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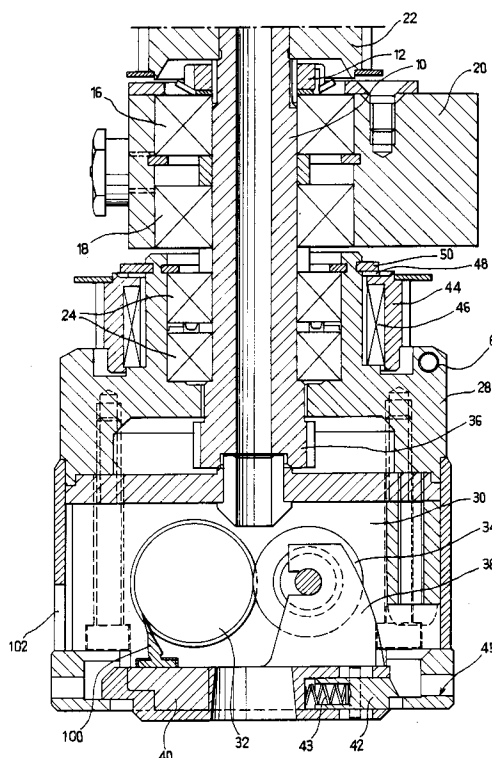
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(54) **Stretch and pre-twist device for continuous ring spinning machines.**

(57) The device comprises a tubular member (10) for passage of the thread or rove, a spider (28) rotatably supported with respect to said tubular member and carrying a pair of stretch cylinders (32, 34), and a drive pulley (44) supported coaxially with the spider. The drive pulley is rotatable with respect to the spider, and first and second cooperating connecting means (52, 56; 88, 92), which are supported on the spider (28) and on the drive pulley (44), respectively, are biased in mutual engagement, in order to make fast the drive pulley with the spider, by elastic means (60, 66; 80) adapted to yield for unlocking said first and second connecting means from each other when a predetermined torque between the spider and the drive pulley is exceeded.

Fig. 1**EP 0 506 156 A1**

This invention is concerned with a stretch and pre-twist device for continuous ring spinning machines, and more particularly with a stretch and pre-twist device comprising a tubular member for the passage of the thread or rove, on which a spider, integral with a driving pulley, is rotatably supported. The tubular member is itself mostly rotated by another driving pulley. In the spider, a pair of stretch cylinders are transversely supported, which are rotated by the motion difference between the spider itself and the tubular member, through planet gears. The rove runs through the tubular member and is stretched by the cylinders, while the rotation of the spider subjects it to a pre-twist.

In the operation of the above stretch and pre-twist devices the problem often arises of the occasional build-up of fluff on one or both the stretch cylinders: slivers from the thread or rove are wound on the cylinder and build up to considerable thicknesses, thus braking the rotation of the cylinders and progressively clogging up the stretch device. If the operator does not immediately stop the machine, the bulk of the fluff builds up and causes mechanical breakdowns in the device, such as gear or bearing failures.

In order to at least partly palliate to such problem, it has been suggested to use a weaker member, say of a plastic material, in the drive for the stretch cylinders, so that the failure is always located in the same member and repair is made easier. However, such a remedy is obviously a mere palliative, since the member of plastic material does have a non-negligible cost, and, moreover, its replacement requires at least a partial disassembly of the stretch device, with a consequent expensive lost time in the operation of the machine.

A main object of the invention is therefore to provide a stretch and pre-twist device for continuous ring spinning machines, in which the fluff is detected and automatically causes the twisting to stop.

Another object is to provide the above device so that its operation can be easily and quickly restored after removal of the fluff, without having to disassemble the device or to carry out other mechanical operations.

The invention achieves the above and other objects and advantages, such as will appear from the following disclosure, by means of a stretch and pre-twist device for continuous ring spinning machines, comprising a tubular member for passage of the thread or rove, a spider rotatably supported with respect to said tubular member and carrying a pair of stretch cylinders, and a drive pulley supported coaxially with the spider, characterized in that the drive pulley is rotatable with respect to the spider, and first and second cooperating connect-

ing means, which are supported on the spider and on the drive pulley, respectively, are biased in mutual engagement, in order to make fast the drive pulley with the spider, by elastic means adapted to yield for unlocking said first and second connecting means from each other when a predetermined torque between the spider and the drive pulley is exceeded.

The invention will now be disclosed in more detail with reference to a preferred embodiment, shown in the attached drawings which are given by way of nonlimiting example, and wherein:

Fig. 1 is a view in axial cross-section of a stretch and pre-twist device according to a preferred embodiment of the invention;

Fig. 2 is a view in tranverse cross-section of the stretch and pre-twist device of Fig. 1, partly broken away, in an operative condition;

Fig. 3 is a view similar to Fig. 2, but showing the device in an unlocked condition;

Fig. 4 is a view in transverse cross-section, partly broken away, of a stretch and pre-twist device according to another preferred embodiment of the invention, in an operative condition;

Fig. 5 is a view similar to Fig. 4, but showing the device in an unlocked condition;

Fig. 6 is a lateral view, partly broken away, of a stretch and pre-twist device according to another preferred embodiment of the invention, in an operative condition;

Fig. 7 is a view in transverse cross-section made along line A-A of Fig. 6;

Fig. 8 is a lateral view similar to Fig. 6, but showing the device in an unlocked condition; and

Fig. 9 is a view in transverse cross-section made along line B-B of Fig. 8.

With reference to Fig. 1, the stretch and pre-twist device according to a preferred embodiment of the invention comprises a tubular member 10, rotatably supported in a crosspiece 20 by means of a nut 12 and bearings 16, 18. Tubular member 10 is rotated by means of a belt drive engaging a toothed pulley 22, although implementations with a stationary tubular member can also be envisaged.

A spider 28 is journaled on tubular member 10 by means of bearings 24. Spider 28 has a housing 30 where two stretch cylinders or rollers 32, 34 are rotatably supported, the former having a fluted surface, the latter having a smooth, rubbery surface. Cylinders 32, 34 are parallel and transverse to the axis of tubular member 10, as known per se, and they are rotated by a planet gear train not shown and known per se, which engages a pinion 36, carried at the lower end of tubular member 10.

While cylinder 32 is supported by bearings directly on the walls of housing 30, cylinder 34, generally known as "pressure roller", is supported

in brackets 38 carried by a slide 40 which closes housing 30 at its bottom, by the interlocking of a latch 42 biased by a spring 43. Latch 42 can be unlocked by inserting a tool through a hole 45, in order to remove roller 34. Spring 43 also fulfills the important task of elastically biasing pressure roller 34 against cylinder 32.

According to the invention, a toothed pulley 44 is rotatably supported on spider 28 through a roller bearing 46 and is axially retained by a washer 48 held by an elastic ring 50.

With reference now to Fig. 2, toothed pulley 44 is normally held fast with spider 28 by a connecting mechanism formed by a catch 52 which is pivoted in 54 on the periphery of spider 28, and having one end adapted to engage in a recess 56 on toothed pulley 44, and an opposite end shaped as an inclined plane 48 against which abuts a follower 60 which is slidably received in a seat 65 formed in spider 28, and elastically biased by a spring 66. Adjacent to recess 56, toothed pulley 44 has a small projection 67. Preferably, the catch has a notch 68, engageable with follower 64, adjacent to inclined plane 58.

In the normal operation of the spider, toothed wheels 22, 44 are driven at desired speeds, different from each other, and pull along tubular element 10 and spider 28 (due to the engagement of catch 52), respectively. The pair of cylinders 32, 34 is driven (through gears not shown, as known per se) with a speed proportional to the speed difference between the tubular element and the spider. The rove is fed from above along the hollow tubular element 28, and is stretched by the grip of cylinders 32, 34, while it also becomes twisted by the rotation of the spider.

When fluff builds up on cylinders 32, 34, due to any cause, the increased resistance acts back on both toothed wheels 22, 44, and the spider will tend to overtake the rotation of pulley 44. The increased force acting on the catch eventually will cause a push of inclined plane 58 on follower 60, such that spring 66 will be overridden, and the catch will withdraw from recess 56. Catch 52 will slide on the periphery of toothed pulley 44 and will then meet projection 67, which will push it further away, until notch 68 engages follower 60, as shown on Fig. 3. Toothed pulley 44 will thus unlock from spider 28 and will continue its idle rotation on bearing 46, while the spider is no longer bound and will tend to adjust to the speed of the planet gear. Slide 40 can then be opened together with roller 34, and the fluff can be removed. After this, after reinserting roller 34 in its operative position, the connection between the pulley and the spider can be restored, by simply pushing catch 52 into its position shown on Fig. 2. Engagement of the catch within the recess takes place automatically with the

rotation of the spider as pulled along by the planet gear.

The automatic release device can also be implemented as an eccentric mechanism, as shown on Figs. 4 and 5, where numbers 28 and 44 still indicate the spider and the toothed pulley, respectively. An eccentric 70 is journaled on a pivot 72 rising on the periphery of the spider, parallelly to the axis of the spider, and having a maximum radius equal or slightly larger of the distance from pivot 72 to the periphery of drive pulley 44. A projection or lever 74 extends from the eccentric, and an abutment pin 76 is carried by the spider for abutment of the lever.

When eccentric 70 is pushed to the position shown on Fig. 4, it will become wedged against the surface of toothed pulley 44, and the torque exchanged between the pulley and the spider will promote the wedging, thus assuring the engagement between the driving member and the driven member. Abutment of lever 74 against pivot 76 insures that the eccentric, as a consequence of the torque applied by pulley 44, cannot turn beyond the point of maximum pressure, which would inappropriately unlock the spider from the pulley. However, when the fluff build-up slows down the rotation of the planet gears and tends to drag the spider to the speed of tubular member 10, the spider will tend to overtake the rotation of pulley 44, and will cause unwedging of the eccentric and unlocking of the members, as shown on Fig. 5.

A third embodiment of the automatic release device is shown on Figs. 6 to 9, where parts corresponding to Fig. 1 are referenced with the same reference numbers. In this embodiment, a torsion bar 80 extends within a longitudinal cavity in the wall of spider 28, with an end fastened to a block 82 which is held in place by a screw 84 acting eccentrically in order to allow adjustment. The free end of torsion bar 80 carries a ferrule 86 adjacent toothed pulley 44. A catch 88 similar to catch 52 of Fig. 1 is pivoted on the ferrule, around an axis radial to spider 28, and accommodated in an aperture 90 in the wall of the spider. The nose of catch 88 is biased by torsion bar 80 to engage in a recess 92 of toothed pulley 44, similar to recess 56 of Fig. 1. Finally, a ledge of pulley 44, adjacent to catch 88, has an inclined plane 94 (only visible in Fig. 8), in an angular position remote from recess 92, for purposes that will now be explained.

The operation of the release device of Figs. 6 to 9 is similar to that of Figs. 1 to 3. Under normal conditions, catch 88, by engaging in recess 92, maintains spider 28 integral with toothed pulley 44. When the fluff build-up increases the torque applied by the pulley to the spider, catch 88 will overcome the elastic bias applied by torsion bar 80, and will open radially outwards, disengaging

from recess 92 and sliding on the smooth surface of pulley 44, until it meets with inclined plane 94, which causes it to rotate downwards (see Fig. 8) around its radial pivot, in order to prevent it from again meeting with recess 92 during the next turn of the toothed pulley.

Once the fluff has been removed, catch 88 may be manually shifted back to the position of Fig. 6, by acting upon it thru aperture 90.

The invention also provides means to prevent slivers from building up in the housing and on cylinders 32, 34, and to cooperate with the automatic spider release, in order to improve the performance of the stretch device by reducing the build-up of fluff.

Again with reference to Fig. 1, slide 40 has a rubber lip scraper 100, grazing on fluted cylinder 32. The scraping action of the rubber lip peels off any dead slivers sticking to the cylinder, and which might start fluff formation. The scraped slivers can be hurled out of the housing by centrifugal force, thru a window 102 opened in the wall. The housing is thus automatically cleaned.

Optionally, a second sliver-ejection window (not shown) could be opened in the spider wall diametrically opposite window 102.

A similar rubber lip could be provided also for roller 34, with an adjacent associated window in the housing wall. Obviously the lips, rather than being mounted vertically on the slide, could be mounted horizontally on the housing walls.

The connecting means using a catch with a wound spring or a torsion bar or using an eccentric are the embodiments of the invention currently preferred, but many other embodiments of the inventive idea are possible, such as a catch biased by a leaf spring, or a ball slidable in an axial seat in the spider under spring bias, and engaging a notch in the toothed pulley. In general, any type of mechanism which is maintained in engagement by elastic means could be utilized to carry out the invention. Moreover, although the preferred mechanism is provided with means (notch 68) for holding catch 52 in an unlocked position, this is not absolutely necessary. It must be understood that the inventive idea extends to any connecting mechanism that is functionally equivalent to the ones described.

Moreover, although the invention has been described in its application to a stretch and pre-twist device with separate drives for tubular member 10 and spider 28, it is obvious that it is applicable as well to stretch and pre-twist devices where the tubular member is stationary and only the spider is rotated.

Claims

1. A stretch and pre-twist device for continuous ring spinning machines, comprising a tubular member (10) for passage of the thread or rove, a spider (28) rotatably supported with respect to said tubular member and carrying a pair of stretch cylinders (32, 34), and a drive pulley (44) supported coaxially with the spider, characterized in that the drive pulley is rotatable with respect to the spider, and first and second cooperating connecting means (52, 56; 88, 92), which are supported on the spider (28) and on the drive pulley (44), respectively, are biased in mutual engagement, in order to make fast the drive pulley with the spider, by elastic means (60, 66; 80) adapted to yield for unlocking said first and second connecting means from each other when a predetermined torque between the spider and the drive pulley is exceeded.
2. The stretch and pre-twist device of Claim 1, characterized in that said connecting means are provided with manually overridable retaining means (68), adapted to maintain the connecting means in an unlocked condition against the action of said elastic means.
3. The stretch and pre-twist device of Claim 1 or 2, characterized in that said first connecting means comprise a first mechanical member (52) movable on the spider between a first and a second position, and biased to said second position by the action of elastic means (60, 66), and said second connecting means comprise a second mechanical member (56) integral with the drive pulley and adapted to engage with the first mechanical member when the latter is in its second position.
4. The stretch and pre-twist device of Claim 1 or 2, characterized in that said second connecting means comprise a first mechanical member movable on the drive pulley between a first and a second position, and biased to said second position by the action of elastic means, and said first connecting means comprise a second mechanical member integral with the spider and adapted to engage with the first mechanical member when the latter is in its second position.
5. The stretch and pre-twist device of Claim 3, characterized in that said first mechanical member is a catch (52; 88) pivoted on the spider, and said second mechanical member is an abutment (56; 92) on the drive pulley.
7. The stretch and pre-twist device of Claim 5, characterized in that said elastic means comprises a follower (60) slidable in a seat (64) and biased by a wound spring (66).
8. The stretch and pre-twist device of Claim 5, characterized in that said elastic means comprises a torsion bar (80) connected between the spider (28) and the catch (44).
9. The stretch and pre-twist device of Claim 8, characterized in that said torsion bar (80) is longitudinally disposed.

dinally accommodated in a housing of the spider.

10. The stretch and pre-twist device of Claim 9, characterized in that the catch (88) is linked to the torsion bar (80) around an axis radial to the spider, the toothed pulley has an inclined plane (94) for deflecting the catch when the toothed pulley disengages from the spider. 5

11. A stretch and pre-twist device for continuous ring spinning machines, comprising a tubular member (10) for the passage of the thread or rove, a spider (28) rotatably supported with respect to said tubular member and carrying a pair of stretch cylinders (32, 34), characterized in that the spider is rotatable with respect to the drive pulley and carries an eccentric (70) rotatably linked around an axis parallel to the axis of the spider and adapted to wedge against a smooth area of the drive pulley. 10 15

12. The stretch and pre-twist device of Claim 11, characterized in that the spider further has an abutment (75) and said eccentric (70) has an integral tooth (74) adapted to abut against said abutment when the eccentric becomes wedged against the smooth area of the drive pulley. 20

13. A stretch and pre-twist device for continuous spinning machines, comprising a tubular member (10) for the passage of the thread or rove, a spider (28) rotatably supported with respect to said tubular member and carrying a pair of stretch cylinders (32, 34), characterized in that it further comprises at least one scraper (100) mounted in the housing and grazing on at least one of said stretch cylinders. 25 30

14. The stretch and pre-twist device of Claim 13, characterized in that said scraper (100) is mounted on the slide (40). 35

15. The stretch and pre-twist device of Claim 13 or 14, characterized in that it includes a scraper (100) associated to each of said cylinders (32, 34). 40

16. The stretch and pre-twist device of one of Claims 13-15, characterized in that a window (102) adjacent to each of said scrapers (100) is opened in the spider. 45 50 55

Fig. 1

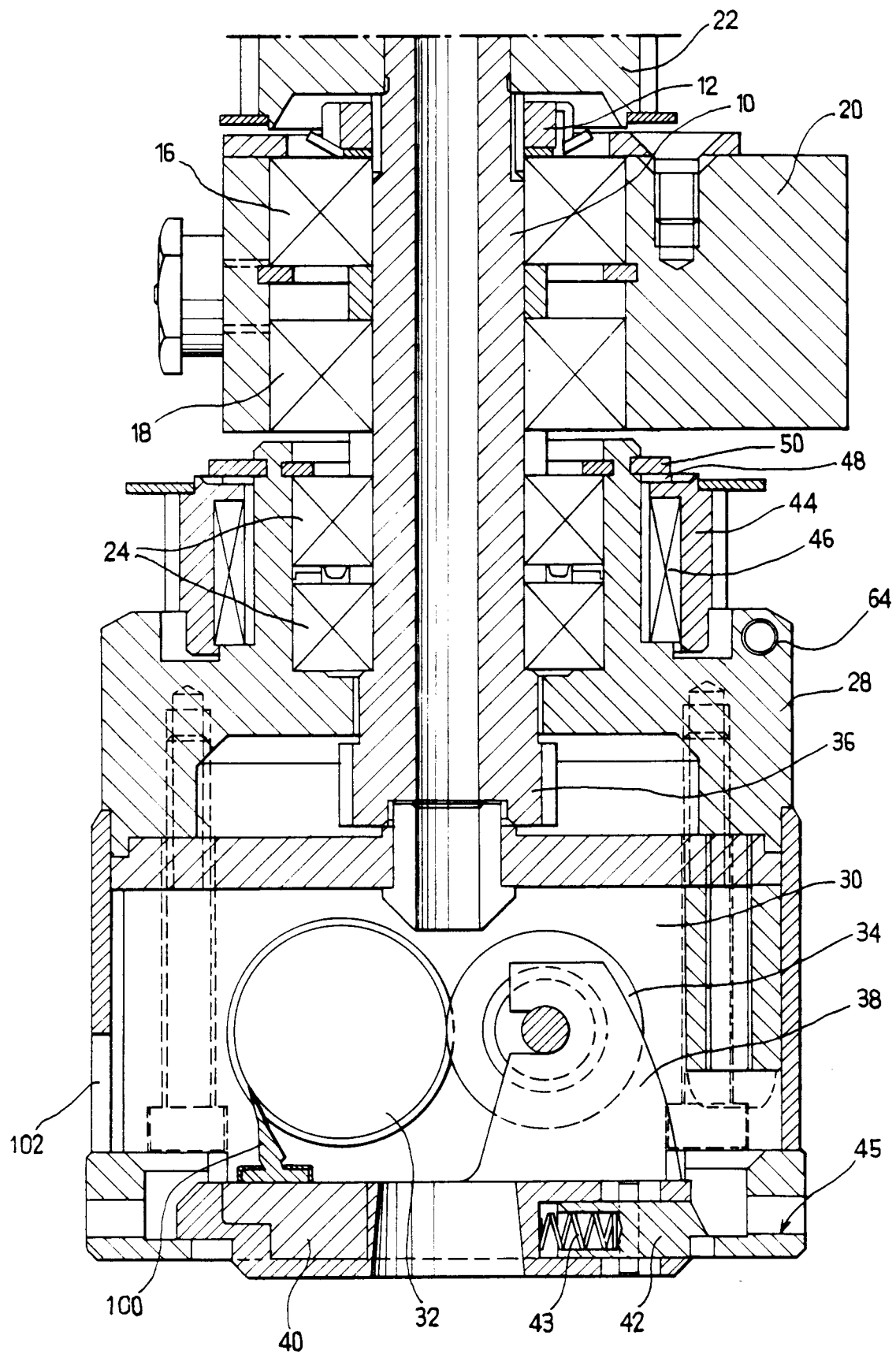


Fig. 2

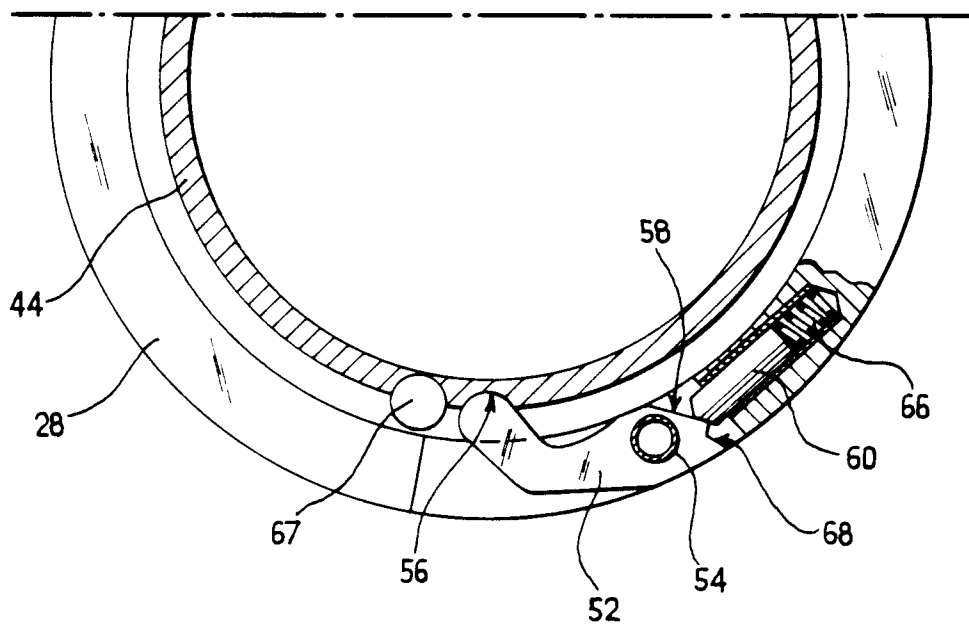


Fig. 3

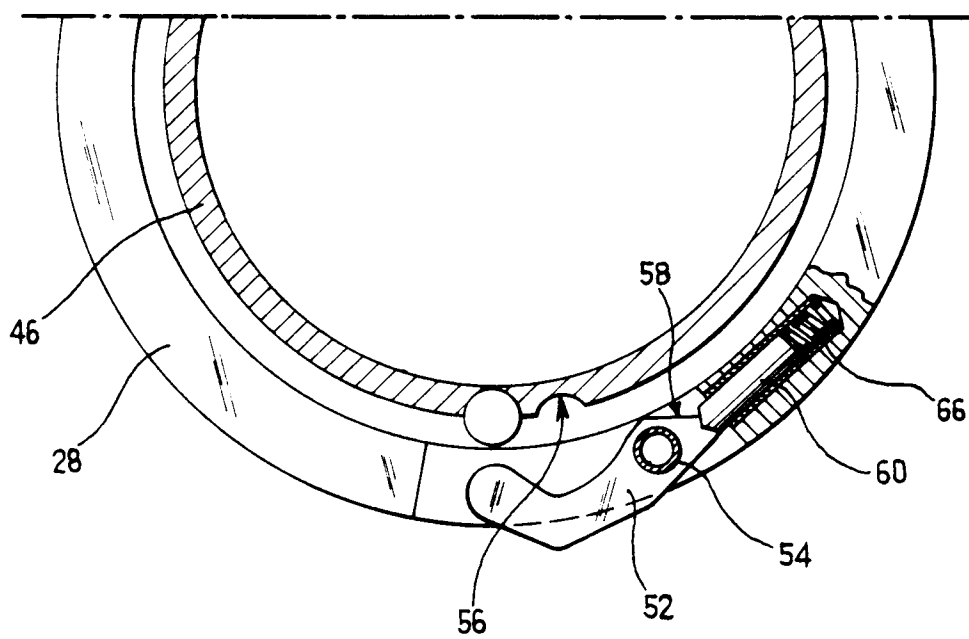


Fig. 4

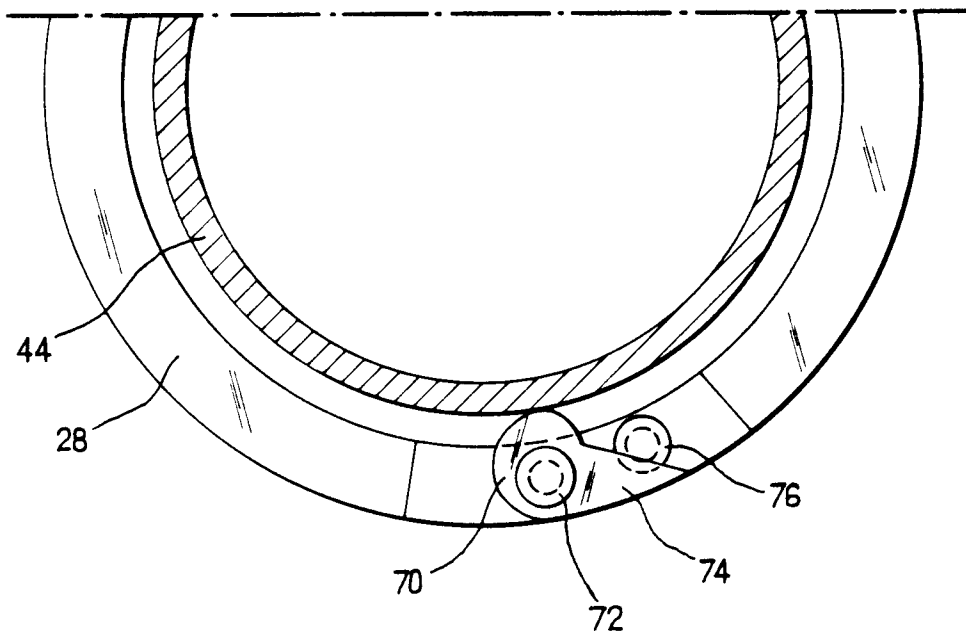
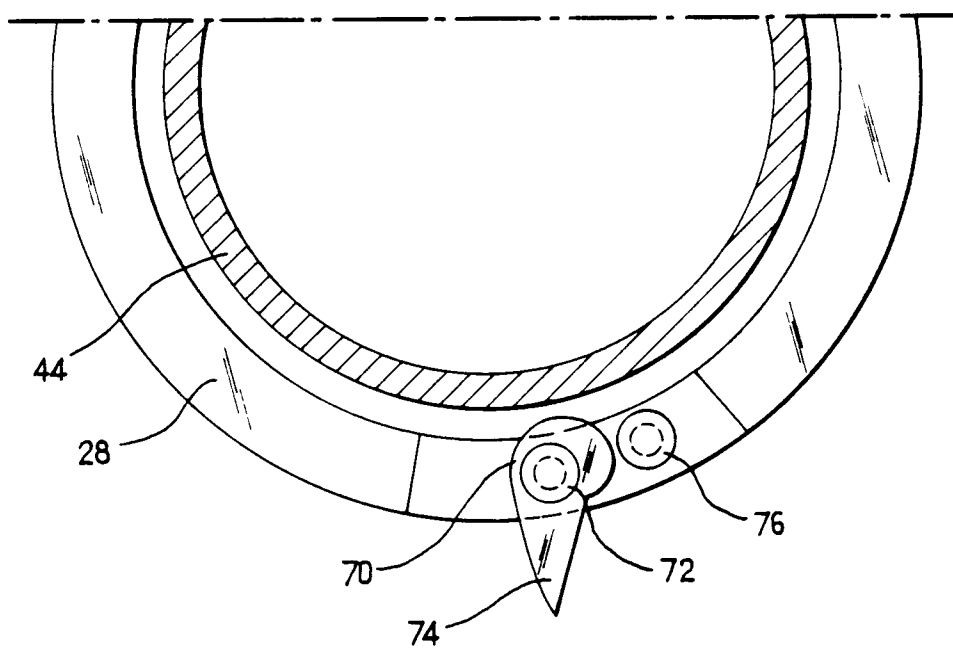


Fig. 5



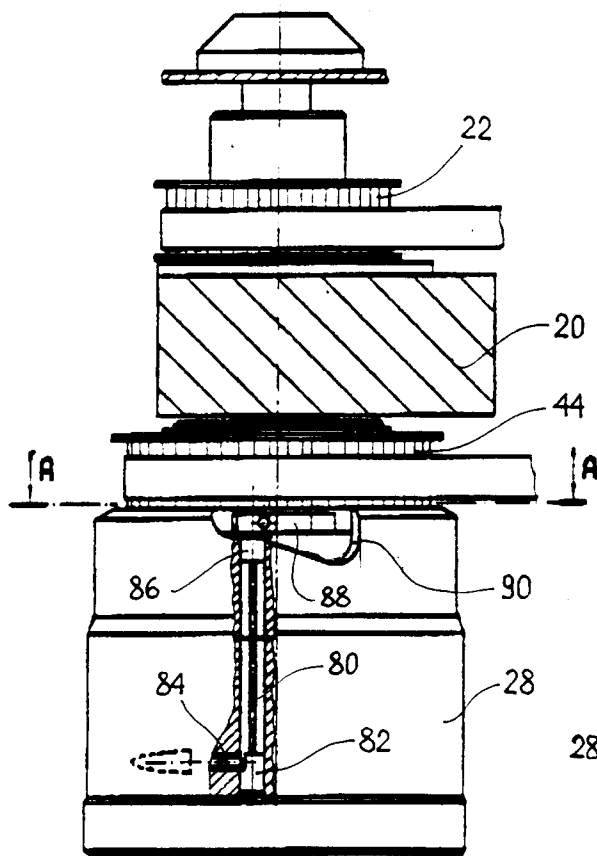


Fig. 6

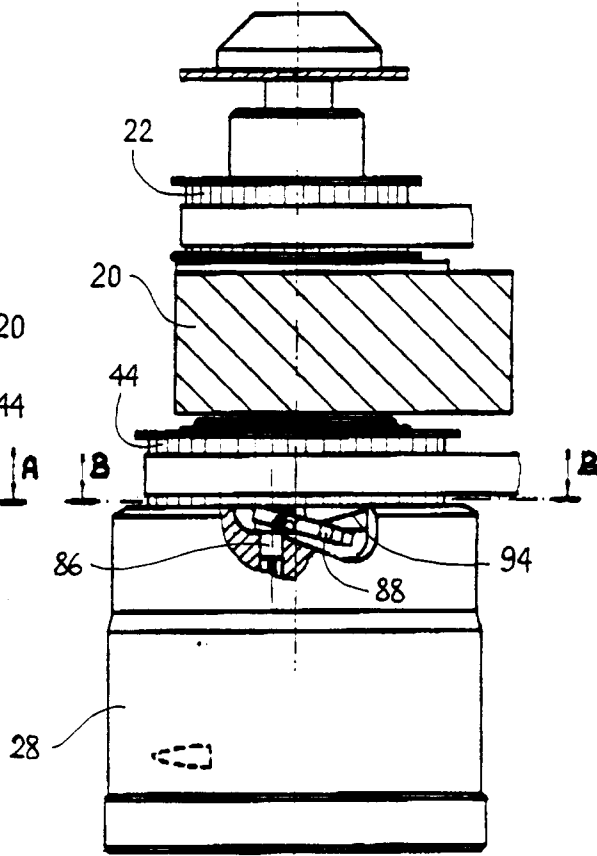


Fig. 8

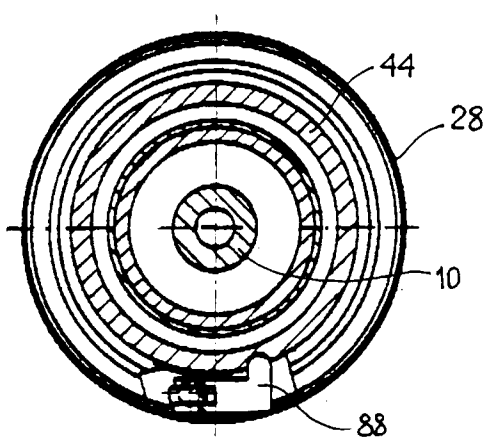


Fig. 7

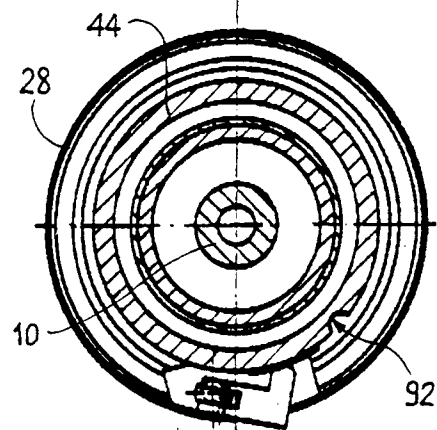


Fig. 9



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Application Number

EP 92 20 0507

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.5)
A	DE-A-2 934 867 (SCHLAFHORST) * the whole document *	1, 11	D01H7/92
X	GB-A-699 119 (CHLUPACEK) * page 3, line 16 - line 32; figure 1 *	13, 15	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D01H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 JUNE 1992	Examiner RAYBOULD B. D. J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			