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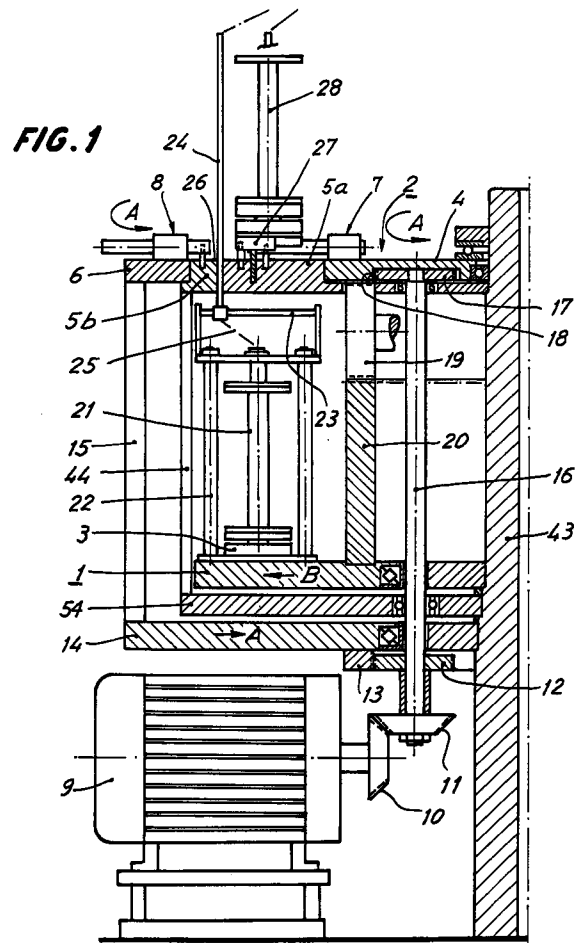
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(54) Improvements to a thread braiding machine

(57) It includes a lower tray (1) with rotatory coil holders (3) in "B" sense and a top tray (2) composed of: fixed crown (6), plate (5a) and ring (5b) and disk (4). Said plate and ring define a circumferential track (29) where coil holders (27) run, and there is a sinusoidal gap (26) where thread guides (24) of lower coil holders (3) run, crossing each other with the circumferential track (29). Coil holders (27) are driven in "A" sense by pullers (7, 8) fixed to the crown (6) and disk (4) and provided with alternative stems (33) guided by shoes or rollers (35) introduced in tracks (30, 31) of the plate (5a) and ring (5b); while a stem (33) pulls a coil holder (27) the others avoid the thread guides (24). When the coil holders (27, 3) of the top and lower trays run a circumferential path, a high number of revolutions is achieved.



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## Description

The object of this patent consists in improvements to a thread braiding machine either to form electric cables under a textile sheath, of the so-called HO3 RT-F series, such as for fiberglass insulated cables and pipes, screened or shielded cables for communications, cable TV, computer elements, HI-FI, or to produce narrow fabrics and textile sleeveings, with which improvements significant upgrading are achieved with respect to presently existing machines, namely for production increase purpose.

In fact, machine for braiding head are known since a long time which are substantially constituted by a fixed tray with two guides or sinusoidal slots which cross each other and draw closed circuits. Two respective series of coils are travelling on said slots, coils of one series crisscrossing those of the other series. Obviously, the thread being uncoiled above each coil is also crossing threads of remaining coils, all of them gathering together at a top, narrow and common point where properly so called braid is achieved.

Thereafter, other machines appeared which tried to facilitate coils replacements as well as increasing production. For example, document ES 540126 discloses a machine for circularly braiding threads which also includes two series of thread cones, but with the peculiarity that they are arranged on different planes: one on a lower tray rotating in a first sense and the other on a top tray which is divided into two parts, i.e., in a concentric circular crown with an internal disk, both being separated by a circumferential slot through which thread guides are passing coming from the series of lower cones. As well the crown as the internal disk rotate in same sense, but opposite to that of the lower plate, and they are provided with a series of radial cuts through which those from the bottom of said top series cones are obliged to enter and exit because of the impact against a series of fixed cams, consequently drawing a sinusoidal path and producing, in fact they cross the threads coming from the series of lower cones, forming thus required braid.

However, as well the machines of this last disclosed type as those mentioned at the beginning show a common drawback which prevent them to increase production with certain quaranties. As a matter of fact, in all those machine it is noted that sole tray coils or cones, on one had, and those of the top tray, on the other hand, are continuously showing a sinusoidal path with detriment to the driving members which are moving such cones or coils, said members having to sustain a series of frictions and second moments with the to and fro movement of said coils or cones bottoms through the peaks and hollows of said sinusoids. In addition, the stress of the driving members is obviously not same as when cones or coils bottoms go close to the tray as when they go far away. All of this has a negative incidence increasing the machine revolutions and, in fact,

its production.

This important drawback is overcome with the machine object of the invention, for bobbins or coils, in which, according to the preamble of claim 1, it provides the peculiarity that as well lower series coil holder bottoms as those of the top series draw a perfectly circumferential path, without additional frictions or to and fro stresses, which allows to dramatically increase machine speed and, therefore, production thereof as explained below.

It encompasses other additional advantages, but not less important:

- a lower number of machines for same production,
- smaller premise space as there is less machines,
- a significant saving in workforce and
- an important energy conservation.

In order to facilitate the explanation, five sheets of drawings are attached to this description in which a practical case of embodiment has been illustrated, which is mentioned for no limitative example purpose only of the scope of this invention.

In said drawings:

Fig. 1 is a elevation sectional view of half the machine involved.

Fig. 2 is a plan view of the machine top tray not provided with coils

Fig. 3 illustrates a perspective view of the parts composing the bottom of a coil sliding on the top tray.

Fig. 4, 5 and 6 illustrates details of a single bottom of a coil sliding on the top tray and thread guide of lower tray in different positions.

Fig. 7 illustrates a sectional elevation view, of half a machine according to the invention, driven in this case by means of a driving belt.

According to said figures, the thread braiding machine according to these improvements basically includes: a lower tray (1) on which a series of circular bottoms (3) coil holders fixed to said tray are installed and a top tray (2) divided into a central disk (4) holding pulling members (7), a plate (5a) and an arch (5b) holding a series of tracks, which will be disclosed below, for a second series of coil holders and an external crown (6) bearing other pulling members (8).

A motor (9) bears a pinion (10) which is geared to another pinion (11) through the wheel (12), crown (13) solid with the platform (14) and props (15) drive the higher external crown (6) with a rotation in "A" arrow sense.

The shaft (16) of same pinion (11) provides, through the wheel (17) and toothed part (18) of the top disk (4) with a rotation the disk (4) itself in same "A" sense.

On the other hand, toothed part (18) of mentioned

disk (4) provides, through the wheel (19) and crown (20) with rotation the lower tray (1) in "B" arrow sense.

So then, crown (6) and top disk (4) rotate in same "A" sense, but opposite to "B" rotation of lower disk (1) on which bottoms (3) of coils (21) are fastened. Coils are rotatory on said bottom (3) and at both sides of them there is respective supports (22) supporting bars (23) on which the beginning of a thread holder duct (24) is slidable which leads upwards the thread (25) which is being unwound from each coil (21) while the braid (not shown) is being formed as it is already conventional.

Top plate and ring consist in part (5a) fixed to central strut (43) and part (5b) propped by small pillars (44) which go up from second platform (54) also fixed to said central strut (43); through the narrow space (26) left by both parts (5a, 5b) between them, thread guide duct (24) of lower series coils (21) run. Said space (26) has a sinusoidal profile in order to propel with said movement lower thread guides (24) path, this later will have a to and fro movement on said respective bars (23).

It is essential in the machine according to this invention, that bottoms (27) of top coils (28) move on a perfectly circumferential track or slot (29) (Fig. 2) driven by pulling members (7, 8).

The bottom (27) bearing top coils (28) show such a configuration (Fig. 3) which has a top portion (27a) substantially circular on which the coil itself and an arcuate shovel-shaped lower portion (27b) rest, this later may partly be introduced on the circumferential track (29).

Mentioned portion of shovel shows two holes (32).

Pulling members (7 and 8) consist in some pairs of stems (33) mounted on related supports (34) respectively fixed on external crown (6) and internal disk (4) and which string said holes (32) of coil holder (27) bottom. As the space (26) through which thread guides (24) cross has a sinusoidal outlining, which is continuously crossing circumferential track (29) toward one and the other side thereof, said pulling stems (33) could impinge said thread guides (24) passage, and in order this does not occur it has been provided that said stems (33) are slidable on each support (34) in order to continuously be taken away from lower thread guides (24) run. With this aim, near each stem (33) end there is a shoe or roller (35) introduced and guided by tracks (30, 31), approximately sinusoidal, which follows, at some distance, the space (26) where lower thread guides (24) pass, (Fig. 4, 5 and 6), one of them (30) at one side of said space (26) and the other (31) at the other side thereof, in such a way that stems (33) do not interfere at said thread guides (24) and there is always at least one stem (33) pulling respective coil holder (27) as it can be seen at said figures which illustrate several situations of a single coil holder (27) with respect to closest thread guides (24).

With normal or relatively small coils, lower thread guide are not interfered, but with large coils, i.e. having a larger diameter, it could happen. To prevent it, and turning back to Fig. 3, an intermediate small tray (36)

has been provided, having a convenient diameter and larger than that of the bottom, which on one hand would support related large coil (not illustrated) and on the other hand could move diametrically on bottom (27). Therefore, small tray (36) will bear a lower dovetail-shaped protrusion (37) sliding on a recess (38) having same shape and existing at the bottom (27a) portion.

Said small tray (36) shows a hole (39) in which shoe or roller (40) top end is engaged, which can be introduced to and guided by an additional track (41) which will have suitable outlining to take away, in the moments of possible interferences, the tray (36) (and its coil) from the run of lower thread guides (24). It could occur that at some time said shoe or roller (40) interferes with related bottom (27a); to prevent it, a groove (42) has been made on said bottom.

In the embodiment illustrated up to now, a machine solely driven by gears has been considered, however, it is obvious that drive may be through other means. Therefore (Fig. 7), motor (9) at same time it moves lower platform (14) and crown (6) by means of pinion (45) and wheel (46) is also moving top disk (4) and lower tray (1) (by means of wheel (47) and crown (48) through an ascending belt (49) which respectively passes through holes (50, 51, 52) of first platform (14), second platform (54) and disk (53) which prop lower tray (1).

Although a machine having a total capacity for 32 coils has being disclosed, i.e. 16 coils for the lower tray (1) and 16 for the top tray (2), it is obvious that said amount can be changed without modifying the essence of the invention.

Anyway, the braiding machine according to the invention foresees a lower coils (21) tray in which they continually draw a circumferential run, and a top coils (28) tray (2) in which the bottom of said coils also draw a circumferential run, which allows the machine itself of the invention to reach a number of revolutions dramatically greater than that of presently existing machines.

The invention, within its essentiality, can be realized in other kind of embodiments which are different only in details from the disclosed only as an example, which embodiments will also be covered by the protection applied for. These improvements can also be performed in a thread braiding machine with the means, components and accessories best suitable, as their are all included in the spirit of following claims.

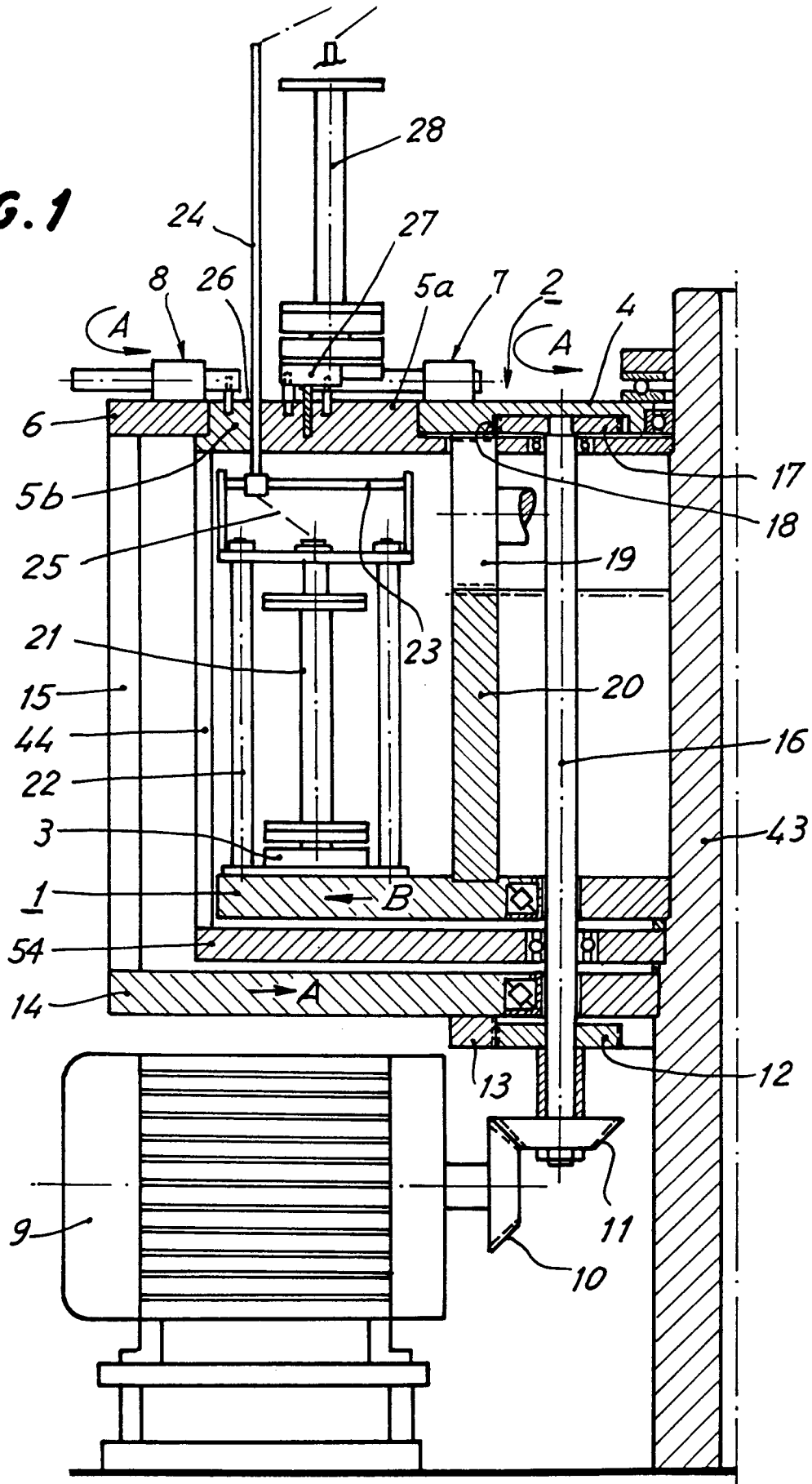
### Claims

1. Improvements to a thread braiding machine, of the type including a lower tray (1) rotatory in a first sense (B) jointly with a series of bottoms (3) having rotatory thread coils (21) about their respective shafts, and a top tray (2) in which there is an associated second series of bottoms (27) with thread coils (28), rotatory about their respective shafts, which are crossing themselves with the thread

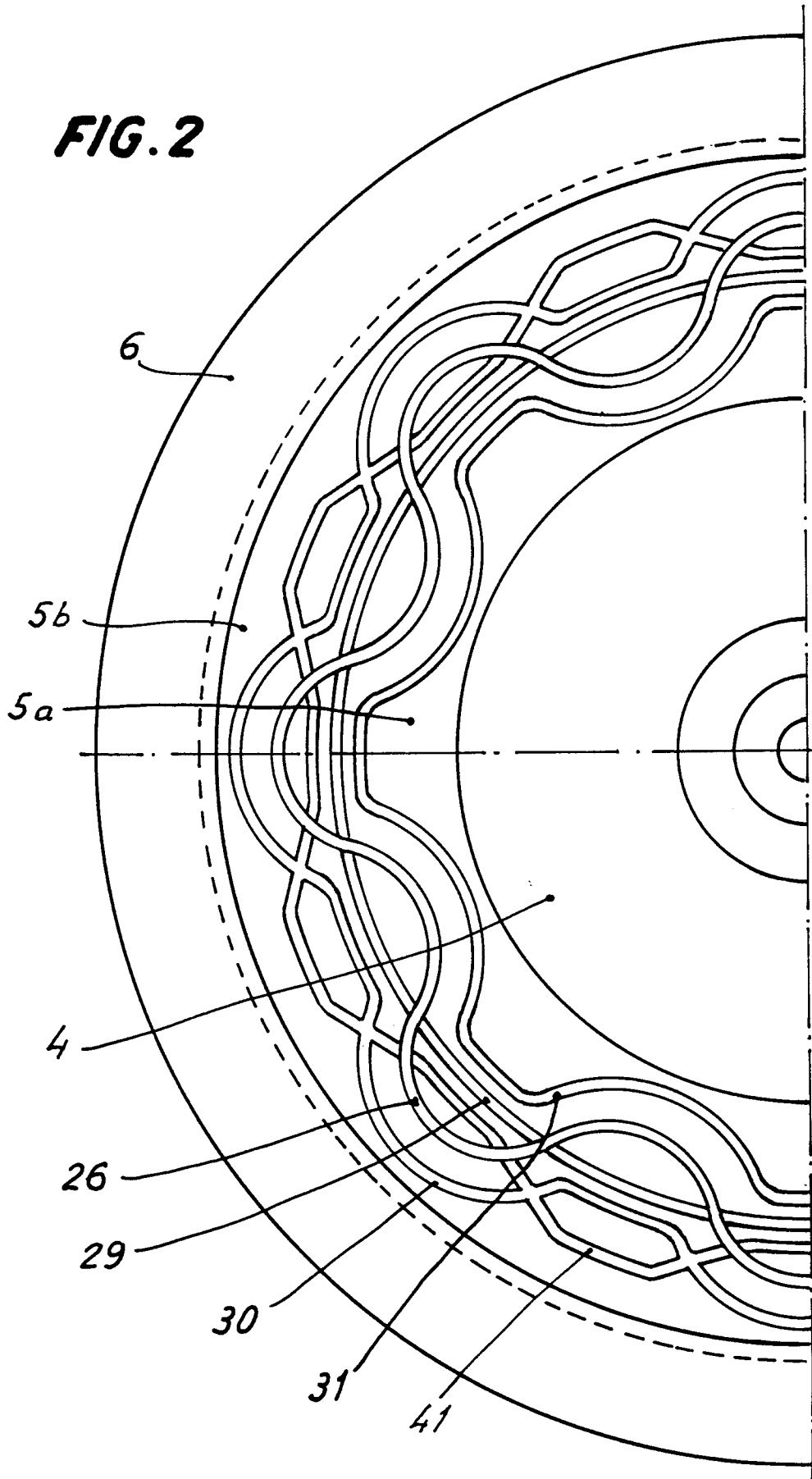
guides (24) of the lower tray (1), essentially characterized in that the top tray (2) is composed by an external crown (6), rotatory in a second sense (A) opposite to the first one, intermediate and fixed plate (5a) and ring (5b) and internal disk (4) also rotatory in (A) sense, all of them concentric to each other; in that plate (5a) and ring (5b), show a circumferential track (29) on which top coil holder bottoms (27) run; and in that between plate (5a) and ring (5b) an endless sinusoidal profile passageway (26) is defined through which thread guides (24) coming from lower tray (1) coils (21) run, which sinusoidal passageway (26) it is constantly crossing and it is passing from one to the other side of said circumferential track (29), top coil holders bottom (27) pulling means (7, 8) having being provided.

2. Improvements according to claim 1, characterized in that said pulling means (7,8) of each top coil holders bottom (27) consists in stems (33) movable on related supports (34) incorporated to external crown (6) and internal disk (4), which stems (33) are fit to perform a to and fro movement and to alternately go through top coil holder bottom (27) holes (32), said to and fro movements being driven by related sliding elements (35) protruding from each stem (33) and introduced in related guide tracks (30,31) of respectively internal and external side of said sinusoidal passage (26) and which, in turn, draw an outline approximately sinusoidal parallel to said passage (26).
3. Improvements according to above claims, characterized in that the lower beginning of each lower thread guide (24) passing through said sinusoidal passage (26) is sliding on bars (23) associated to related lower coil holder bottom (3).
4. Improvements according to above claims, characterized in that, for the event of coils having a relatively large diameter, a small tray (36) intercalated between each bottom (27) and respective top coil is provided, said small tray (36) is movable on at least one sliding member (40) associated by one end to the small tray (36) itself and introduced by the other end in an additional track (41) of the ring (5b) which, in due time, take said small tray (36) and respective coil apart, preventing the interference with the thread guides (24) circulating on the sinusoidal passage (26).
5. Improvements according to above claims, characterized in that sliding members (35, 40) are constituted by shoes.
6. Improvements according to claims 1 to 4, characterized in that sliding members (35, 40) are constituted by rollers.

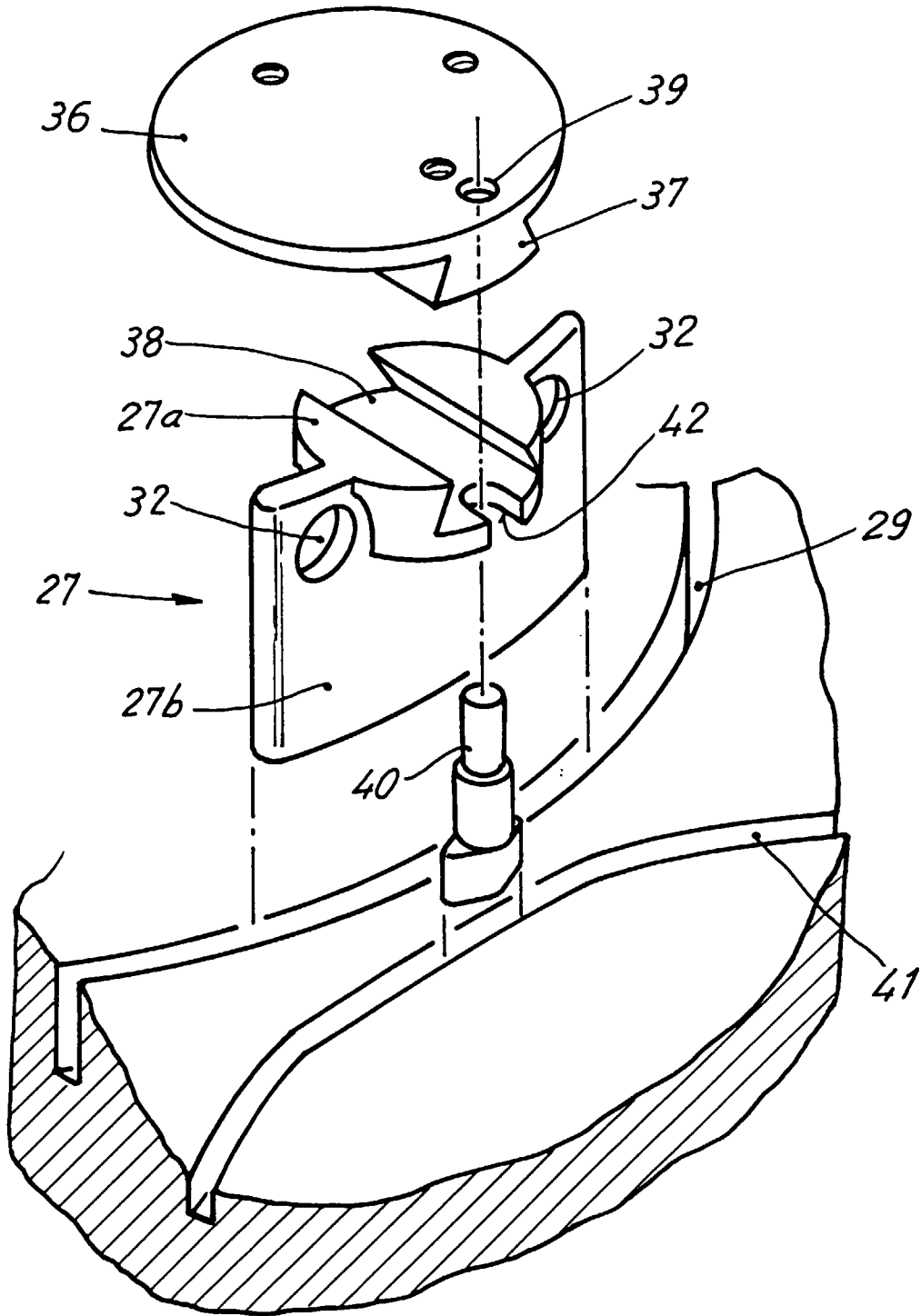
**FIG. 1**

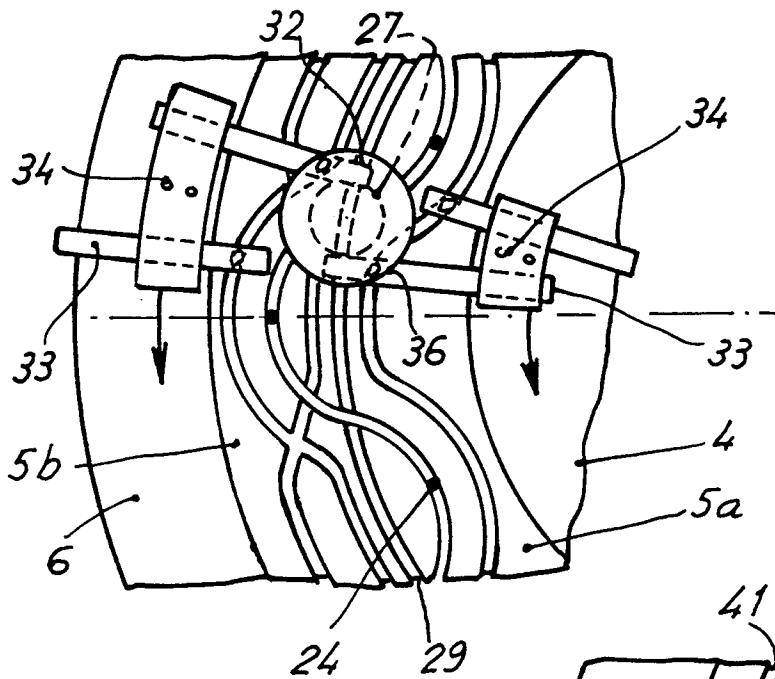


**FIG. 2**

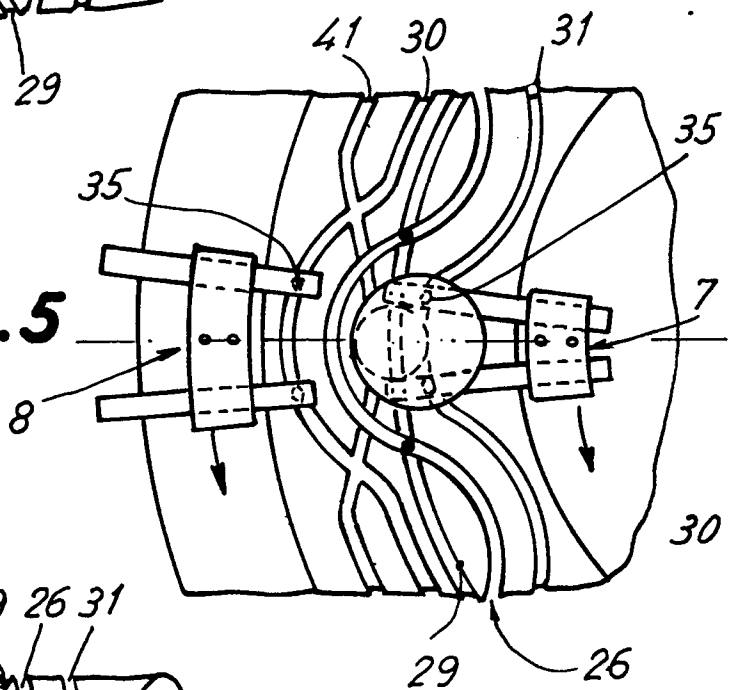


**FIG. 3**

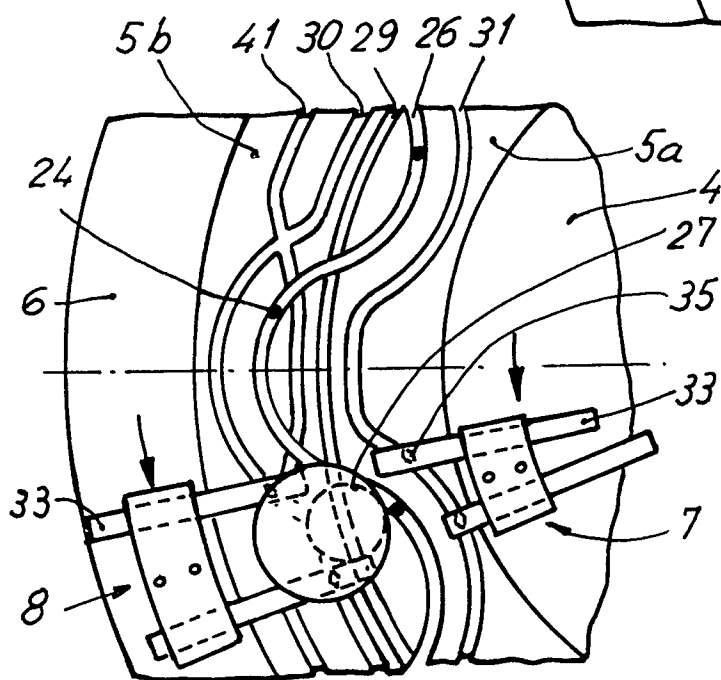




**FIG. 4**



**FIG. 5**



**FIG. 6**



**FIG. 7**

