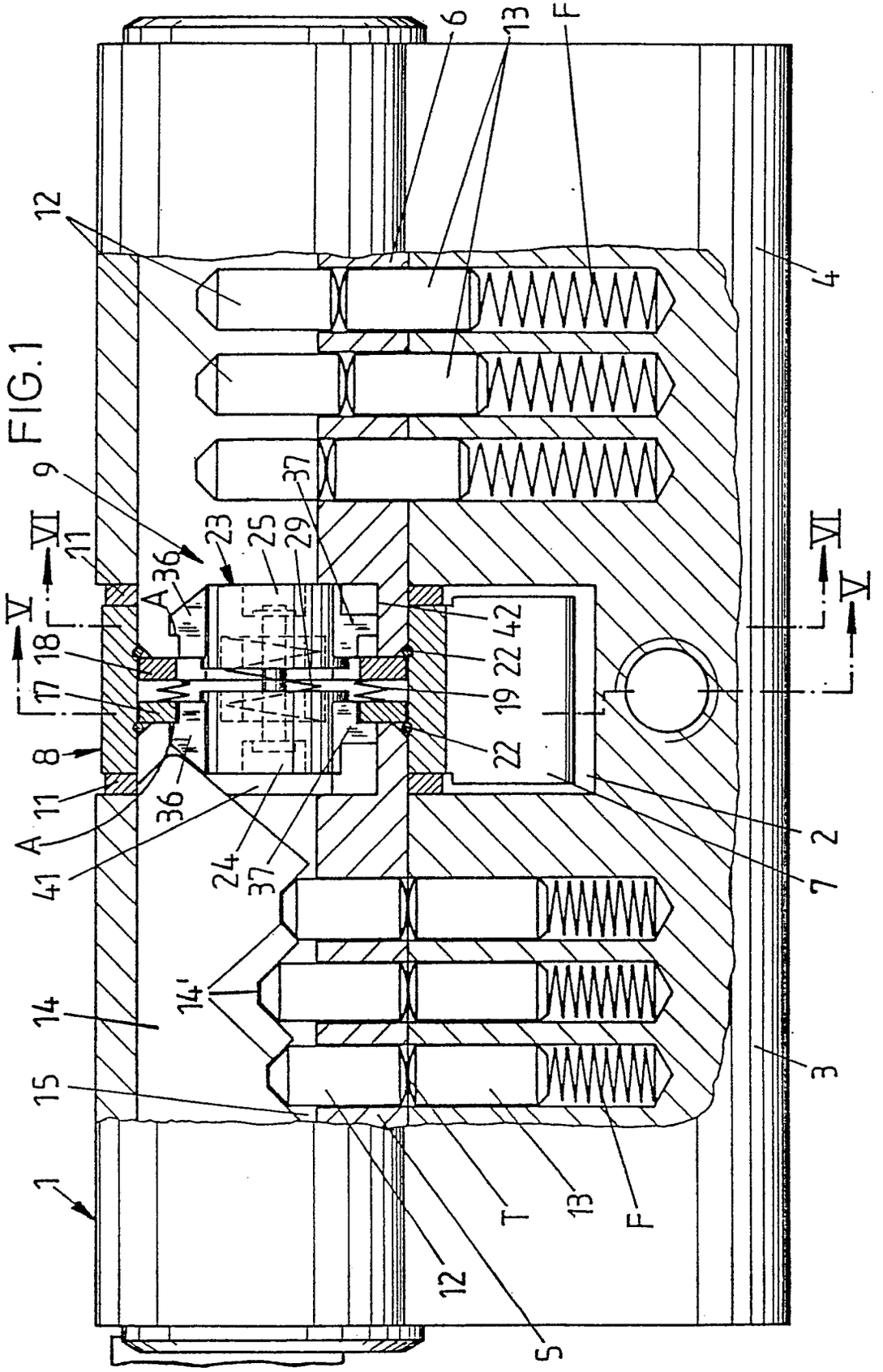
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FIG.1

FIG.2

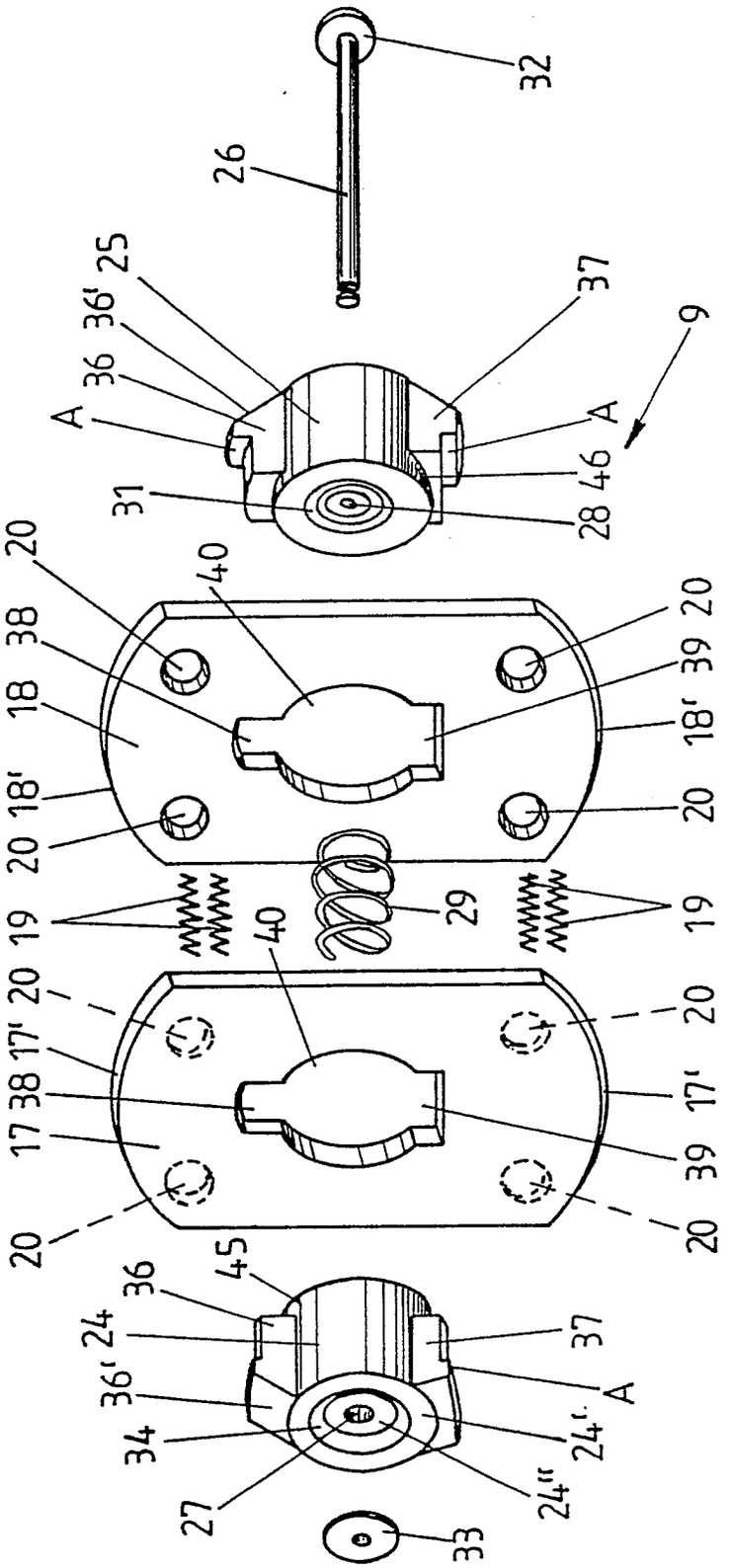
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FIG. 3

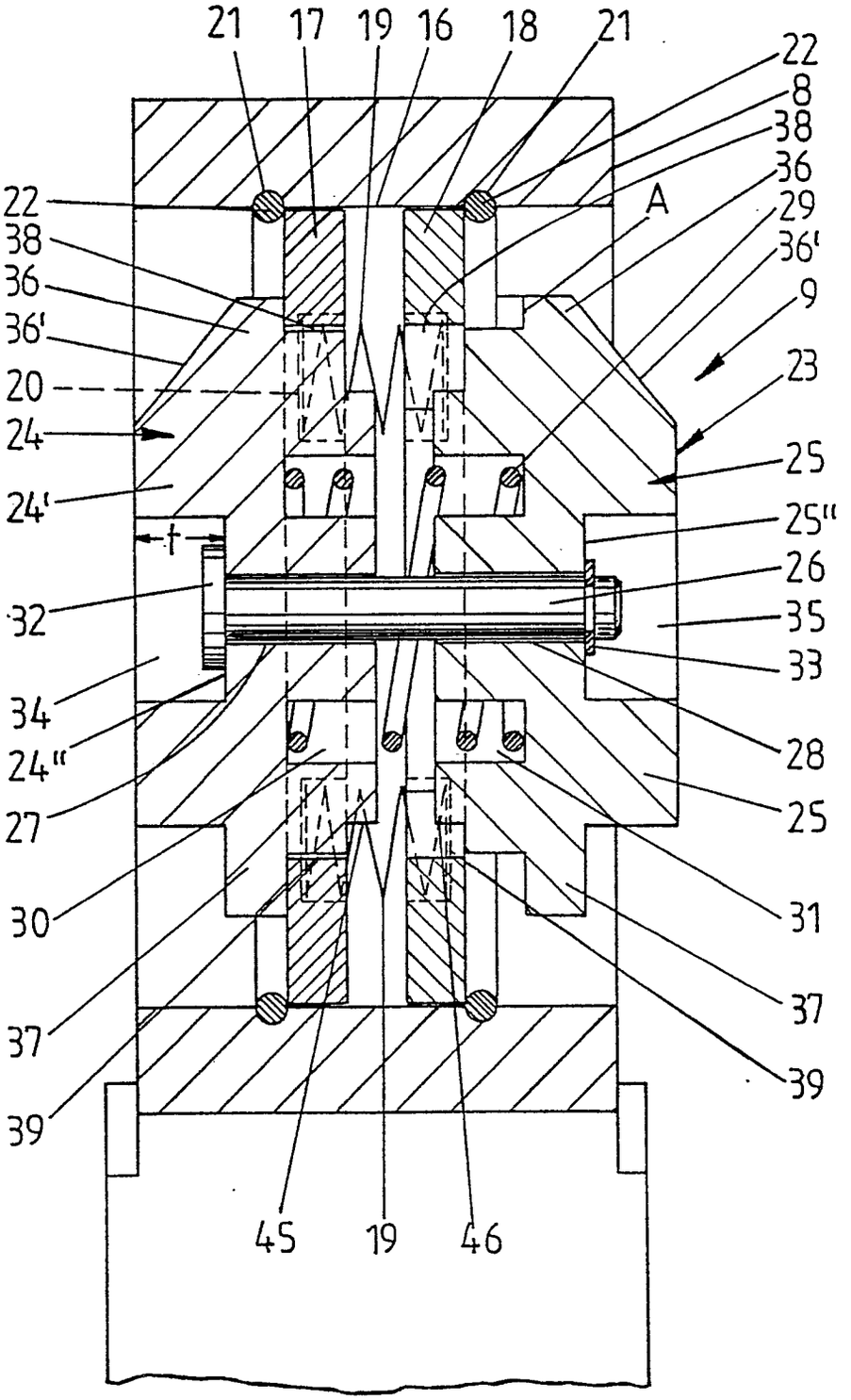
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FIG.4

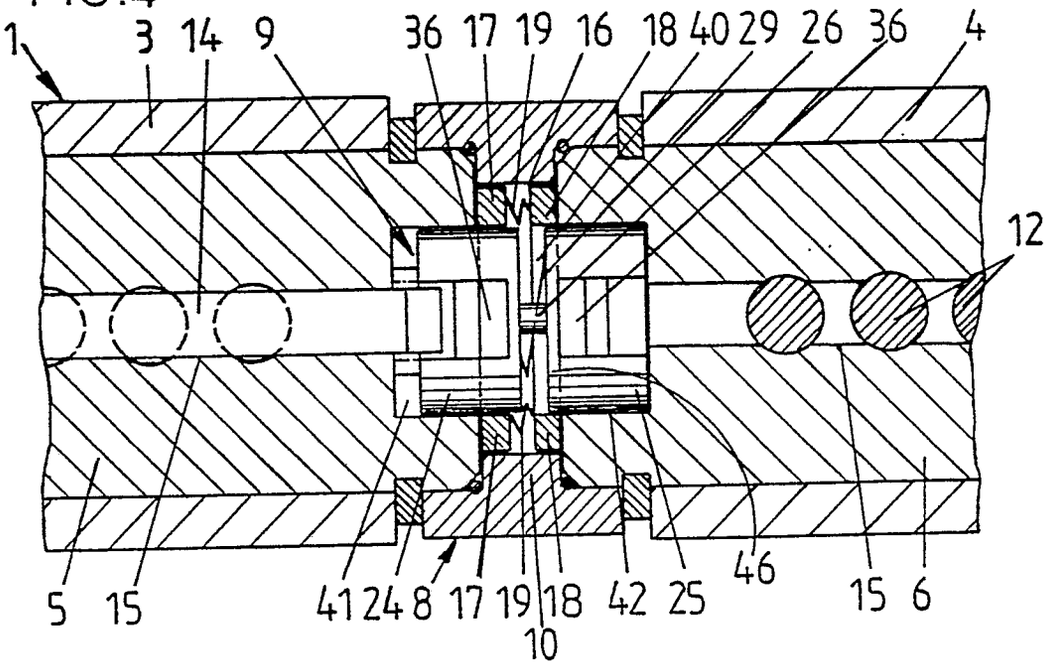

FIG.5

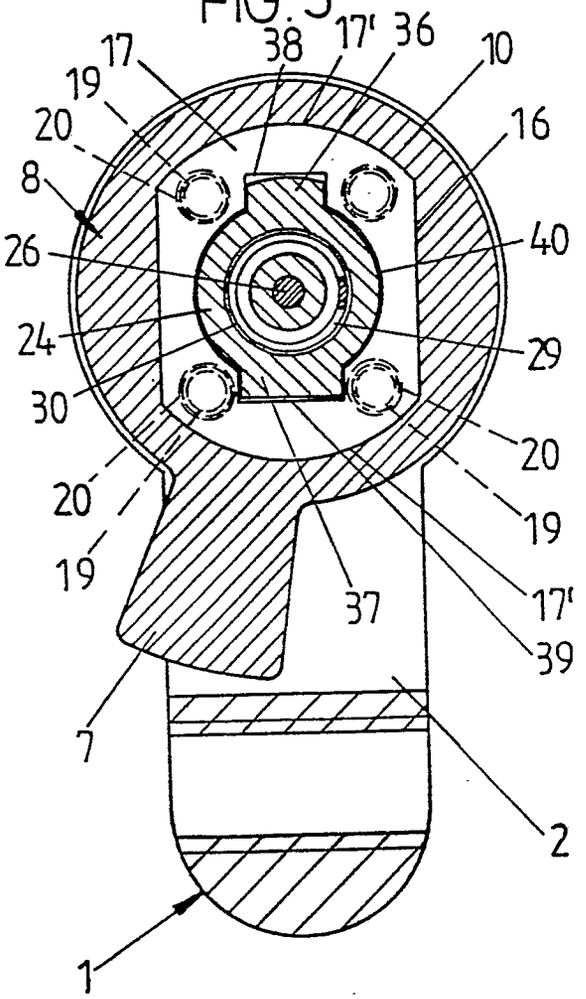

FIG.6

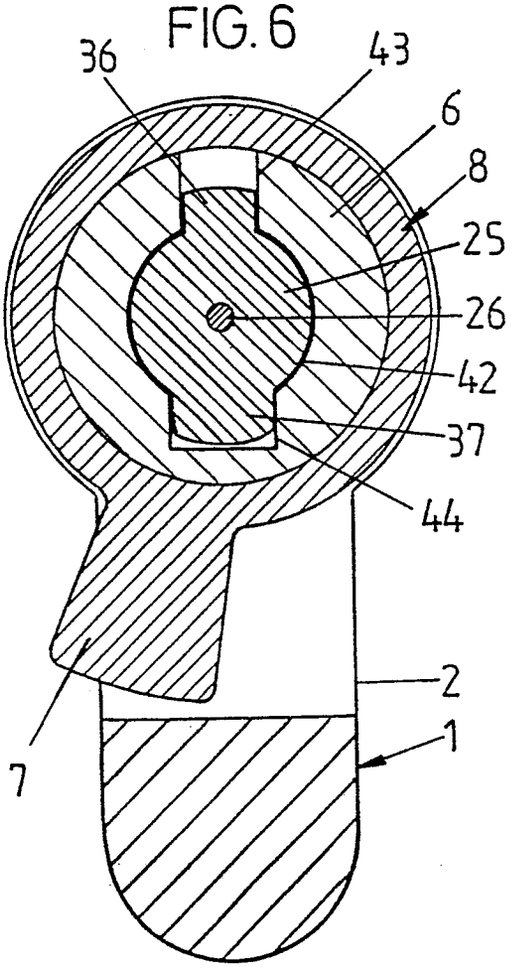

FIG.7

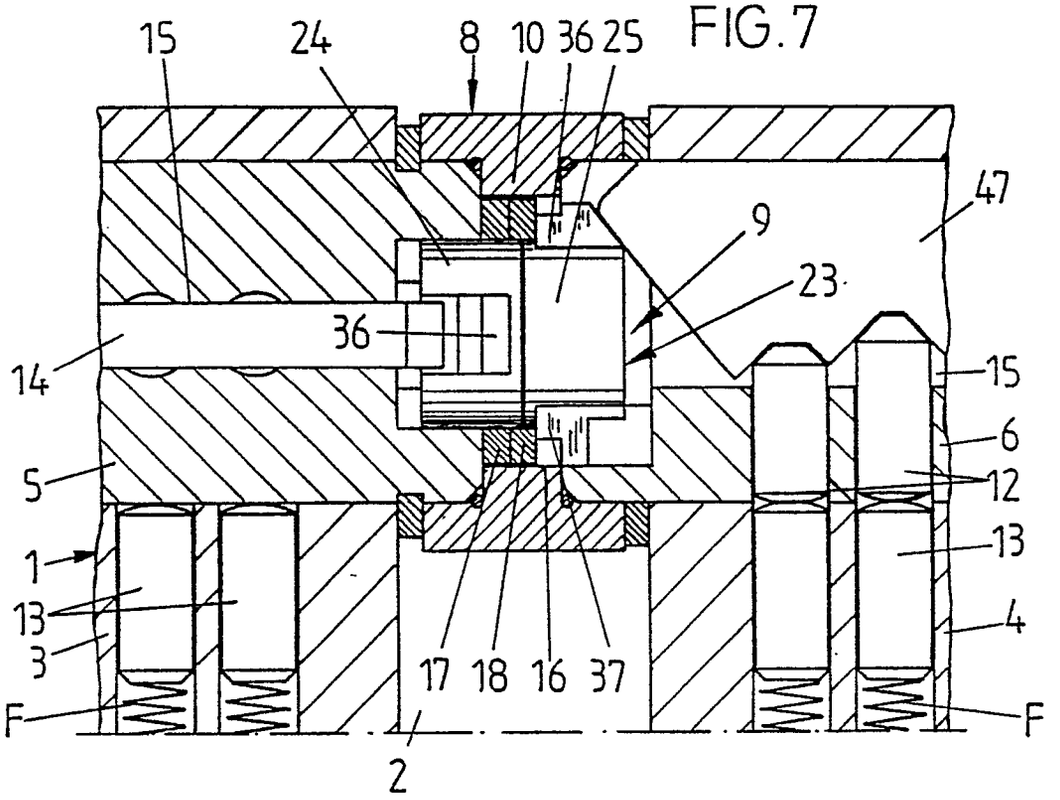
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FIG.8

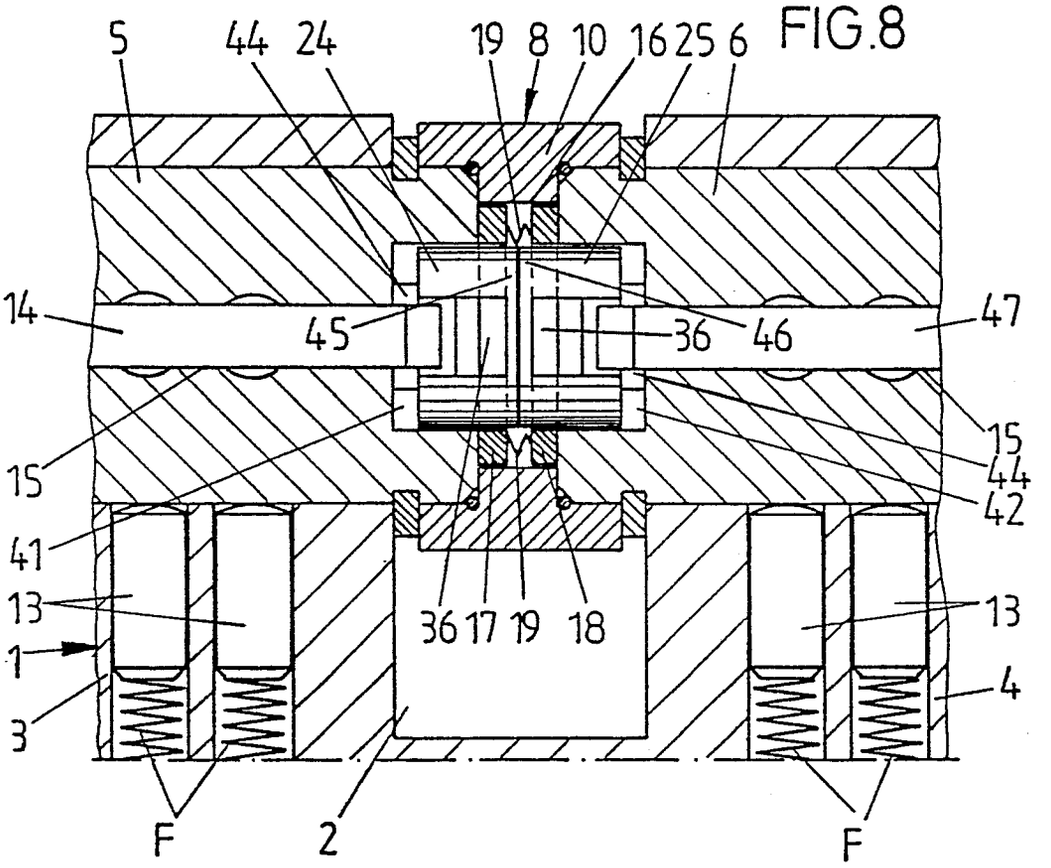
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FIG.9

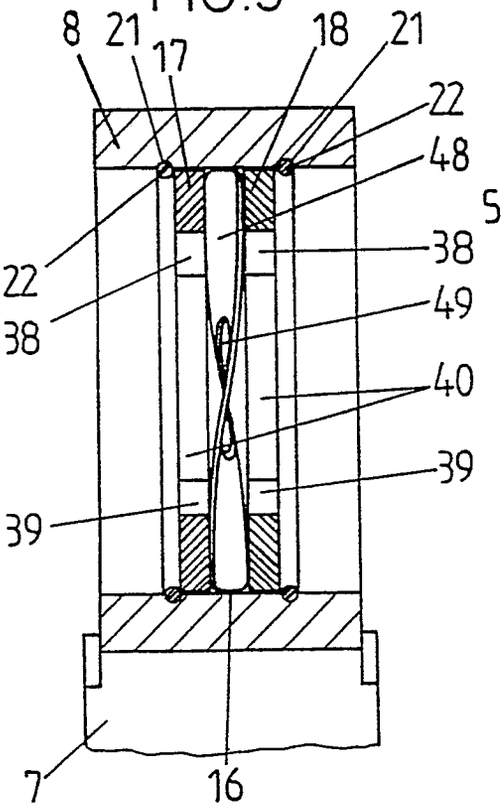

FIG.10

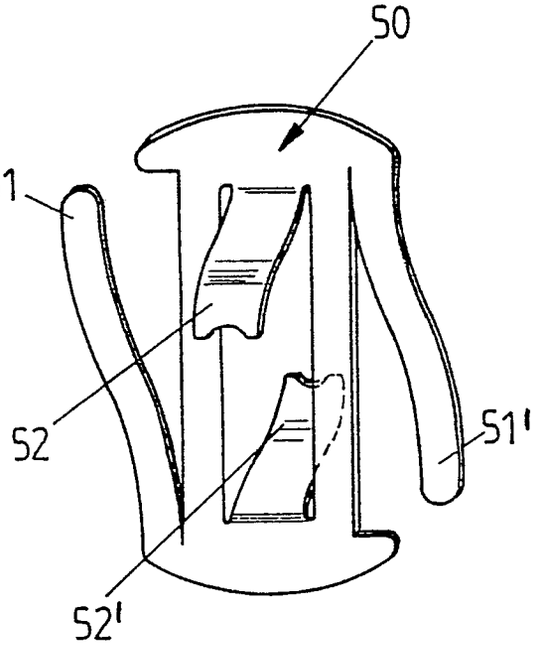

FIG.11

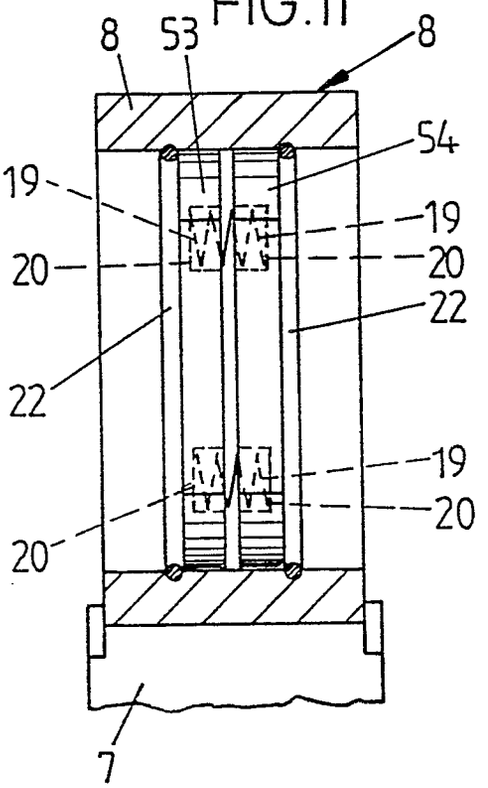

FIG.12

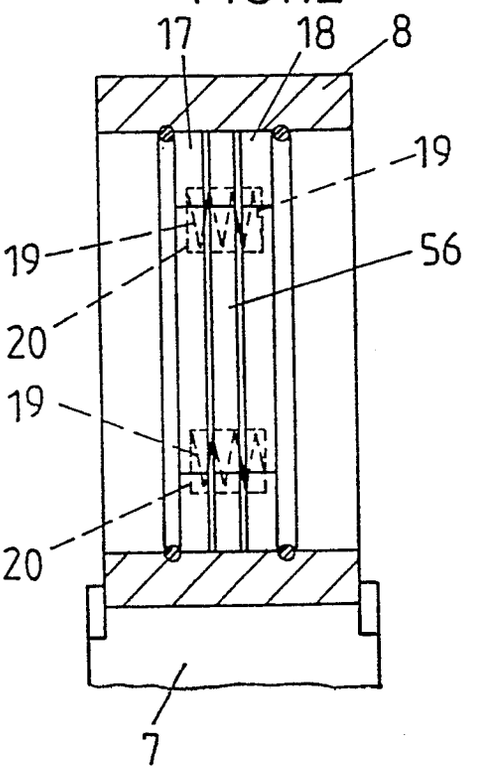

FIG.13

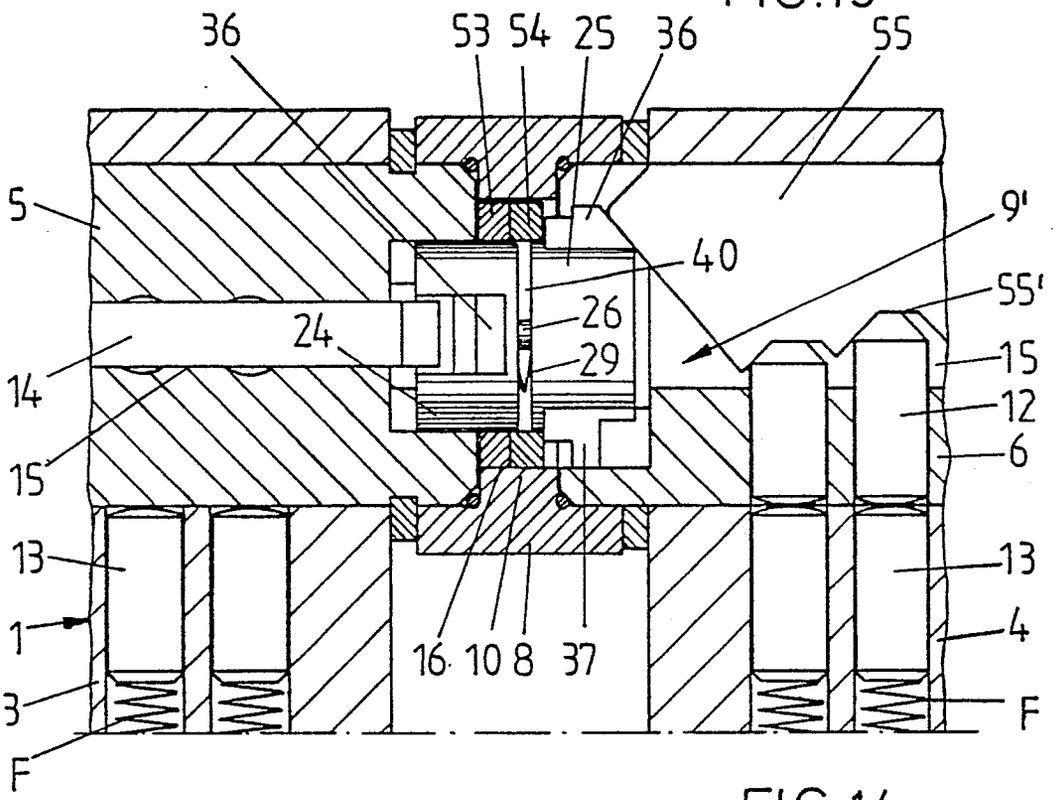
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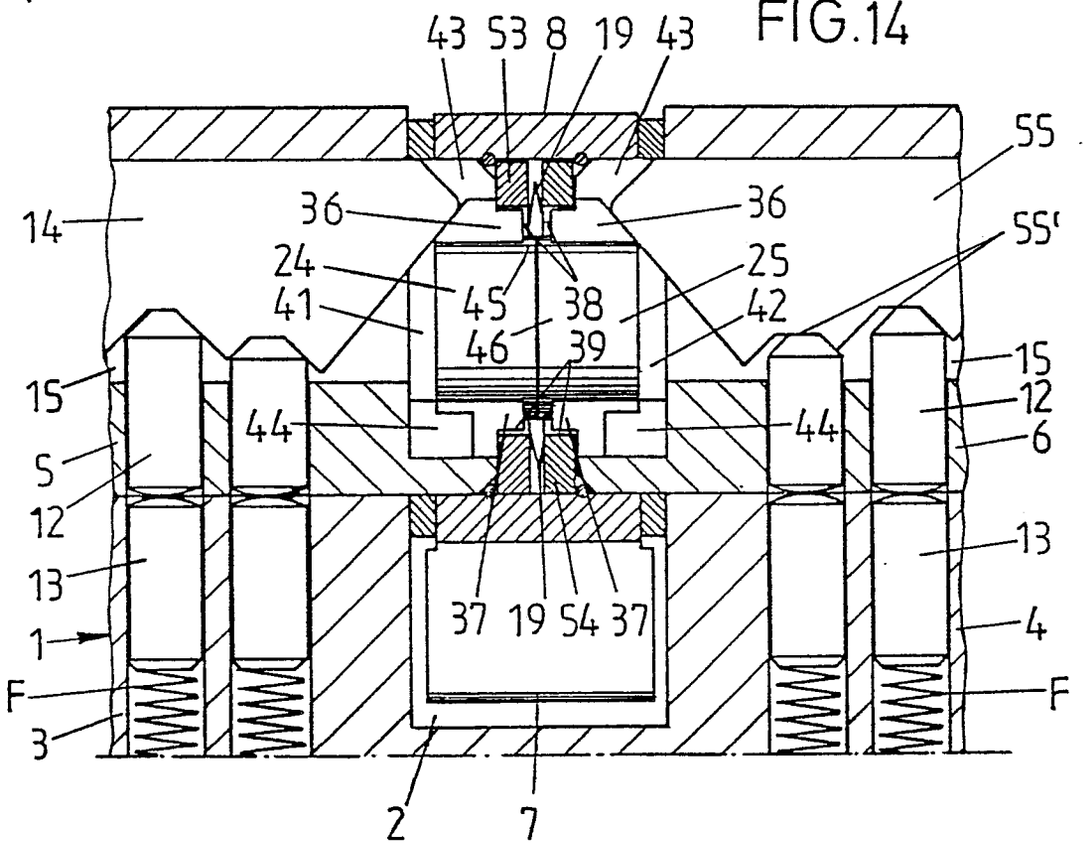
FIG.14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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 30 3995

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	DE-B-1 261 010 (KARRENBERG) * Figures 6-9; column 5, line 51 - column 6, line 34 *	1	E 05 B 9/10
A	DE-A-1 930 739 (S.p.A.C.I.S.A.) * Figure 1; page 3, paragraph 2; page 4, paragraphs 2-4; page 10, paragraph 1 - page 11, paragraph 2 * & FR-A-2 039 193	1,4,7	
A	DE-A-3 535 426 (KLOOSTERZIEL) * Figures 3,4; column 5, lines 8-44 *	1,4,5-7	
A	DE-A-1 428 524 (KARRENBERG) * Figures 2-4; page 5, paragraph 4 - page 7, paragraph 3 *	1	
A,D	DE-B-1 678 025 (KARRENBERG)		
A,D	DE-B-2 133 782 (KARRENBERG)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

E 05 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19-08-1988	HAMMOND

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