

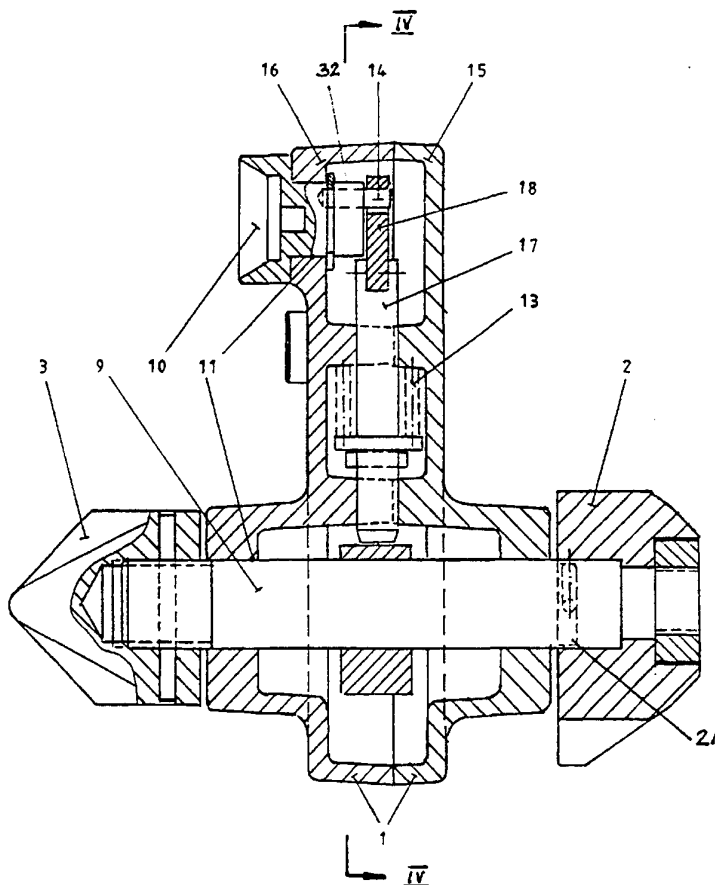


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(21) International Application Number: PCT/SE93/01005 (22) International Filing Date: 23 November 1993 (23.11.93) (30) Priority Data: 9203526-0 23 November 1992 (23.11.92) SE (71) Applicant (for all designated States except US): HYDROCON INTERNATIONAL AB [SE/SE]; P.O. Box 7079, S-300 07 Halmstad (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): FLODIN, Yngve [SE/SE]; P.O. Box 7079, S-300 07 Halmstad (SE). (74) Agent: BLOMBERG & CO.; Skandinaviska Patentbyrå AB, P.O. Box 6250, S-102 34 Stockholm (SE).		(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: CONTAINER LOCK FOR INTERLOCKING STACKED CONTAINERS**(57) Abstract**

This particular invention relates to a self-locking device for interlocking superposed stacked containers, particularly on the deck of ship or on a platform, during transportation, comprising a lock housing (1, 1') in which a vertical shaft is rotatably mounted when in use. The shaft has an upper portion with an upper locking device (2, 2') located outside the lock housing and a lower portion with a lower locking device (3, 3') located outside the lock housing. On shaft (9, 9') is fixed a carry-out (5, 5') by means of which the shaft can rotate. Furthermore, the lock housing comprises a hydraulic unit (4, 4') with a primary piston (7, 7') and a secondary piston (8, 8') fixed to be able to effect the above-mentioned carry-out (5, 5'). Thus the primary piston is fixed to be effected by the weight of the container when lowering it to the underlayer so that the said locking devices (2, 2', 3, 3') are automatically turned into locking position through the above-mentioned secondary piston and carry-out.



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Container lock for interlocking stacked containers.Field of invention

This particular invention has reference to a container lock with the purpose to interlock superposed stacked containers for example on another container or on a platform, during transportation, comprising a lock housing in which a vertical shaft is rotatably mounted when in use. This shaft has a top with an upper gear lock located outside the lock housing and a lower end with a lower gear lock located outside the lock housing whereby the gear locks are to be locked to the oval hole in the container as well as to the underlayer.

Background of the invention

In the field of engineering there are many solutions as to the linking up of stacked containers. As an example may be mentioned SE B 85.05199, SE B 9003041-2, SE B 368945, DE 2 840 281, EP 0 233 960, GB 2 073 705, US A 5 012 560, US A 3 961 595 and WO 89/01907.

All these patent specifications show and describe mechanical locking devices which have to be effected manually both when locking and when unlocking. The manoeuvre device causing this effect of the lock is owing to its position and dimension difficult to reach and to handle when the container staples stand close vertically as well as laterally. The manual control of the locks has to be handled from the top of the container, when stacked, both when locking and when unlocking the container. This means that the operator has to be placed at the top of the container during the whole period of loading and unloading. When locking and when disengaging the container (i.e. during the loading and unloading) the operator must have free access to the container locks and when unloading he must also have the possibility to remove the locks from the top of the con-

tainer. Owing to the accessible position of the locks in the corners of the container, the locks can easily be damaged above all when loading and unloading. Such a handling may thus lead to the fact that the locks will be difficult to manoeuvre or even completely out of working order.

Disclosure of the invention

The aim of this particular invention is to eliminate the above disadvantages concerning convential container locks and to produce a new container lock which can automatically lock a container at the underlayer when lowering it towards the underlayer.

In accordance to the inventive idea the above mentioned problems will be solved by the fact that a carry-over is fixed at this shaft in the lock housing by means of which the shaft may rotate because of the fact that the lock housing furthermore is furnished with a hydraulic unit with a primary piston as well as with a secondary one in order to be able to effect the above mentioned carry-over, to which the primary piston is located so as to be effected by the weight of the container when lowering it towards the underlayer so that the above locking devices through the above mentioned secondary piston and carry-over, will be automatically turned into locking position. Moreover, the inventive idea will produce a container lock which will be reliable in running, demand a slight effort to perform, create a safer working environment and which will guarantee a considerable durability.

Brief description of the drawings

Fig. 1 shows a side view of the container lock.

Fig. 2 shows a plane view of the container lock in fig. 1.

Fig. 3 shows a cross section III-III of the lock in fig. 4.

- Fig. 4 shows a cross section IV-IV of lock in fig. 3.
- Fig. 5 shows an extent cut out through the hydraulic unit.
- Fig. 6 shows a view seen from above of the revolving locking device.
- Fig. 7 shows the manoeuvre device with the aid of which the locking function will be disengaged.
- Fig. 8 shows the tool for disengaging the container lock from the lower corner boxes of the overhead container.
- Fig. 9 shows the way to disengage the container lock from the overhead container with the aid of the tool of fig. 8.
- Fig. 10 shows a different type of design of the container lock from a vertical view.
- Fig. 11 shows a cross-section of the container lock of fig. 10 from a horizontal view.
- Fig. 12 shows a cross-section of the hydraulic unit from a vertical view.
- Fig. 13 shows the hydraulic unit of fig. 12 from a vertical view.
- Fig. 14 shows an explanatory sketch of the lock before the attachment to the container.
- Fig. 15 shows the lock with a locking device inserted at the underside of the container.
- Fig. 16 shows a cross-section of the lock of fig. 14 from a horizontal view in initial position.
- Fig. 17 shows a cross-section of the lock of fig. 14 from a horizontal view after the container has been lowered onto the underlayer and the lower locking device has been turned into locking position on the underlayer.
- Fig. 18 shows a cross-section of the lock of fig. 14 from a horizontal view, when the lock has been disengaged from underlayer.

Detailed description of a preferred embodiment of the invention

Fig. 1 and 2 shows the main parts of the lock in accordance with the invention. As can be seen in the figure the lock

comprises a lock housing 1 consisting of two parts 15, 16. Furthermore it shows a hydraulic unit 4 partially projecting from the lock housing and two locking devices 2, 3 located outside the lock housing. These lock devices are comparatively angle and are connected to guiding parts 35, 36 of the lock housing 1, which fit in the existing standardized oval holes (ISO) of the container corners. If the container is to be locked on a different underlayer, a similar oval hole naturally has to be made on the underlayer. In this case the angle is 30° . the housing is also furnished with a manoeuvre device 10, which can be handled from the outside of the lock housing. The mutual angle position of the locking device leads to the fact that one locking device can be fixed to an oval hole in the container at the same time as the other locking device can pass through an adjacent oval hole of an underlaying container as well as the underlayer. Thus lock can hang at the underside of the container, see fig. 14 and 15.

Fig. 3 and 4 show the cross-section III-III and IV-IV of the figures 4 and 3. As can be seen in the above figures the lock comprises a through shaft 9 located outside the lock housing and on the ends of which the two locking devices 2 and 3 are fixed. The locking device 2 can rotate about its own shaft 9, 30° , whereby locking device 2 in one end position will be parallel to locking device 3. Locking device 2 is loaded to the other end position by means of a leaf spring 21, see fig. 6. As can moreover be seen in fig. 6 locking device 2 has an interior recess 22, which allows the spring 21 to be bent when locking device 2 is brought to a position which is parallel to locking device 3.

The main part of the hydraulic unit 4 is also installed in the lock housing 1. As can be seen for example in fig. 5 the unit comprises a primary piston 7 with quite a large sectional area, a secondary piston 8 with quite a small sectional area, which

is perpendicular to the primary piston. A carry-out 5 is fixed around shaft 9 and locked to the latter by means of a locking screw 29. The carry-out comprises a first arm 25 and a second arm 26 and a gear lock 31. A bar 17, loaded by means of a spring 13 against the carry-out can be fixed to carry-out 5 on one side of gear lock 31 and in that way lock it. In a normal position safety bolt 17 is in contact with gear lock 31. The free end of the secondary piston is in contact with first arm 25 of the carry-out so that this arm can be brought to rotate clockwise while the other arm 26 of the carry-out is loaded in counter clockwise direction by a pull back spring 12. The movements of the bar and the secondary piston are controlled by shaft journals 11.

Bar 17 can be disengaged relative gear lock 31 by means of an eccentric pin or tap screw 14 which is eccentrically guided in a tap 32 and which runs in a transverse groove 33 fixed in a plate 18 rigidly attached to bar 17. Tap 32, which is a part of manoeuvre device 10, can be turned from the outside by means of an extensible tool 23, resembling a screw driver and which can be seen in fig. 7.

A cut away hydraulic unit is shown in fig. 5. The primary piston 7 which is mounted in primary cylinder 38 is furnished with one part 37 projecting outside lock housing 1 and which can be pressed into housing 1 by the weight of the container which is to be locked on the underlayer. Piston 37 has a diameter which is less than that of the primary piston in which way the primary piston can be attached in cylinder 38 by means of nut 40, which guides piston 37 and which is secured by screws in the primary cylinder. Piston 7 is also hollow and contains a pull back spring 20. The primary cylinder is communicating via a hole 42 to a secondary cylinder 41. Secondary piston 8 is mounted into secondary cylinder 41 and has a free end 43 projecting from the cylinder. As can also be seen in the figure the free end of the

secondary piston 8 is in contact with carry-out 5.

The function of the container lock is as follows.

At the corners of the container there are, as mentioned above, oval holes of standard size and in the initial position one lock at each corner of the container is attached to the underside of the container.

When the container is lowered towards the underlayer the lower locking device 3, which has the shape of a pyramid, will first be guided into the oval hole and then the guiding part will also be inserted. The height of the guiding part 35 is adapted so that the piston can be engaged with the underlayer when locking device 3 has passed through the oval hole. Hence locking device 3 as well as shaft 9 can be turned. Owing to the heavy weight of the container primary piston 7 will be pressed into hydraulic unit 4 against the force of spring 20 in the course of the continuous lowering. The existing hydraulic fluid of the hydraulic unit will hereby press the secondary piston towards carry-out 5. Owing to the different areas between the primary and the secondary pistons a multiplier effect will hereby be obtained, i.e. a slight displacement of secondary piston 8.

Secondary piston 8 will then turn carry-out 5 and also shaft 9 clockwise against the force of spring 12. the piston stroke of the secondary piston is chosen so that shaft 9 can turn 60° . In the final position the lower locking device 3 will thus be turned 60° in relation to the longitudinal axis of the oval hole while upper locking device 2 will be turned 90° . In this final position bar 17 will slip down behind gear lock 31 thus preventing carry-out 5 to sway back, effected by pull back spring 12, and pull back spring 20 which is located in primary piston 7,

if, for example, the container was to be lifted somewhat from the underlayer. In this way you will obtain a safe, stable and completely automatic locking of the container on the underlayer. It might be pointed out that when using the above illustrated construction for interlocking stacked containers on a plane surface such as a platform and the like, it may be advisable to turn the lock upside-down contrary to what has been described above, i.e. with the lock attached to the underlayer instead of to the container in the starting position.

When the container is to be lifted from the underlayer the operator inserts the tool shown in fig.7 into manoeuvre device 10 in all the locks and turns the tap in driving slot 14 into position 19 shown in fig.4, causing bar 17 to disengage from gear lock 31. When finally the container is lifted the influence of pull back springs 12 and 20 will make carry-out 5 and consequently shaft 9 turn back to starting position as the primary piston is being relieved from the weight of the container. Hence the locking devices are returned to the starting position shown for example in fig. 1 and 2 and the container can be completely removed from the underlayer.

The locks are still attached to the container, see fig.9. In order to remove the locks completely from the container, it is sufficient to insert the tool shown in fig.8 into one of the existing oval standard sideholes 44 at the corners of the container, see fig.9 and 14, and to press locking device 2 into a position which is parallel to the extent shaft of the oval hole against the force of spring 21. Now the lock easily can be removed from the oval hole.

Figures 10 - 20 show an alternative performance of the invention. As can be seen in fig.10 and 11 the construction is in its fundamental features similar to the performance described

above. Angles, measures and functioning are also mainly in accordance with the latter. Thus the lock comprises a lock housing 1' consisting of two parts 15' and 16'. Moreover is shown a piston 37' partially projecting from lock housing 1', composing one part of hydraulic unit 4', and two comparatively oblique locking devices 2' and 3' located outside the housing. The locking devices are also in line with the guiding parts 35' and 36' on housing 1'. On the housing there is also a manoeuvre device 10' which can be effected from the outside of the housing. Furthermore the lock comprises a through shaft 9' to which the two locking devices 2' and 3' are attached. Locking device 2' can rotate 30° around shaft 9' so that locking device 2' in one end position is parallel to locking device 3'. The locking device 2' is loaded against the second end position by means of screw spring 21.

As can be seen most evidently from fig. 10, the lock also comprises a pull back spring 28' which effects shaft 9' in counter clockwise direction.

In housing 1' is also the main part of hydraulic unit 4' mounted. As can be seen for example in fig. 12 the unit comprises a primary piston 7' with quite a large sectional area, a secondary piston 8' perpendicularly designed and with quite a small sectional area. The free end of the secondary piston is furnished with a transverse tap. A carry-out 5' is mounted around shaft 9' to which it is located by means of a screw 29'. On the carry-out is fixed an arm 25' with a small notch 45'. In notch 45' the projecting tap of the secondary piston 46' can effect carry-out 5'.

A cut away hydraulic unit is shown in fig. 12'. Primary piston 7', mounted in primary cylinder 38', is furnished with a piston 37' projecting outside lock housing 1'. Piston 37' has a diameter which is less than that of the primary piston which means that the primary piston 7' can be held in position in cy-

linder 38' by means of nut 40', holding piston 37', and which is screwed into the primary cylinder. Moreover, piston 7' is hollow and contains a pull back spring 20'. The primary cylinder is communicating by hole 42'. Secondary piston 8' is mounted in secondary cylinder 41' and has a free end 43', projecting from cylinder 41', in which tap 46' is fixed.

An essential difference between the two performances is that primary cylinder 38' is turnably mounted in holes of flanges projecting from upper- and lower parts 14' and 15' of lock housing 1', so that the secondary cylinder which is integral with the primary cylinder can rotate through the axis of the primary cylinder. An operating arm 47' with a manoeuvre plate 49', composing the manoeuvre device, is integral with the primary cylinder.

In the extension of the secondary cylinder, at the opposite side of the lock housing, on the projecting secondary piston 43' there are a guiding spring tap 48' on which a spring 12' is mounted with some prestressing. Because that the spring 12' is articulately connected in both ends it can turn over to two balance position.

The function of this design can be seen in the figures 16 - 18, where is also shown how an indicated device in the shape of a flat bar 27', the one free end of which is guided through a rectangular hole 51' in the side of lock housing and the other end of which is turnably connected to the other arm 26' in locking device 5' in a way that the free end is visible outside the lock housing and the other end within the lock housing

The initial position is shown in fig. 16 where the locking device are in the same position as in the performance described at first. The secondary piston 8' is in initial position in secondary cylinder 41' and carry-out arm 25' is under the influence of pull back spring 28', turned into contact with tap 46' of the secondary piston. Manoeuvre plate 49' bearing against the outside of the lock housing and the free end of indication flat bar 27'

is located inside the lock housing. The free end of the secondary piston is located against the rotary motion of notch 45'.

In fig. 17 the container has been lowered on to the underlayer and the secondary piston has been totally pressed out of the secondary cylinder. Carry-out 5' and shaft 9' have thus been turned 60° in counter clockwise direction from the initial position and the locking devices have been turned into the same locking position as in the previous design. Indicating flat bar 27' is then projecting out of the lock housing, indicating a correct locking.

Fig. 18 shows the disconnection of the lock which is effected as follows. The end of tool 23' is inserted behind manoeuvre plate 49' and is turned a little. Hence, primary cylinder 38' is turned clockwise, which means that the secondary piston turns clockwise as well and is disengaged from carry-out 25'. Carry-out 25' is then free to turn clockwise into the initial position under influence of pull back spring 28'. Thus the indicating flat bar is pulled into the lock housing and the locking device return to the initial position shown in fig. 14 and 15 so that the container can be lifted from the underlayer.

As indicated in fig. 18 the secondary piston is pressed back into the secondary cylinder by pull back spring 12' in combination with spring 20' of the primary piston. In order to make the free end of the secondary piston get into contact with notch 45' of arm 25', in order to get it ready for use it is enough with a slight hit on manoeuvre plate 49' whereby the secondary piston under the influence of the prestressed spring 12' transfer engagement with arm 25'.

When the lock is to be removed completely from the container the process will be the same as in the example described at first.

It should be stressed that the invention can be modified in many ways within the limits of the included patent claims.

Patent claims.

1. Container lock for interlocking superposed stacked containers, particularly on the deck of a ship or on a platform, during transportation, comprising a lock housing (1 1') in which a vertical shaft (9 9') is rotably mounted when in use. The shaft has an upper portion with an upper lock device (2 2') located outside the lock housing and a lower portion with a lower lock device (3 3') located outside the lock housing, CHARACTERIZED in that a carry-out (5 5'), by means of which the shaft (9 9') can be turned, is fixed at the shaft, that the lock housing also comprises a hydraulic unit (4 4') with a primary piston (7 7') and a secondary piston (8 8') mounted in order to be able to effect above carry-out (5 5') whereby the primary piston is fixed so as to be effected by the weight of the container when lowering it onto the underlayer, so that the above mentioned locking devices (2 2', 3 3') will automatically be turned into locking position by means of the above mentioned secondary piston and carry-out.

2. Container lock with reference to demand 1 CHARACTERIZED in that the said primary piston (7 7') is loaded against its initial position by a spring (20 20').

3. Container lock with reference to any of the above mentioned claims CHARACTERIZED in that one of the said locking devices (2 2', 3 3') have a limited rotation on the said shaft (9 9') whereby the said locking device is loaded against an angle position relative the other locking device by a spring (21 21')

4. container lock with reference to any of previous claims, CHARACTERIZED in that an indicating device, which can indicate the turning positions of the shaft, is connected with the said shaft.

5. Container lock with reference to any of the previous claims, CHARACTERIZED in that the above mentioned indication device comprises a flat bar (27') the one free end of which is turnably mounted on a tap at the said carry-out so that the free end of the flat bar is located outside the housing in one of the end positions of the turning movement of shaft (9 9') and inside the housing in the other end position.

6. Container lock with reference to any of the previous claims, CHARACTERIZED in that the carry-out (5 5') comprises a first arm (25 25') and a second arm (26 26') whereby the first arm (25 25') can be effected by the above mentioned secondary piston and the above mentioned second arm (26) by a pull back spring (12)

7. Container lock with reference to any of the previous claims, CHARACTERIZED in that a spring-loaded safety bolt (17) , which can block the shaft in locking position and which can be handled from the outside of the lock housing, is connected.

8. Container lock with reference to any of the claims 1 - 5, CHARACTERIZED in that the said hydraulic unit (4') is rotatably mounted in the lock housing so that the said secondary piston (8') can rotate owing to the fact that the free end (48') of the secondary piston can be engaged with and disengaged from the above mentioned carry-out (5') and that the free end of the above mentioned secondary piston (8') is loaded in the opposite direction by a pretressed pull back spring (12') whereby the said secondary piston is turnable between two balance positions, one where the secondary piston can get or is engaged with the above mentioned carry-out and another where the secondary piston is not engaged with the above mentioned carry-out.

9. Container lock with reference to any of the claims 8 or 9 CHARACTERIZED in that a manoeuvre device that can be handled from outside of the lock housing is connected with above mentioned secondary piston can be brought to turn from one balance position to the other by means of the manoeuvre device.

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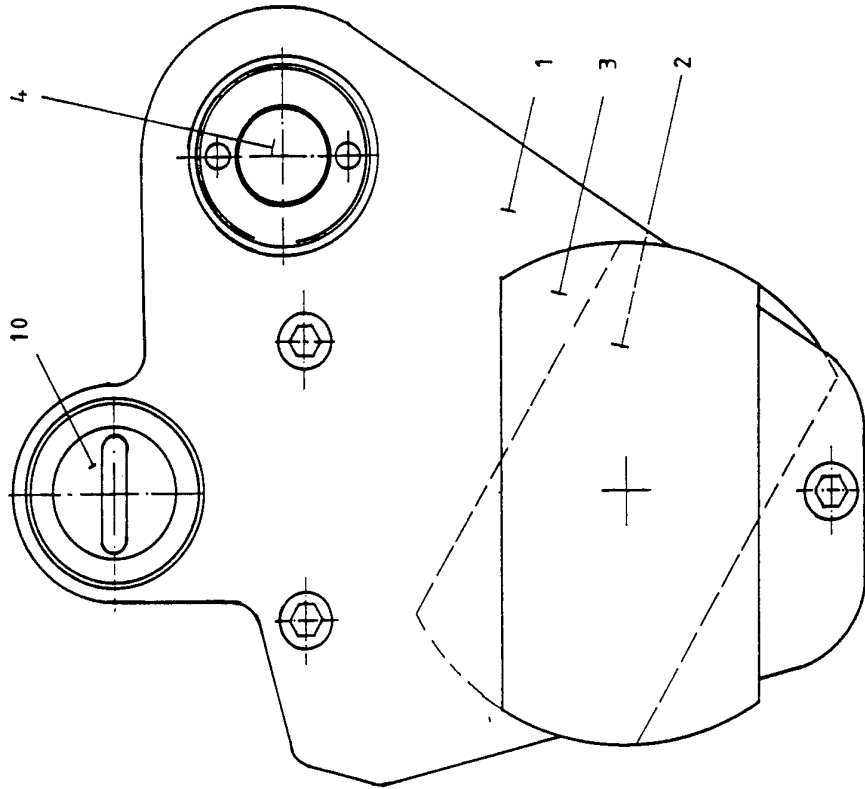


Fig. 2

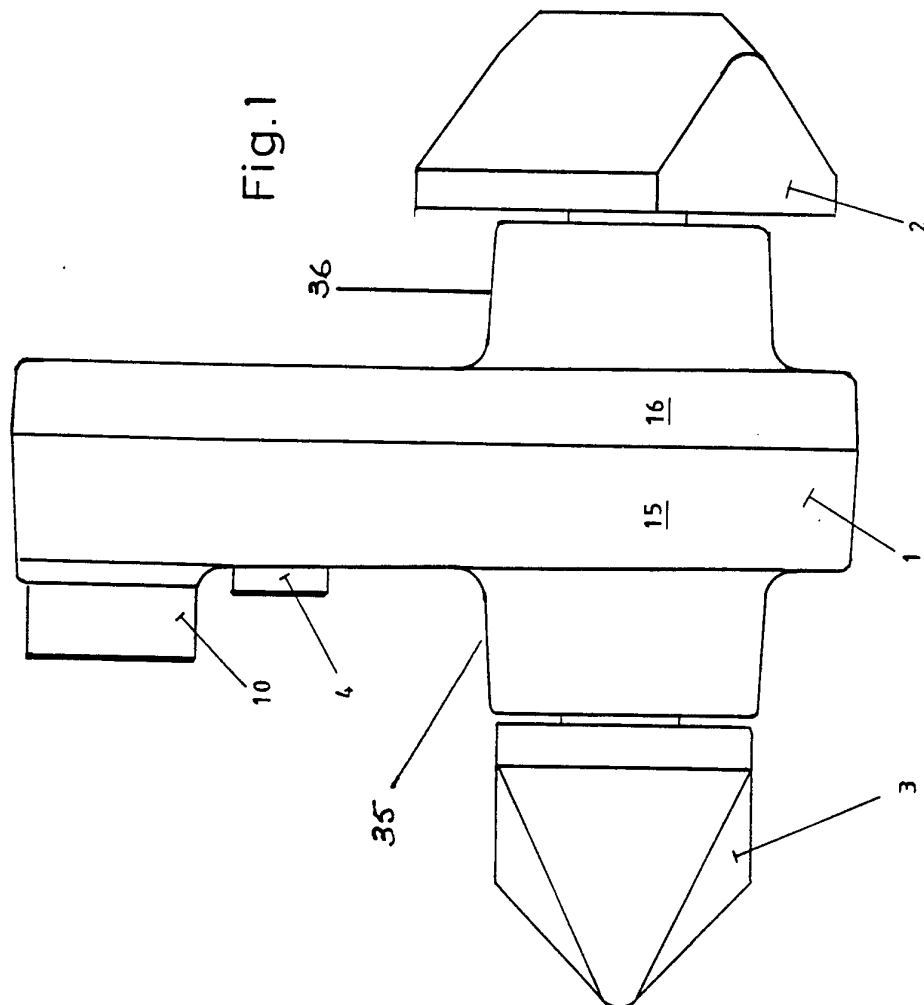
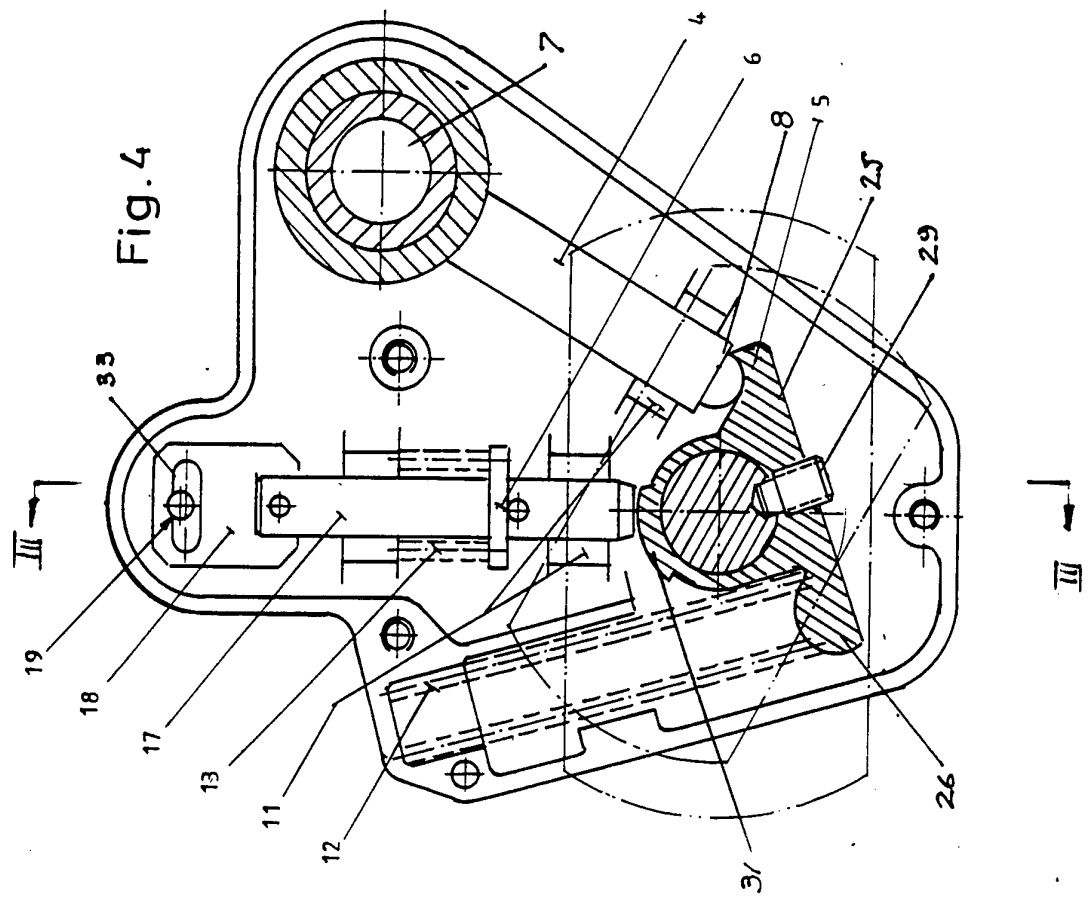
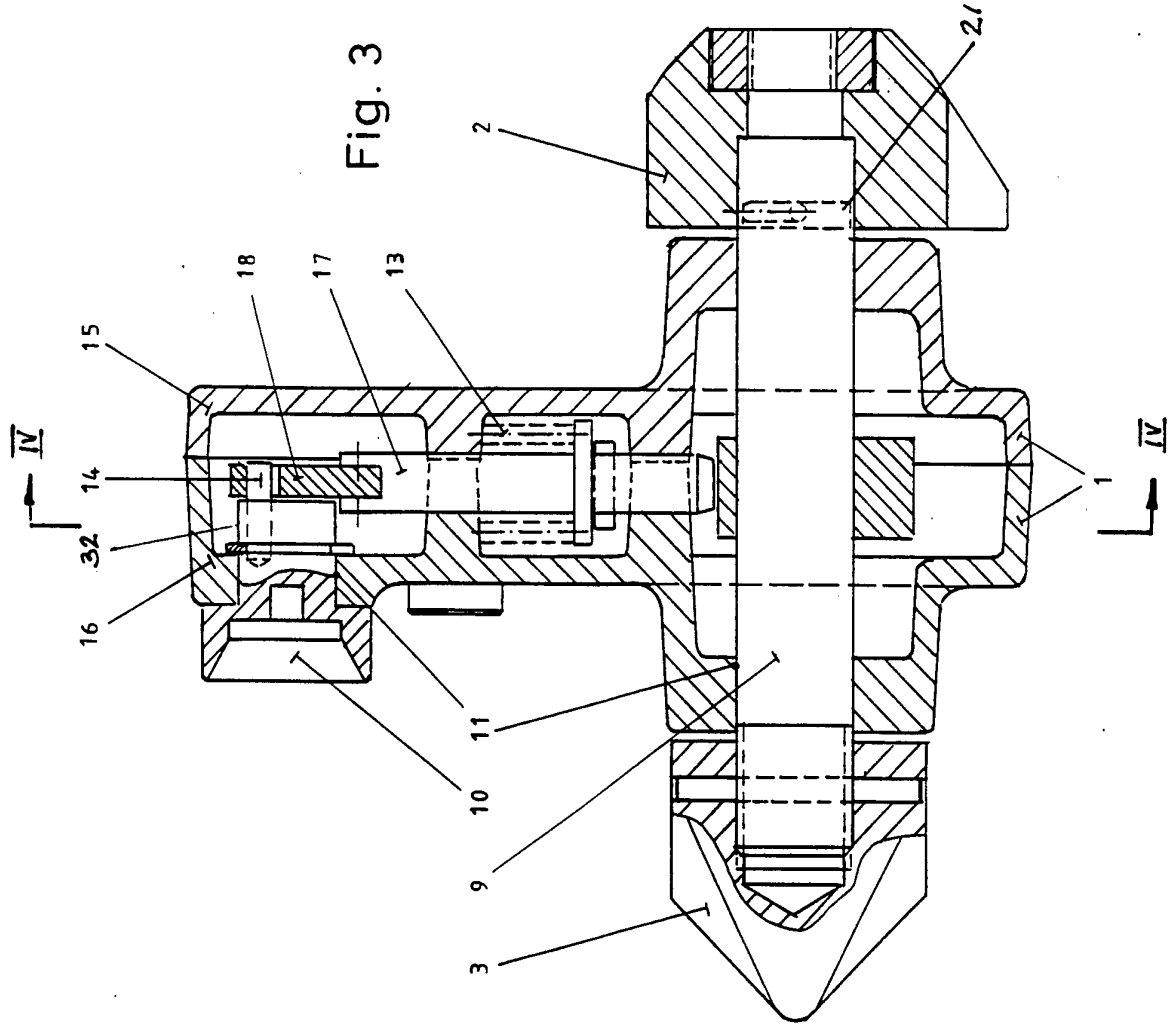


Fig. 1



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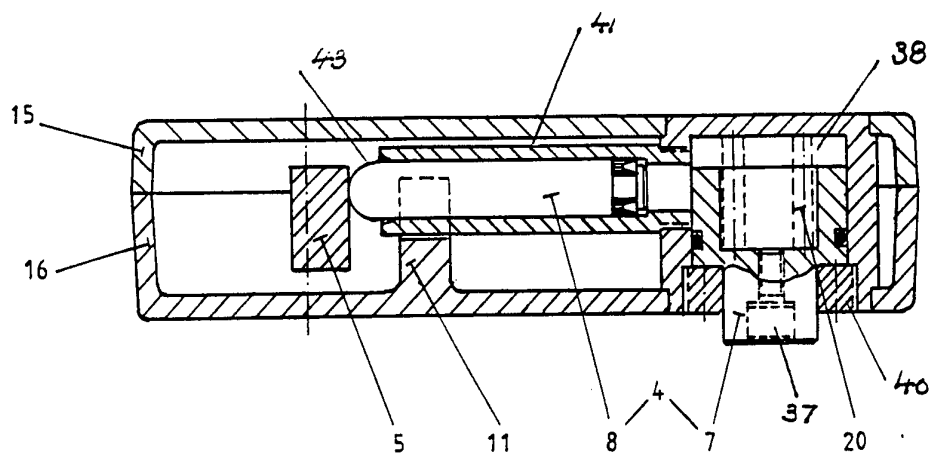


Fig. 5

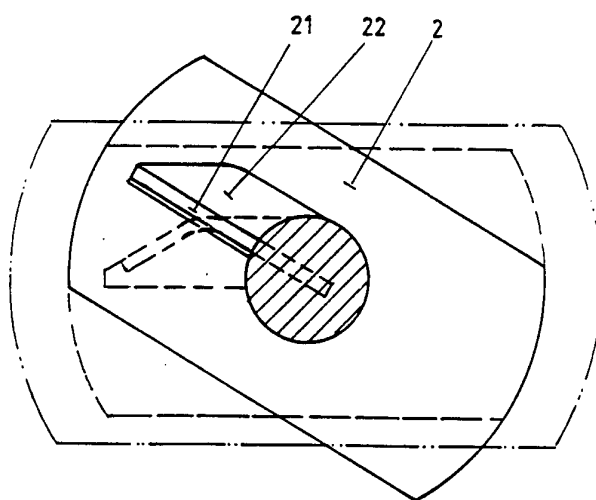


Fig. 6

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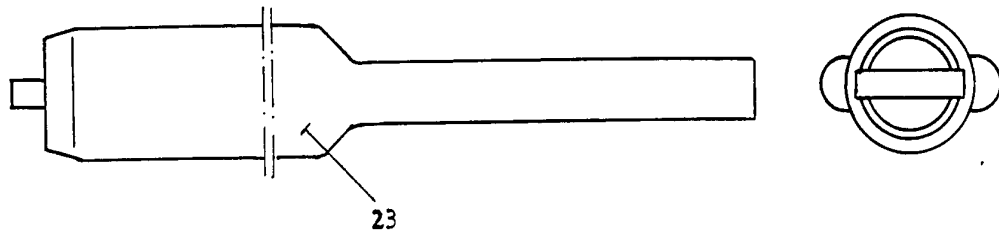


Fig. 7

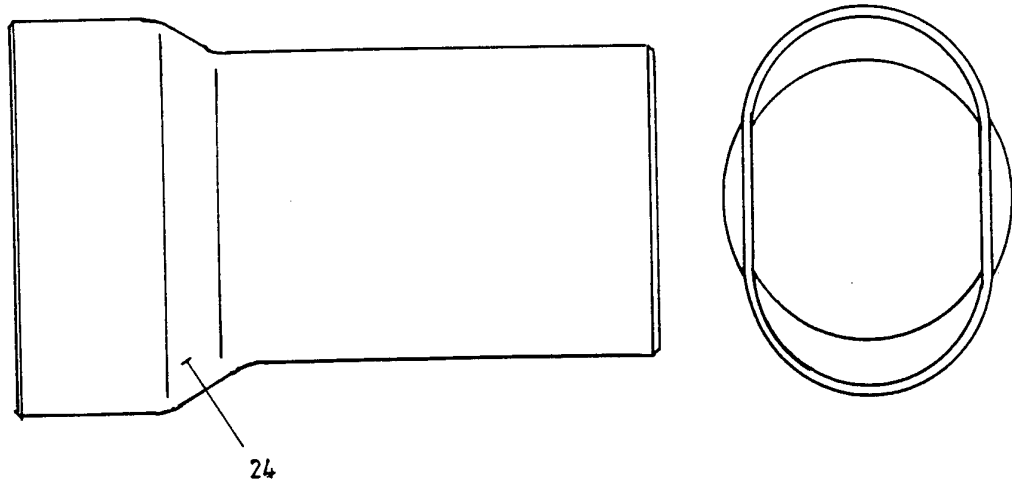


Fig. 8

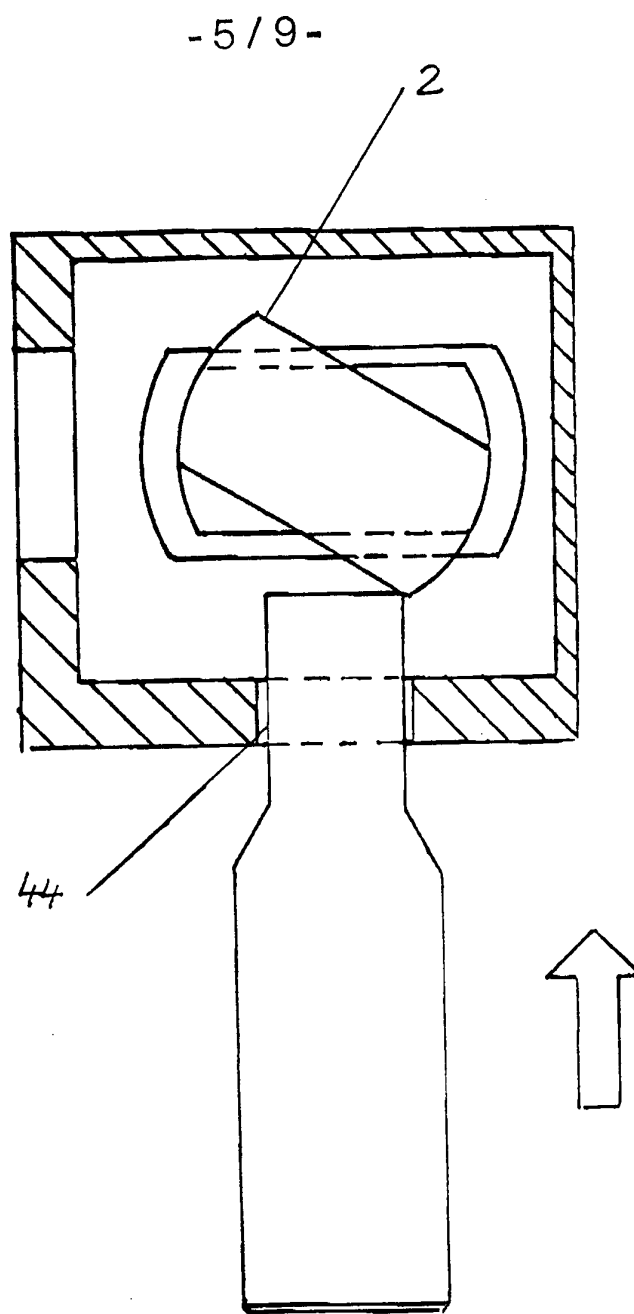
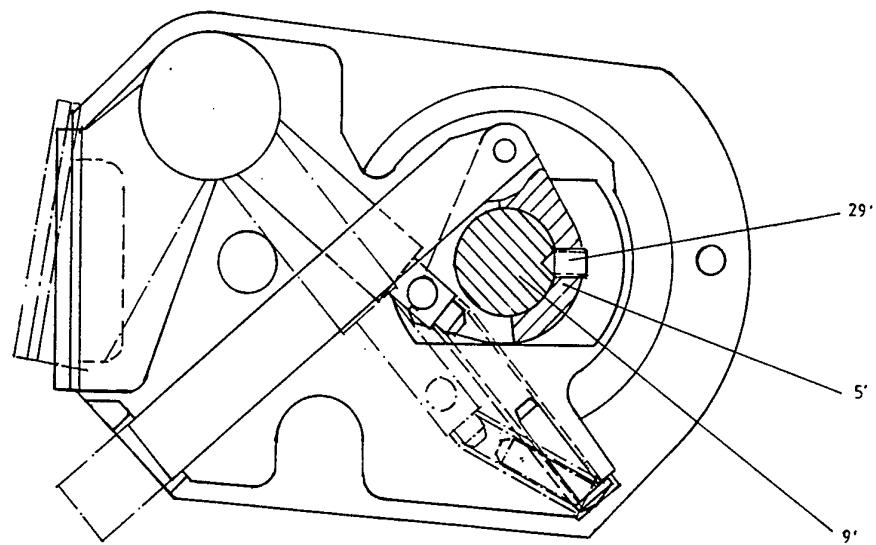
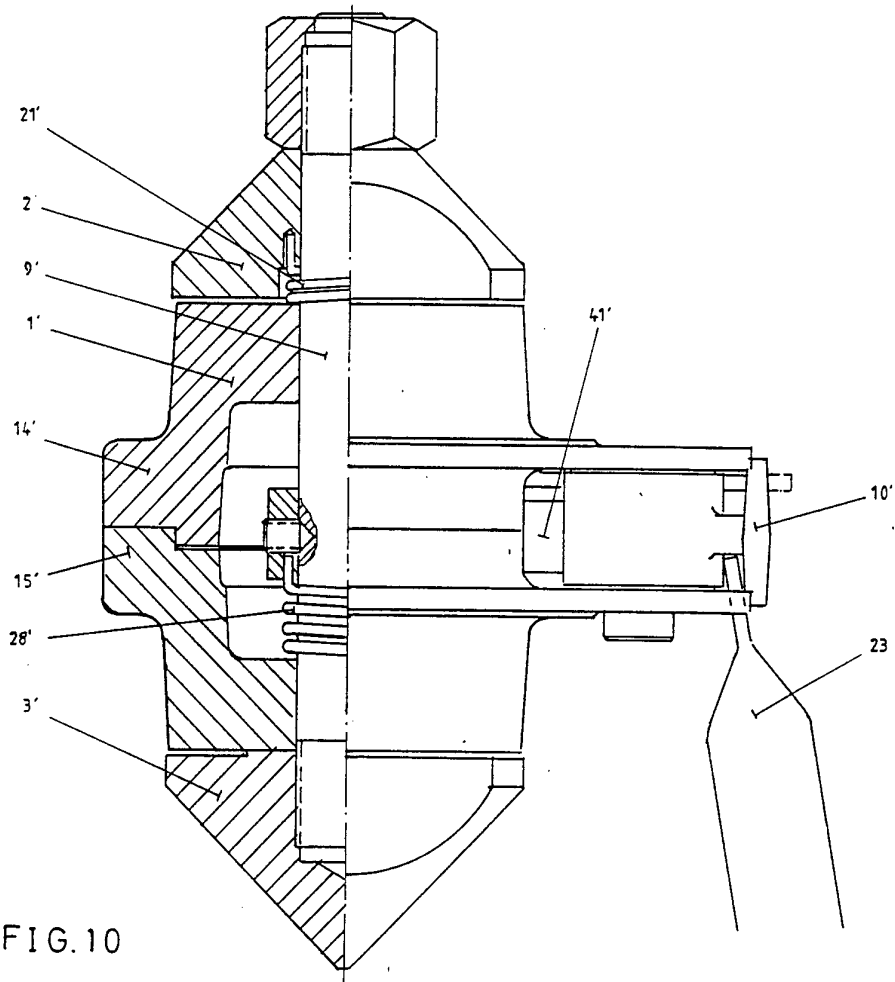


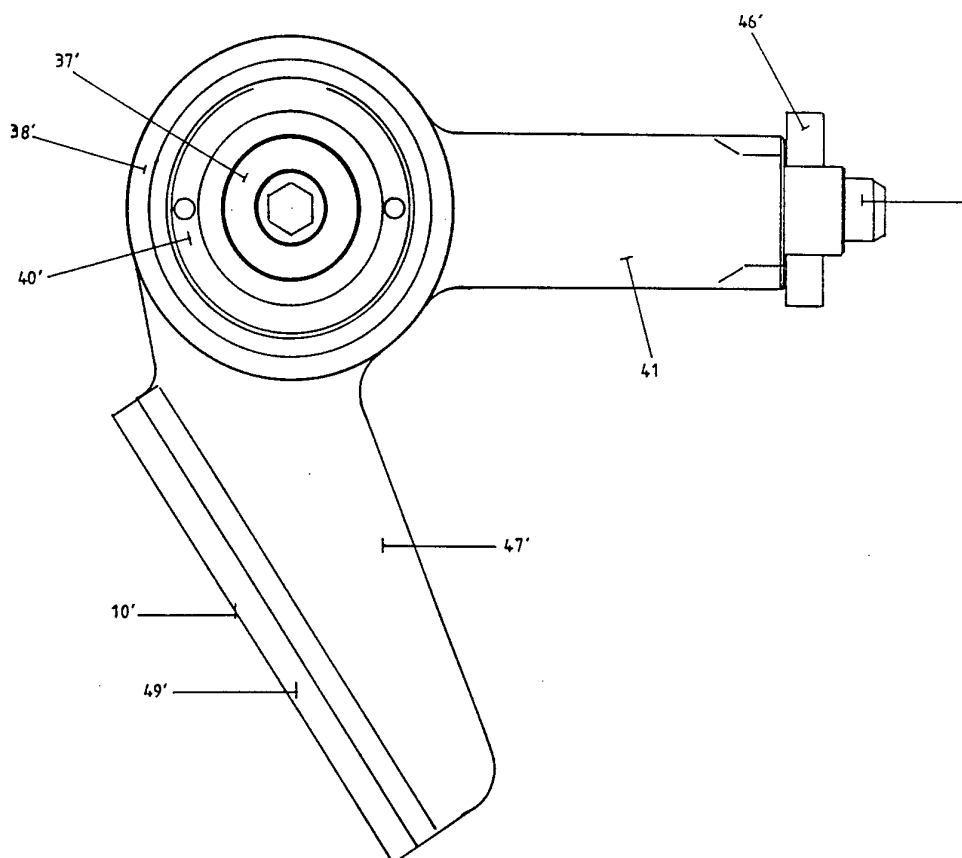
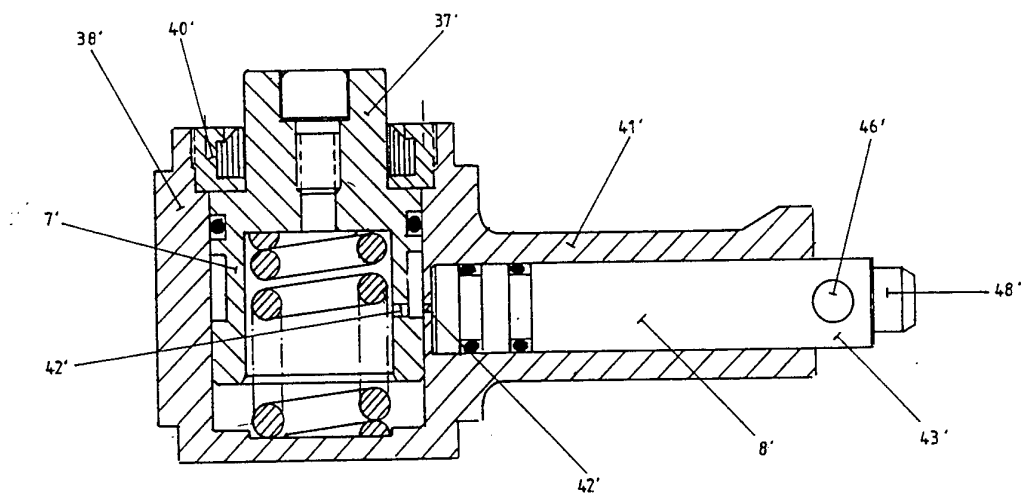
Fig.9

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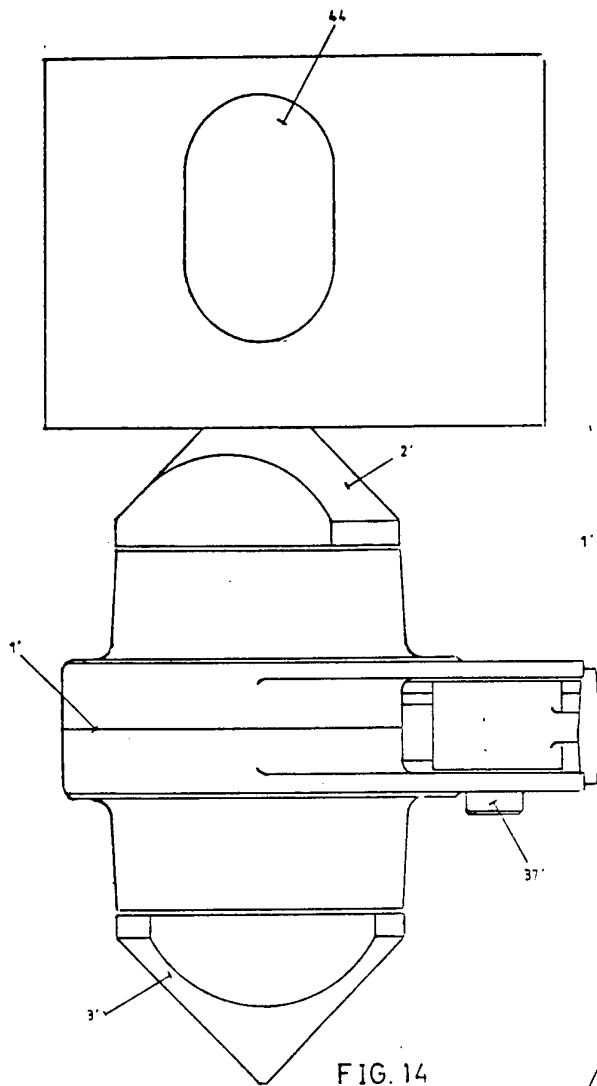


FIG. 14

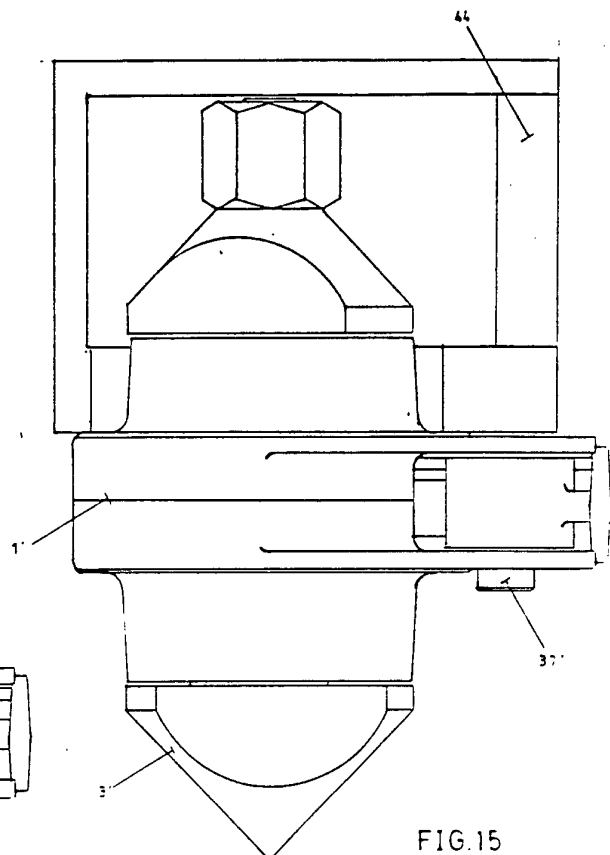


FIG. 15

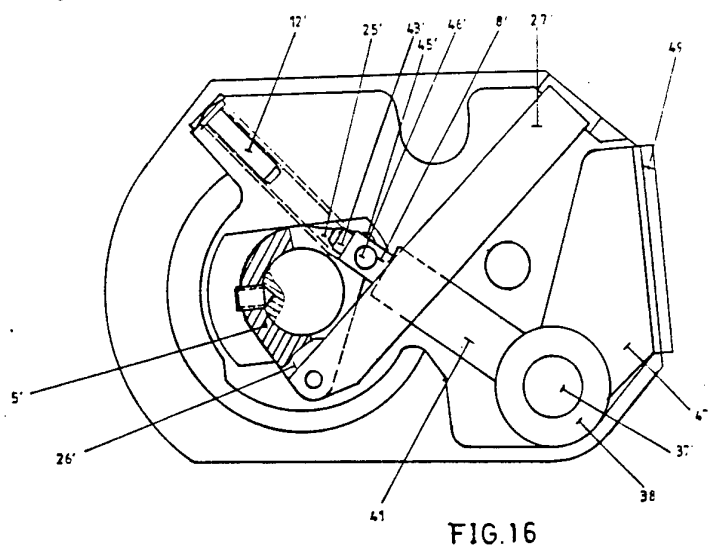


FIG. 16

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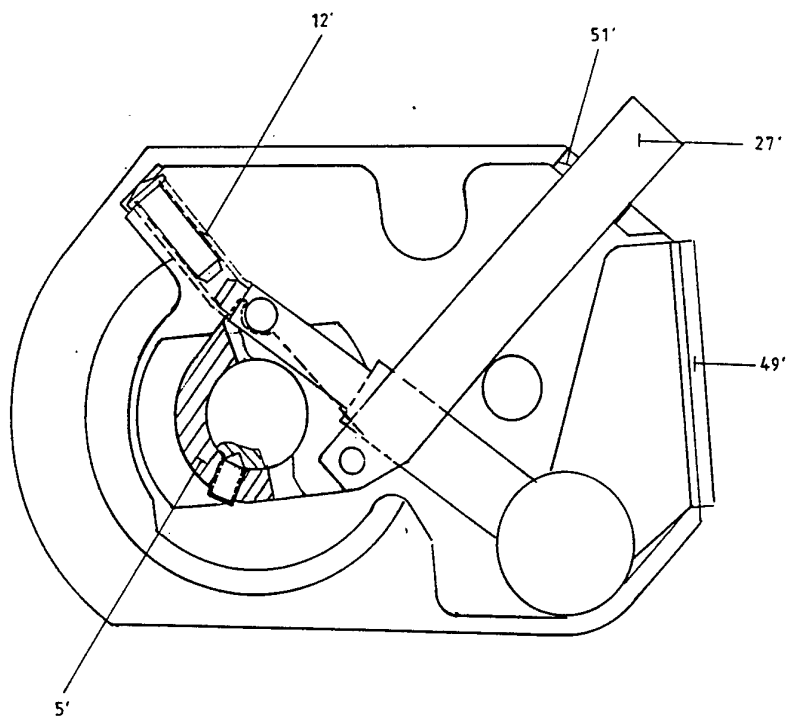


FIG.17

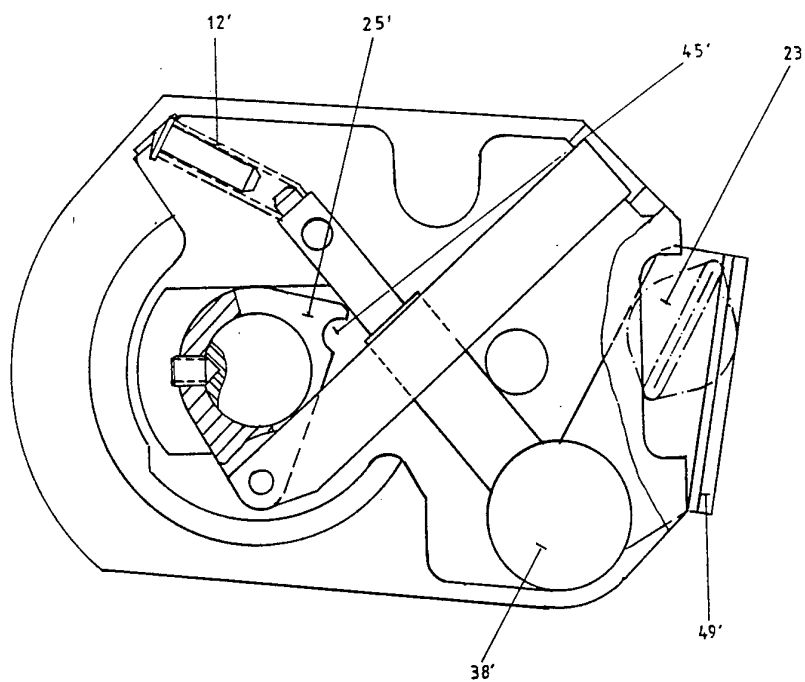


FIG.18.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/01005

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B65D 90/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B60P, B63B, B65D, B65J

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

SE,DK,FI,NO classes as above

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE, B, 368945 (AB BACKTEMANS PATENTER), 29 July 1974 (29.07.74), page 4, line 13 - line 41; page 5, line 1 - line 41 --	1-9
A	WO, A1, 8803100 (JENSEN, GUNNER), 5 May 1988 (05.05.88) --	1-9
A	US, A, 5062752 (TAKAGUCHI), 5 November 1991 (05.11.91) --	1-9
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Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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			FR-A-	2084265	17/12/71
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