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**EUROPEAN PATENT APPLICATION**

21 Application number: 83830090.3

51 Int. Cl.<sup>3</sup>: **D 04 B 9/10**

22 Date of filing: 04.05.83

30 Priority: 21.05.82 IT 8339582

43 Date of publication of application:  
30.11.83 Bulletin 83/48

84 Designated Contracting States:  
DE FR GB

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54 Improved cylinder with rotating sleeve to prevent twisting on circular knitting machines.

57 Improved cylinder (10) with rotating sleeve to prevent twisting on circular knitting machines, and advantageously on circular machines for stockings, whereby said cylinder (10) comprises an inner sleeve (19) rotating in cooperation with the part of the cylinder (10) which knits, and whereby said sleeve (19) is supported at its upper end by the sinker ring (12) and said sinker ring (12) in its turn is supported by the needle cylinder (11), and whereby means for the vertical adjustment of the sinker ring (12) and also means able to hinder the vertical raising of said ring (12) are envisaged.

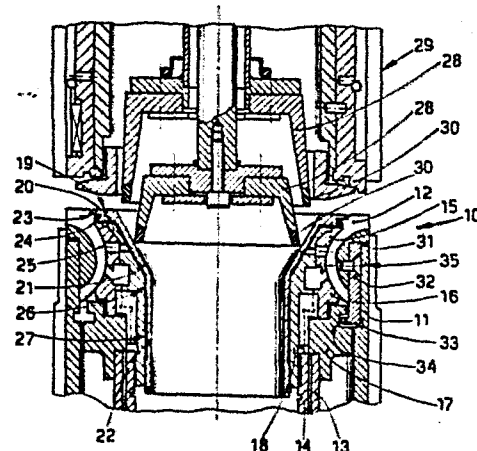


fig.1

1. Description of the invention entitled:  
 "IMPROVED CYLINDER WITH ROTATING SLEEVE TO PREVENT TWISTING  
 ON CIRCULAR KNITTING MACHINES"  
 in the name of OFF. SAVIO S.p.A. at Pordenone

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This invention concerns an improved cylinder with rotat-  
 ing sleeve to prevent twisting on circular knitting machines.  
 10. and, in particular, on circular machines for stockings.

It is known that, above all on circular machines for sto-  
 ckings, the fabric produced becomes twisted during the  
 processing, that is to say, the rows of stitches formed leng-  
 thwise take on a spiral development, which is caused partly  
 15. by the twisting of the yarn, partly by the knitting action of  
 the needles and partly by the friction applied to the fabric  
 itself by the inner portion of the cylinder through which the  
 formed fabric passes.

Said friction is developed because in the known art  
 20. the part of the cylinder which does the knitting and which  
 consists of the needle cylinder and sinker ring rotates and  
 takes with it the fabric formed, whereas the inner part of  
 the cylinder comprising the sinker cams and the elements bear-  
 ing said cams is stationary and is in contact with the formed  
 25. fabric through an inner bush solidly fixed to said bearing

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0095445

1. elements, the fabric sliding on said inner bush.

Said friction is considerably accentuated when the machine employs a system to pull the fabric which envisages elements cooperating with said stationary bush, such as a pair of scoop elements rotating substantially in step with the cylinder and gifted with an alternating axial motion which brings the periphery of each scoop element alternately into contact with the fabric, which is interposed between the funnel-shaped portion of said stationary bush and the periphery of said scoop elements, whereby said fabric is thrust axially by the scoop elements, which thus produce the desired action.

The twisting of the fabric due to the aforesaid factors is corrected by a pressing operation thereafter; the greater the twisting of the fabric, the more carefully the pressing operation has to be performed.

The main purpose of our invention is to embody an improved cylinder for circular knitting machines which is especially suitable for machines making hosiery and which has constructional lay-outs that enable the unfavourable friction between the fabric and the inner part of the cylinder to be eliminated so as to lessen considerably the times employed in the pressing operation.

Our invention also proposes further improvements concerning the part of the cylinder which carries out the knitting work.

At the present time, if the sinker nib or butt is broken or the sinkers have to be changed, the work in replacing one or more sinkers is relatively delicate and burdensome in that there is a risk that the sinker ring may be displaced from its correct alignment on the cylinder.

Furthermore, with the cylinders now existing there is a possibility that the intrinsic dust of the yarn and dirt in

0095445

1. general may be introduced between the sinker ring and the upper sinker cams, thereby leading to shortcomings in the working of the machine.

Our invention aims to eliminate or lessen the aforesaid problems and shortcomings by adopting specific means and suitable technical lay-outs.

The invention is therefore embodied in an improved cylinder with a rotating sleeve to prevent twisting on circular knitting machines, and advantageously on circular machines for stockings, said cylinder being characterized by comprising an inner sleeve rotating in cooperation with the part of the cylinder that performs the knitting, whereby said sleeve cooperates at its upper end with the sinker ring through supporting means, and whereby supporting means and means for the vertical setting of the sinker ring are envisaged on the needle cylinder, and whereby means are included which can hinder the vertical displacement of said sinker ring from its position of alignment on the needle cylinder.

The invention visualises supporting means and means for the coupling of said inner sleeve to the sinker ring, said means consisting respectively of a supporting surface obtained by making an annular cutaway portion on the upper surface of the sinker ring, and of an O-ring located between the sinker ring and the edge of the inner rotating sleeve which faces said sinker ring.

In the preferential embodiment of the invention said O-ring has the twofold task of setting and keeping in rotation said inner sleeve during the operation of the knitting portion of the cylinder and also, in cooperation with the surface 23, of preventing the entry of dust and dirt between the sinker ring and the inner rotating sleeve.

Moreover, according to the invention the sinker ring is upheld not by fixed organs such as the cams of the sinkers,

0095445

1. but by the needle cylinder rotating with and solidly fixed to  
. said sinker ring, which is adjusted vertically by shim means .  
. which can be inserted between the sinker ring and the surface  
. of the cylinder that supports said sinker ring.

5. Furthermore, in the preferential embodiment of the inven-  
. tion the means able to hinder the vertical displacement of .  
. the sinker ring when one or more sinkers are being changed .  
. consist of a prong cooperating with a circumferential groove .  
. made in the stationary tubular element of the cylinder, said  
10. prong being envisaged at the lower end of the tongue which is  
. solidly fixed to the sinker ring and is located between the .  
. needle cylinder and said sinker ring so as to set the latter .  
. in rotation.

. According to a variant of the invention the inner rotat-  
15. ing sleeve is not engaged with the knitting portion of the .  
. cylinder but rotates at an adjustable speed of rotation lower  
. or higher than or the same as the speed of said knitting port-  
. ion owing to the action of drive means cooperating with the .  
. lower part of the rotating sleeve stretching along the lower  
20. cylinder of the machine.

. According to said variant it is possible to control ad-  
. vantageously, to suit specific requirements, the friction de-  
. veloped between the rotating sleeve and the fabric owing to .  
. the different speed of rotation of said sleeve as compared to  
25. the knitting portion of the cylinder and to the system for .  
. pulling the fabric.

. We shall give hereinafter the description of the impro-  
. ved cylinder according to the invention with the help of the .  
. attached table, wherein:-

30. Fig. 1 shows the preferential embodiment of the cylinder co-  
. operating with a pulling system of scoop elements of .  
. the type described hereinbefore;

. Fig. 1a shows a detail of the zone of the coupling of the ro-

0095445

1. rotating sleeve to the sinker ring;

.Fig.2 shows a variant of the invention.

. With reference to the Table, the improved cylinder 10 of  
. the invention has a knitting portion consisting of the outer  
5. cylinder 11 bearing the needles and of the ring 12 bearing  
. the sinkers, and a stationary portion consisting of a central  
. tubular element 13, an inner tube 14 coaxial with said tubul-  
. ar element 13, the upper 15 and lower 16 cams of the sinkers,  
. said cams 15 and 16 being lodged in a seating formed by the  
10. upper end 17 of said central tubular element 13, and of an  
. inner bush 18 screwed onto said tube 14.

. According to the invention an inner sleeve 19 is envisa-  
. ged which is coaxial with the cylinder 10 and rotates substan-  
. tially in step with the knitting portion of the cylinder 10;  
15. said inner sleeve 19 cooperates at its upper end with the sin-  
. ker ring 12 and stretches downwards so as to cover the inner  
. bush 18 fully.

. Said sleeve 19 has a substantially flat portion 20 along-  
. side the sinker ring 12, a middle funnel-shaped portion 21  
20. and a lower tubular portion 22.

. Said inner rotating sleeve 19 is upheld on a supporting  
. surface 23 obtained by making an annular cutaway part on the  
. inner portion of the surface of the sinker ring 12.

. In the preferential embodiment of the invention shown in  
25. Fig.1 and according to the detail of Fig.1a an O-ring 24 is  
. visualized as being lodged in a circumferential groove 25 on  
. the upper edge of the sleeve 19 facing the sinker ring 12;  
. when the rotating sleeve 19 is being fitted, said O-ring 24  
. is forced against the sinker ring 12, which is provided with  
30. a connecting surface 12' with a slight taper that tends to  
. keep the rotating sleeve 19 anchored to the sinker ring 12 be-  
. low an inducting bevel 12" made to assist installation. The  
. mechanical union of said two elements is thus insured.

0095445

1. Moreover, the O-ring 24 has the twofold task of anchor-  
ing the inner sleeve 19 solidly to the sinker ring 12 and, in  
cooperation with the surface 23, of preventing the entry of  
dust or dirt which may cause difficulties during working, be-  
5. tween said two elements 12-19.

The tubular portion 22 of said inner rotating sleeve 19  
has on its periphery the sliding surfaces 26 cooperating with  
the inner surface 27 of the bush 18 so as to provide further  
assurance of the guiding and alignment of the sleeve 19.

10. According to the invention the employment of the rotat-  
ing sleeve 19 entails full elimination of unfavourable frict-  
ion of the fabric against the cylinder 10 and thereby the eli-  
mination of the permanent twisting of the fabric caused by  
said friction.

15. This is particularly advantageous whenever the machine  
uses a fabric-pulling system which accentuates the friction  
of the fabric against the cylinder 10, as shown, for instance,  
in the attached table wherein the pulling of the fabric is ob-  
tained with a pair of scoop elements 28 envisaged within the  
20. upper cylinder 29 and rotating substantially in step with  
the cylinder 10 and gifted with an alternating axial motion  
out of phase as between one scoop element 28 and the other,  
whereby said motion brings the periphery 30 of each scoop ele-  
ment 28 alternately into contact with the fabric moving with-  
25. in the cylinder 10, thus producing the desired pulling action  
on the fabric cooperating with the knitting portion of the  
cylinder.

In this case the pressure exerted by the scoop elements  
28 on the rotating sleeve 19 is discharged on the surface 23.  
30. supporting the rotating sleeve 19 and envisaged on the sinker  
ring, thus cooperating helpfully in keeping said rotating sle-  
eve 19 in rotation.

Furthermore, according to the invention the sinker ring.

Gilberto Petraz

0095445

1. 12 is supported, not by the sinker cams 16, but by the needle  
. cylinder 11 through interchangeable shims 31 placed between  
. the needle cylinder 11 and the surface of the sinker ring 12.  
. supporting the same on the needle cylinder 11, whereby said  
5. shims 31 enable the vertical position of said sinker ring 12.  
. to be adjusted.

. The sustaining of the sinker ring 12 by the needle cylin-  
. der 11 makes it possible to prevent the weight of the sinker.  
. ring 12 itself and the pressure produced by the pulling act-  
10. ion from burdening the curved surfaces of the lower sinker  
. cams 16 and thereby to avoid shortcomings during rotation of  
. the sinker ring 12 in relation to the stationary sinker cams.

. According to the invention a further improvement of the  
. cylinder 10 is intended to facilitate the replacement or ex-  
15. change of one or more sinkers and consists in embodying a ton-  
. gue 32 to couple the sinker ring 12 to the needle cylinder 11,  
. whereby said tongue 32 is solidly fixed to the sinker ring 12  
. and has at its lower end a prong 33 cooperating with a circum-  
. ferential groove 34 envisaged on the upper end 17 of the cen-  
20. tral tubular element 13.

. When one or more sinkers are being replaced and the butt  
. of the sinker has to be able to pass, it is necessary to un-  
. screw the tube 14 that secures the inner bush 18 and then to  
. raise the upper sinker cam 15.

25. At the present time the machine operator has to devote  
. much care and attention to said operation since there is a  
. risk that the sinker ring 12, which is only resting on the  
. needle cylinder 11, will rise together with the inner bush 18  
. and upper cams 15, thereby hindering the removal of the sink-  
30. er.

. But in the case of the cylinder 10 of our invention this  
. risk does not exist since the prong 33 of the tongue 32, which  
. is secured to the sinker ring 12 with screw fixture means 35,

0095445

1.prevents this rising action as it is engaged in the circumfe-  
rential groove 34 envisaged on the tubular element 13.

According to a variant of the invention the inner rotat-  
ing sleeve 19 is not engaged with the knitting part of the  
5.cylinder 10 but rotates at<sup>a</sup> speed of rotation which may be the  
same as or higher or lower than that of said knitting part  
and which can be regulated by actuation means 36 cooperating  
with the lower part of the rotating sleeve 19 stretching along  
the lower cylinder of the machine, as shown in the non-restric-  
10.tive example of Fig.2.

According to said variant it is thus possible to control,  
so as to suit the specific requirements, the friction develop-  
ed between the rotating sleeve 19 and the fabric owing to the  
difference between the speed of rotation of said sleeve 19  
15.and the speed of rotation of the knitting part of the cylin-  
der and of the system that pulls the fabric.

In this way it is possible to impart to the fabric a twi-  
sting which can cancel or be added to the twisting caused by  
the torsion of the yarn itself and by the knitting action of  
20.the needles, depending on whether it is wished to eliminate  
the twisting of the fabric wholly or to accentuate said twist-  
ing for reasons tied to the fabric design to be obtained.

We have described herein a preferential embodiment of  
the invention and also a variant, but further variants are  
25.possible within the scope of the Claims which follow.

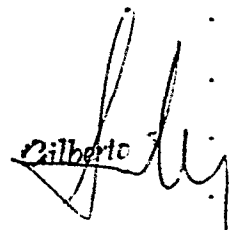
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I N D E X

- 1 .
- .
- .10. Improved cylinder .
- .11. Needle cylinder .
- 5 .12. Sinkers ring .
- .13. Central tubular element .
- .14. Tube to secure inner bush .
- .15. Upper sinker cams .
- .16. Lower sinker cams .
- 10 .17. Upper end of central tubular element .
- .18. Inner bush .
- .19. Inner rotating sleeve .
- .20. Flat portion of inner sleeve .
- .21. Funnel-shaped portion of inner sleeve .
- 15 .22. Tubular portion of inner sleeve .
- .23. Surface supporting the inner sleeve .
- .24. O-ring .
- .25. Circumferential groove to lodge O-ring .
- .26. Alignment surfaces of rotating sleeve .
- 20 .27. Surface of inner bush .
- .28. Scoop elements to pull the fabric .
- .29. Upper cylinder .
- .30. Periphery of scoop elements .
- .31. Interchangeable shims .
- 25 .32. Coupling tongue .
- .33. Prong of coupling tongue .
- .34. Circumferential groove to lodge the prong .
- .35. Means to secure the tongue .
- .36. Means to drive the rotating sleeve. .

30 .

*Gilbert*



C L A I M S

1. Improved cylinder (10) with rotating sleeve to prevent twisting on circular knitting machines, and advantageously on circular machines for stockings, characterized by comprising an inner sleeve (19) rotating in cooperation with the part of the cylinder (10) that knits, whereby said sleeve (19) is sustained at its upper end by the sinker ring (12), which in its turn is borne by the needle cylinder (11), and whereby means for the vertical setting of the sinker ring (12) and also means able to hinder the vertical raising of said sinker ring (12) are envisaged.

2. Improved cylinder (10) with rotating sleeve to prevent twisting as in Claim 1, characterized by the fact that said sleeve (19) is solidly fixed to the part of the cylinder (10) that knits, and rotates in step with said knitting part, whereby means to couple together the sinker ring (12) and said sleeve (19) are visualised.

3. Improved cylinder (10) with rotating sleeve to prevent twisting as in Claims 1 and 2, characterized by the fact that said coupling means consist of an O-ring (24) located between the sinker ring (12) and the edge of the inner rotating sleeve (19) which faces said sinker ring (12).

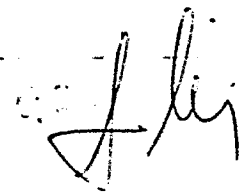
4. Improved cylinder (10) with rotating sleeve to prevent twisting as in Claim 1, characterized by the fact that the inner rotating sleeve (19) is engaged with the knitting part of the cylinder (10) and rotates at a speed the same as or higher or lower than that of said knitting part, said speed being regulated by drive means (36) cooperating with the lower part of the rotating sleeve (19) stretching along the lower cylinder (10) of the machine.

5. Improved cylinder (10) with rotating sleeve to prevent twisting as in Claim 1 and in one or another of the Claims

1. thereafter, characterized by the fact that the rotating sleeve  
(19) is supported by the sinker ring (12) by means of a sup-  
porting surface (23) obtained by making an annular cutaway  
portion on the upper surface of said sinker ring (12).

5. 6. Improved cylinder (10) with rotating sleeve to prevent  
twisting as in Claim 1 and in one or another of the Claims  
thereafter, characterized by the fact that the means for ver-  
tical adjustment of the sinker ring (12) consist of interchan-  
geable shims means (31) placed between the needle cylinder  
10 (11) and the surface of the sinker ring (12) which rests on  
said needle cylinder (11).

7. Improved cylinder (10) with rotating sleeve to prevent  
twisting as in Claim 1 and in one or another of the Claims  
thereafter, characterized by the fact that the means able to  
15 hinder the vertical raising of the sinker ring (12) consist  
of a prong (33) cooperating with a circumferential groove (34)  
made in the stationary tubular element (13) of the cylinder  
(10), whereby said prong (33) is envisaged as being at the  
lower end of the tongue (32) solidly secured to the sinker  
20 ring (12) and located between the needle cylinder (11) and  
said sinker ring (12) so as to set the latter (12) in rota-  
tion.



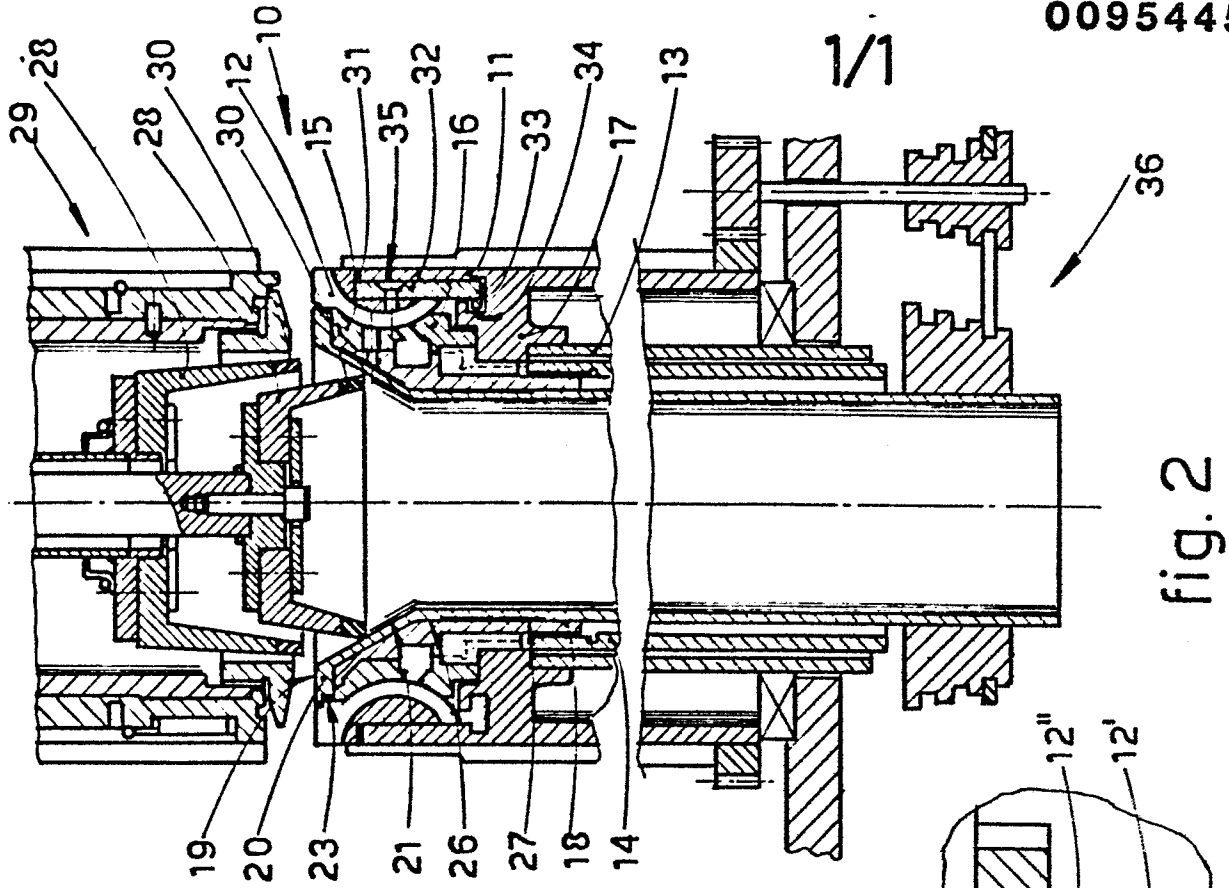


fig. 1

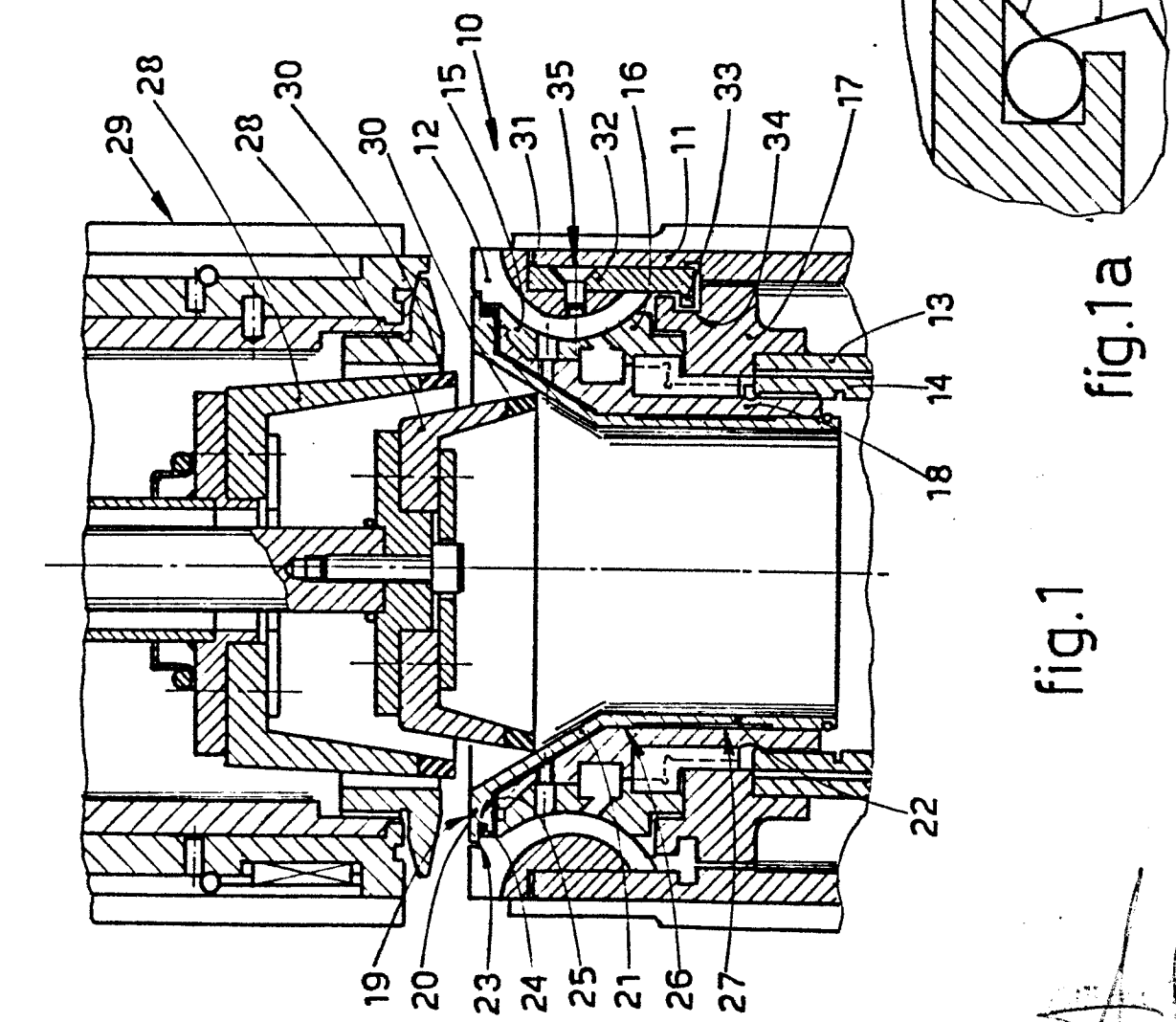


fig. 1a

fig. 2



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. <sup>3</sup> )
A	DE-B-1 030 961 (CARL MERZ) * Column 3, line 45 - column 4, line 11; figure 1 *	1,2	D 04 B 9/10
A	GB-A- 19 214 (BEALE) (A.D.1910)		
A	US-A-2 534 460 (LAWSON)		
A	US-A-2 736 177 (BRISTOW)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. <sup>3</sup> )
			D 04 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29-08-1983	Examiner VAN GELDER P.A.
CATEGORY OF CITED DOCUMENTS		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	
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			