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(54) **CHANGEABLE ROTARY COMBINATION SHACKLE LOCK.**

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Description

Background of the Invention

Cable or chain combination locks of the type having means for setting or changing the combination have been known (U.S. Patent Nos. 4,445,348 and 4,615,191).

Other combination locks have included mechanisms described in U.S. Patent Nos. 1,706,994; 1,898,947; 4,354,365; 4,441,346; and 4,831,860.

The invention relates to a changable combination U-shaped shackle lock in which the shackle has two legs and the lock further has a main body, clutches for selectively effecting locking of the shackle and combination wheels selectively arrangeable in variable combination to said clutches, a first end of a lock shaft body being fixed to the main body, the main body receiving and holding a first shackle leg in the main body for limited movement therein, the lock shaft body upon which said clutches with their combination wheels are supported having at its second end opposite the first end a head including a shackle leg hole to receive the second shackle leg, said lock shaft body having a hollow shaft recess extending axially therethrough, a reciprocal shaft being positioned and guided in the hollow shaft recess so as to be resiliently urged towards the shackle leg hole in the head such that when said second shackle leg is located in the shackle leg hole it is normally maintained through action of the reciprocal shaft in the locked position, the clutches whenever in any locking combination preventing withdrawal of the reciprocal shaft from the position in which it acts to lock the shackle.

From the United States Patent US-A-1,486,934 such a lock is known. This lock is unlocked by turning the combination wheels into the right position. After unlocking, one leg can be pulled out of the main body.

A disadvantage of this known lock is, that the lock can be opened with force while in a locked position.

Summary Of The Invention

Broadly, the present invention includes a shackle combination lock that is readily partially disassembled when the shackle is pulled to the open position to permit change of the combination. To this end the lock according to the invention is characterized in that the lock further comprises a lock ball retained between the reciprocal shaft and the shackle leg hole such as to engagingly lock the second leg upon its insertion into the shackle leg hole, the second leg having thereby been first inserted through an opening in a spring-retained

cap removably located on the head, so that said cap is removable from the head upon overcoming the spring-retention only when the shackle is in its unlocked position, the combination wheels being normally maintained in position by the cap as long as the latter is retained on the head and the combination wheels being removable axially once the cap has been removed.

A cap end is removable by causing the depression of a spring-loaded clasp permitting the combination wheels to be removed from the clutches and replaced in a selected position to attain the desired new combination.

It is a result of the invention that the removable cap is securely held by the lock shackle in the lock position and readily removable when the shackle is in the unlock position.

Brief Description of the Drawings

Fig. 1 is an exploded perspective view of selected parts of the lock;

Fig. 1A is also an exploded perspective view of certain parts of the lock;

Fig. 2 is a partial elevational sectional view of the lock;

Fig. 3 is a sectional view along line 3-3 of Fig. 2;

Fig. 4 is a sectional view along line 4-4 of Fig. 2;

Fig. 5 is a selected view along line 5-5 of Fig. 2;

and

Fig. 6 is bottom perspective of the lock cap.

Description of the Preferred Embodiment

In Figs. 1 and 1A, lock 10 includes fixed body portion 8, removable cap end 9, lock shaft body 11, lock shaft 12, clutches 13 a-d and, combination wheels 16a-d, and U-shaped shackle 15 with shackle legs 15a, 15b. Shaft body 11 includes shaft portion 11a having both holes 25a-d and head 11b. Lock shaft body 11 is permanently fixed to body portion 8 using a pin or other suitable means.

Fixed body portion 8 in turn includes shackle sleeve opening 17, shackle leg retaining pin 18 and shaft body recess 19 (Fig. 2). Removable end cap 9 has shackle cap recess 9a and lock shaft body head 11b includes shaft recess sleeve 22 aligned to receive leg 15b. Caps also has recess 23 to house head 11b.

Removable end cap 9 is held in lock position by shackle leg 15b; however, when leg 15b is moved out of head 11b and cap 9, cap 9 is readily removable by the exertion of force to cause cap 9 to be urged away from shaft body head 11b causing spring 26 to move out of lock cap cavity 27 into head dwell recess 29.

Lock 10 further includes locking mechanism 30 in which shaft 12, housed in shaft body recess 19

of shaft body portion 11a, is urged to the right (Fig. 2) by coil spring 34 causing large shackle lock ball 36 to engage shackle notch 37 of shackle leg 15b. Shaft 12 includes four (4) annular shackle depressions 12a-d for accommodating small shaft lock balls 38a-d. Lock balls 38a-d are captured in depression 12a-d and restrained by clutches 13a-d. Each clutch 13a-d includes a ball clutch pocket 44a-d which permits shaft lock balls 38a-d to be moved out of shaft grooves 12a-d to permit spring 34 to be compressed as shackle leg 15b is pulled upwardly camming ball 36 to the left (see arrow in Fig. 2) to unlock the lock. Fig. 2 shows the clutches 13a-d positioned with clutches 13a-c in positions in which balls 38a-c can not move upwardly out of grooves 12a-c while clutch 13d is turned so that clutch pocket 44d permits ball 38d to move upwardly upon laterally movement of shaft 12. Clutches 13a-d are moved to selected positions by combination wheels 16a-b which are engageable as clutch projections 47a-d enter wheel recesses 48. Clutches 16a-d also carry thumb pieces 51a-d.

Once the combination wheels 16a-d are aligned to permit balls 38a-d to be moved upwardly, a pull on shackle 15 causes shackle leg 15a to move upwardly camming ball 36 to the left (Fig. 2) to release leg 15b. As leg 15b is moved upwardly out of cap recess 9a and head recess 22, cap end 9 is free to be disassembled by applying sufficient force to cause spring 27 to move into dwell recess 29 and release cap 9.

Once cap end 9 is removed, combination wheels 16a-d can be removed laterally and replaced with each of the sets of projections 47a-d moved into a number of wheel recesses 48 on clutches 13a-d to create a new combination.

Claims

1. Changable combination U-shaped shackle lock (10) in which the shackle (15) has two legs (15a, 15b) and the lock (10) further has a main body (8), clutches (13a, 13b, 13c, 13d) for selectively effecting locking of the shackle (15) and combination wheels (16a, 16b, 16c, 16d) selectively arrangeable in variable combination to said clutches, a first end of a lock shaft body (11) being fixed to the main body (8), the main body receiving and holding a first shackle leg (15a) in the main body for limited movement therein, the lock shaft body (11) upon which said clutches (13) with their combination wheels (16) are supported having at its second end opposite the first end a head (11b) including a shackle leg hole (22) to receive the second shackle leg (15b), said lock shaft body having a hollow shaft recess (19) extending axially therethrough, a reciprocal shaft (12) be-

ing positioned and guided in the hollow shaft recess (19) so as to be resiliently urged towards the shackle leg hole (22) in the head (11b) such that when said second shackle leg is located in the shackle leg hole (22) it is normally maintained through action of the reciprocal shaft (12) in the locked position, the clutches (13) whenever in any locking combination preventing withdrawal of the reciprocal shaft (12) from the position in which it acts to lock the shackle (15), characterised in that, the lock further comprises a lock ball (36) retained between the reciprocal shaft (12) and the shackle leg hole (22) such as to engagingly lock the second leg (15b) upon its insertion into the shackle leg hole (22), the second leg (15b) having thereby been first inserted through an opening (9a) in a spring-retained cap (9) removably located on the head (11b), so that said cap is removable from the head upon overcoming the spring-retention only when the shackle (15) is in its unlocked position, the combination wheels (16) being normally maintained in position by the cap (9) as long as the latter is retained on the head (11b) and the combination wheels being removable axially once the cap (9) has been removed.

2. The lock of claim 1 in which the shaft (12) has grooves (12a, 12b, 12c, 12d), the lock shaft body (11) includes holes (25a, 25b, 25c, 25d) and the clutches (13a, 13b, 13c, 13d) have pockets (47a, 47b, 47c, 47d), all for accommodating lock balls (38a, 38b, 38c, 38d).
3. The lock of claim 1 in which the removable cap (9) is held on the head (11b) by a spring detent means (27), which detent means is releasable when the lock is in its unlock position and the second leg removed from the head (11b) and the cap (9).

Patentansprüche

1. Einstellbares U-förmiges Bügelkombinationsschloß (10), wobei der Bügel (15) zwei Beine (15a, 15b) hat und das Schloß (10) weiter aus einem Hauptkörper (8), Kupplungen (13a, 13b, 13c, 13d) zum selektiven Verriegeln des Bügels (15) und Kombinationsrädern (16a, 16b, 16c, 16d) besteht, die nach Wahl in unterschiedlichen Kombinationen den genannten Kupplungen gegenüber einstellbar sind; ein erstes Ende eines Schloßachskörpers (11) ist an dem Hauptkörper (8) befestigt, der Hauptkörper bietet einem ersten Bügelbein (15a) Platz und hält dieses derart in dem Hauptkörper fest, daß dieses nur noch beschränkt bewegen

kann; der Schloßachskörper (11), der die genannten Kupplungen (13) und die dazu gehörenden Kombinationsräder (16) unterstützt, hat im Bereich seines zweiten Endes gegenüber dem ersten Ende einen Kopf (11b), in dem zur Aufnahme des zweiten Bügelbeins (15b) ein Bügelbeinloch (22) sich befindet; durch den genannten Schloßachskörper hindurch verläuft in der axialen Richtung ein Hohlraum (19); eine hin-und- hergehende Achse (12) ist in diesem Hohlraum (19) angeordnet und wird darin geführt, um federnd in Richtung des Bügelbeinlochs (22) in dem Kopf (11b) gedrückt zu werden, so daß wenn sich das genannte zweite Bügelbein in dem Bügelbeinloch (22) befindet, dieses normalerweise durch die Wirkung der hin-und- hergehenden Achse (12) in dem gesperrten Stand gehalten wird, wobei die Kupplungen (13) verhindern, wenn sie in einer beliebigen Sperrkombination stehen, daß die hin-und- hergehende Achse (12) aus dem Stand versetzt wird, in dem dieser den Bügel (15) sperrt, dadurch gekennzeichnet, daß das Schloß weiter aus einer Schließkugel (36) besteht, die in der Weise zwischen der hin-und-hergehenden Achse (12) und dem Bügelbeinloch (22) eingeschlossen ist, daß diese das zweite Bein (15b) effektiv sperrt, wenn dieses in das Bügelbeinloch (22) hineingesteckt wird, wobei das zweite Bein (15b) beim Hineinstecken zuerst durch eine Öffnung (9a) in einer mittels einer Feder befestigten Kappe (9) auf dem Kopf (11b) gesteckt ist, wobei die besagte Kappe nur vom Kopf lösbar ist, wenn die Schließfederkraft überwunden wird und der Bügel (15) in der nicht gesperrten Position steht und wobei die Kombinationsräder (16) normalerweise von der Kappe (9) an ihrer Stelle gehalten werden, wenn diese auf dem Kopf (11b) ruht, die Kombinationsräder (16) in axialer Richtung gelöst werden können, wenn die Kappe (9) entfernt worden ist.

2. Schloß nach Anspruch 1, wobei die Achse (12) Nuten (12a, 12b, 12c, 12d) enthält, der Schloßachskörper (11) Löcher (25a, 25b, 25c, 25d) hat und die Kupplungen (13a, 13b, 13c, 13d) Vertiefungen (47a, 47b, 47c, 47d) aufweisen, dies alles zur Aufnahme von Verriegelungskugeln (38a, 38b, 38c, 38d).
3. Schloß nach Anspruch 1, wobei die lösbare Kappe (9) auf dem Kopf (11b) mittels eines Federmittels (27) befestigt ist, welches Federmittel sich entspannen kann, wenn das Schloß in der geöffneten Position steht und das zweite Bein aus dem Kopf (11b) und der Kappe (9) entfernt ist.

Revendications

1. Serrure (10) à combinaison réglable et à étrier en U, l'étrier (15) ayant deux jambes (15a, 15b) et la serrure (10) comprenant ensuite un corps principal (8), des accouplements (13a, 13b, 13c, 13d) pour le verrouillage sélectif de l'étrier (15) et des roues de combinaison (16a, 16b, 16c, 16d) réglables à choix par rapport aux dits accouplements pour différentes combinaisons, une première extrémité d'un corps de l'axe (11) de la serrure étant fixée au corps principal(8), le corps principal recevant une première jambe (15) de l'étrier et la retenant dans le corps principal d'une telle manière qu'elle ne peut plus faire qu'un mouvement limité, le corps de l'axe (11) de la serrure qui supporte lesdits accouplements (13) et les roues de combinaison correspondantes (16) comprenant à hauteur de sa seconde extrémité en regard de la première extrémité une tête (11b) dans laquelle se trouve un trou de jambe de l'étrier (22) pour recueillir la seconde jambe (15b) de l'étrier, une cavité (19) étant aménagée dans le sens axial à travers ledit corps de l'axe de la serrure, et un axe coulissant en ligne droite (12) étant placé dans cette cavité (19) et étant guidé dans celle-ci afin d'être poussé d'un mouvement élastique dans la tête (11b) dans le sens du trou de jambe (22) de l'étrier d'une telle manière que, lorsque ladite seconde jambe de l'étrier se trouve dans le trou de jambe (22) de l'étrier, celle-ci est normalement maintenue dans la position bloquée sous l'effet de l'axe coulissant en ligne droite (12), les accouplements (13) empêchant, lorsqu'ils se trouvent dans une combinaison de blocage quelconque, que l'axe coulissant en ligne droite (12) est déplacé de la position dans laquelle l'étrier (15) est bloqué, caractérisée en ce que la serrure comprend ensuite une bille de fermeture (36) qui a été enfermée entre l'axe coulissant en ligne droite (12) et le trou de jambe (22) de l'étrier d'une telle façon qu'elle bloque activement la seconde jambe (15b) lorsque celle-ci est introduite dans le trou de jambe (22) de l'étrier, la seconde jambe (15b) lors de son introduction étant d'abord introduite par une ouverture (9a) dans un bouchon retirable (9) et fixé sur la tête (11b) au moyen d'un ressort, ledit bouchon ne pouvant être enlevé de la tête que quand la force de fermeture du ressort est vaincue quand l'étrier (15) se trouve dans la position non bloquée, les roues de combinaison (16) étant normalement maintenues à leur place par le bouchon (9) quand celui-ci repose sur la tête (11b) de sorte que les roues de combinaison peuvent

être enlevées dans le sens axial après que le bouchon (9) a été enlevé.

2. Serrure selon la revendication 1, l'axe (12) ayant des rainures (12a, 12b, 12c, 12d), le corps de l'axe de la serrure (11) ayant des trous (25a, 25b, 25c, 25d), et les accouplements (13a, 13b, 13c, 13d) ayant des creux (47a, 47b, 47c, 47d), tout ceci pour accueillir des billes de verrouillage (38a, 38b, 38c, 38d).
3. Serrure selon la revendication 1, le bouchon retirable (9) étant fixé sur la tête (11b) au moyen d'un moyen de ressort (27), lequel moyen de ressort peut se détendre quand la serrure se trouve dans la position ouverte et la seconde jambe a été enlevée de la tête (11b) et du bouchon (9).

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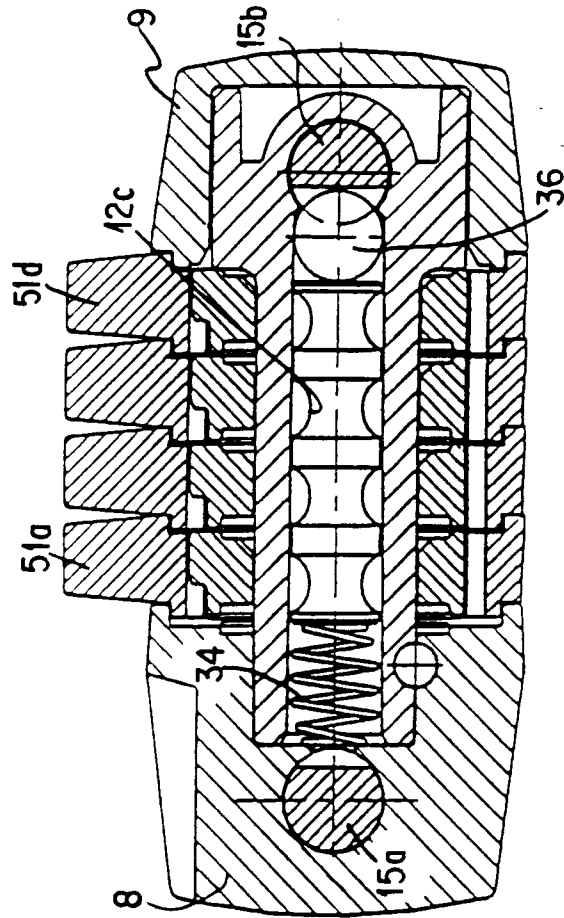


FIG. 5

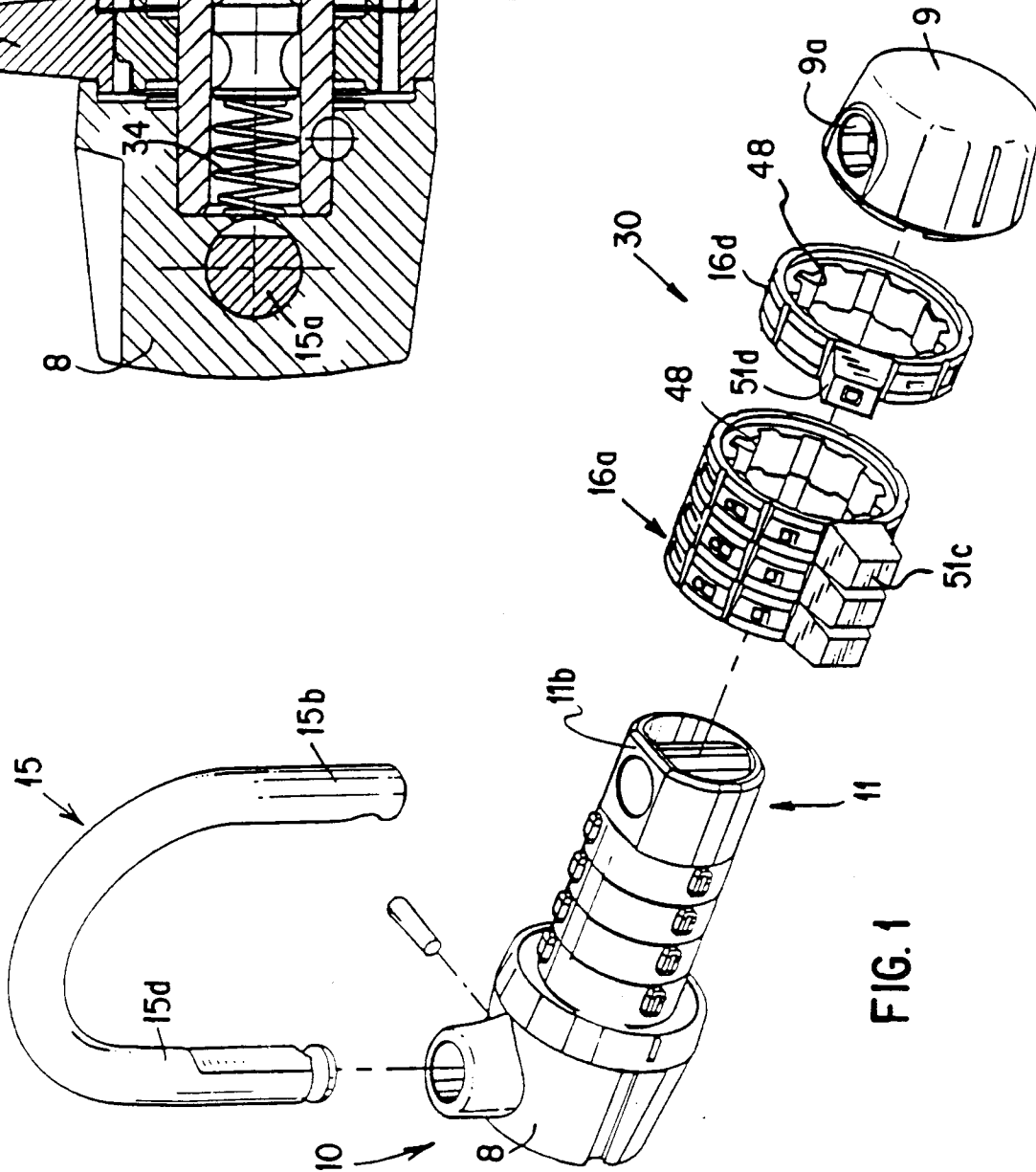


FIG. 1

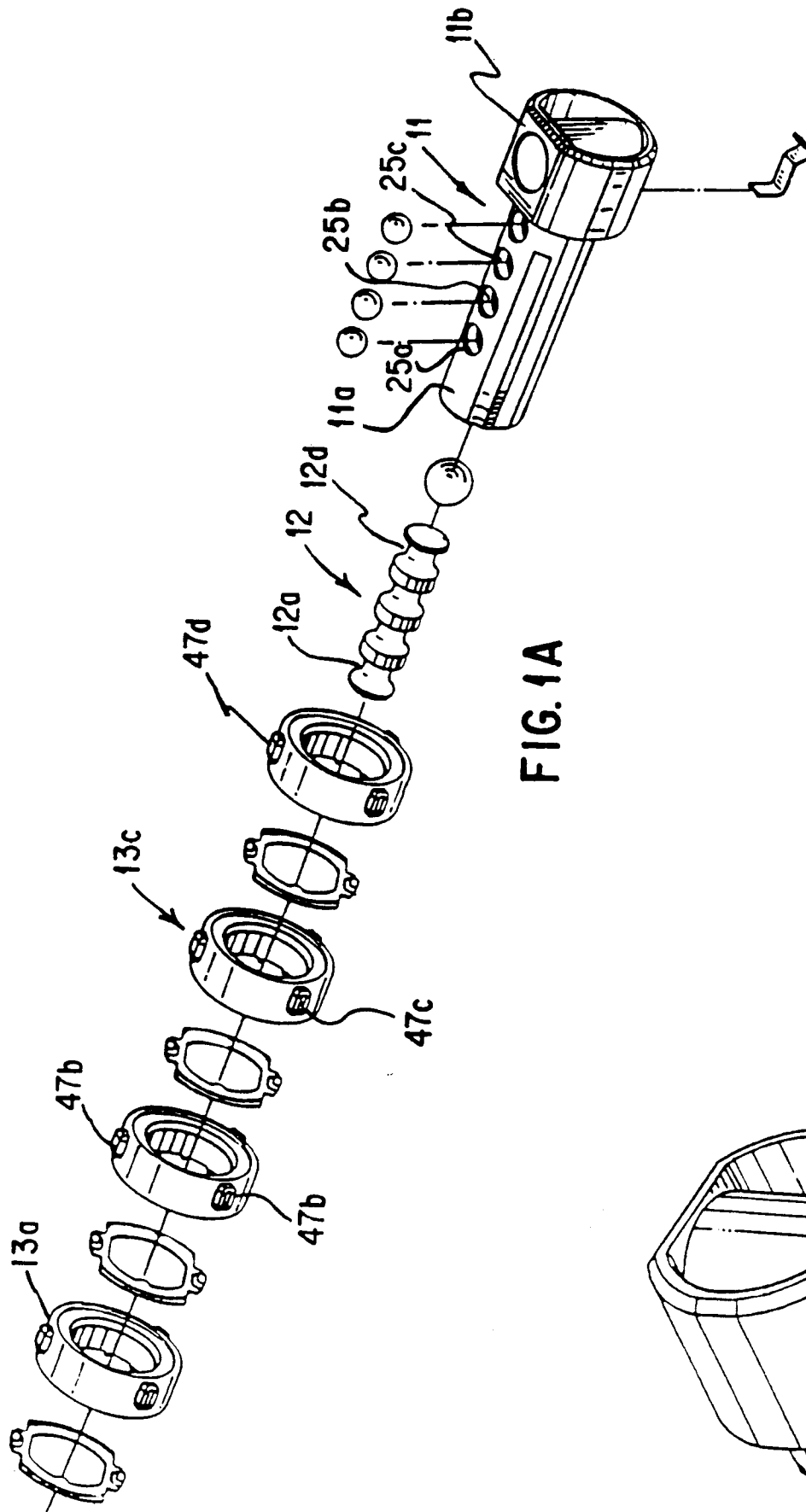


FIG. 1A

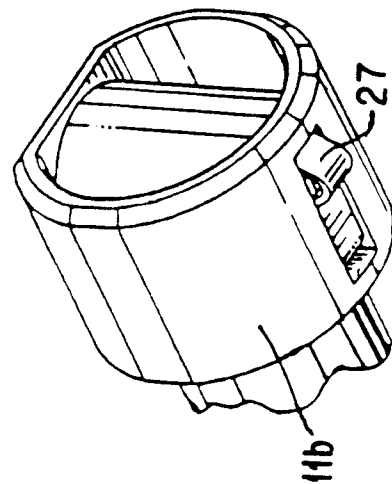


FIG. 6

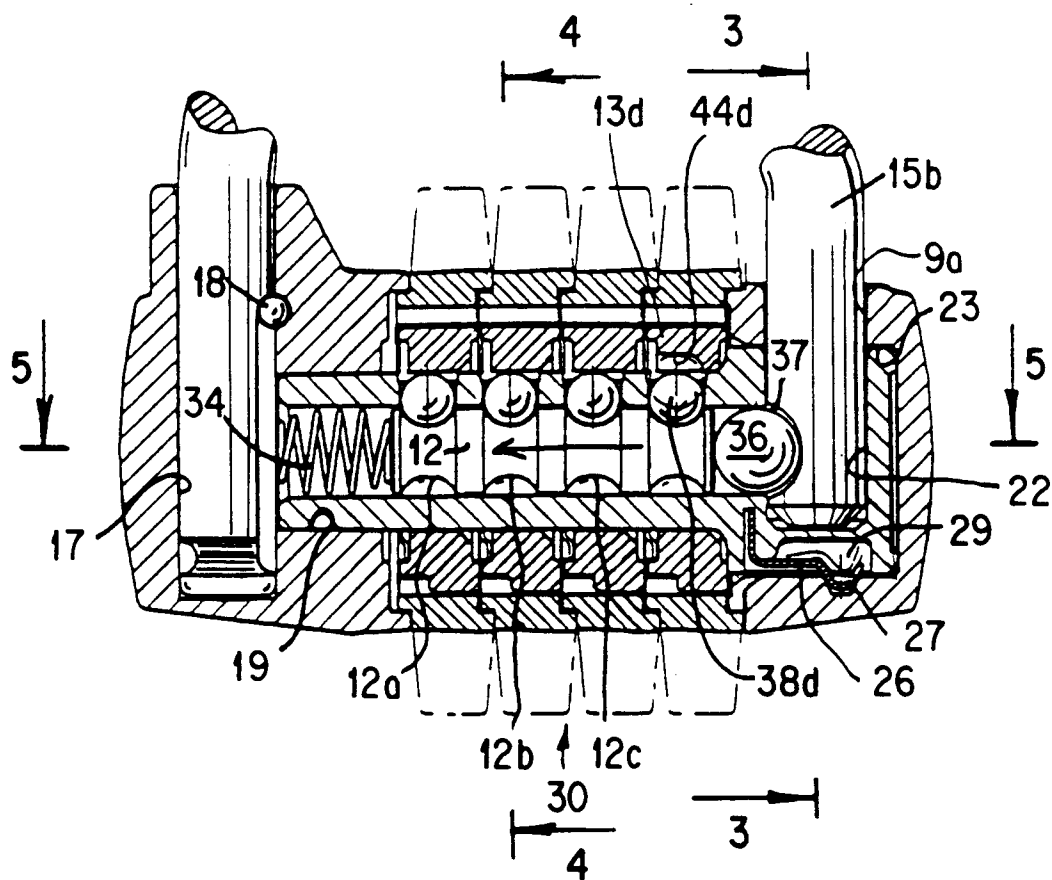


FIG. 2

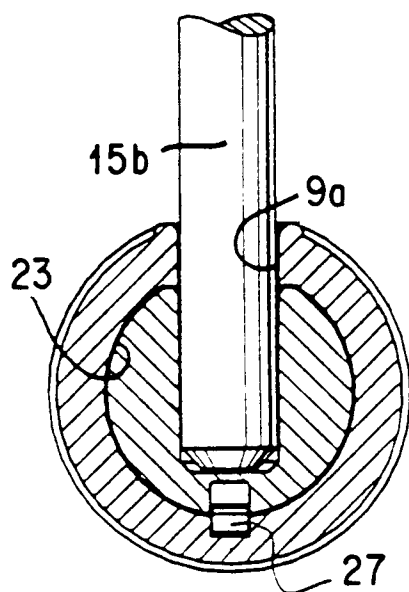


FIG. 3

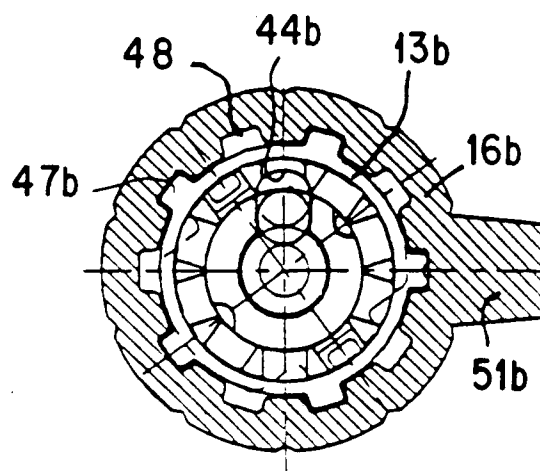


FIG. 4