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(54) **Printing cylinder**

(57) A printing cylinder comprises means for retaining and tensioning a printing blanket therearound, wherein one end portion of the blanket can be clamped and tensioned in a slit sleeve member (3) situated in a channel (2) in the cylinder and a shaft member (5) disposed in the sleeve member. The shaft member (5) is provided with a groove (8) and is disposed with a portion of its circumferential surface bearing against the wall of the bore of the sleeve member (3). A further portion of the circumferential surface of the shaft member (5), which portion extends as far as the groove (8) and adjoins one longitudinal edge of this groove, is so machined down, as to define with the bore wall a gap (10) of axially uniform, wedge-shaped cross-section exists. A further such sleeve member with a shaft member disposed therein and haveing the aforementioned features may be disposed in the channel parallel to the first for the purpose of clamping and tensioning the other end portion of the blanket. Alternatively, the other end portion of the blanket can be inserted into a recess in the channel and the recess then covered over. In other embodiments, shaft member 5 has cam-shaped projections or is mounted eccentrically within the sleeve.

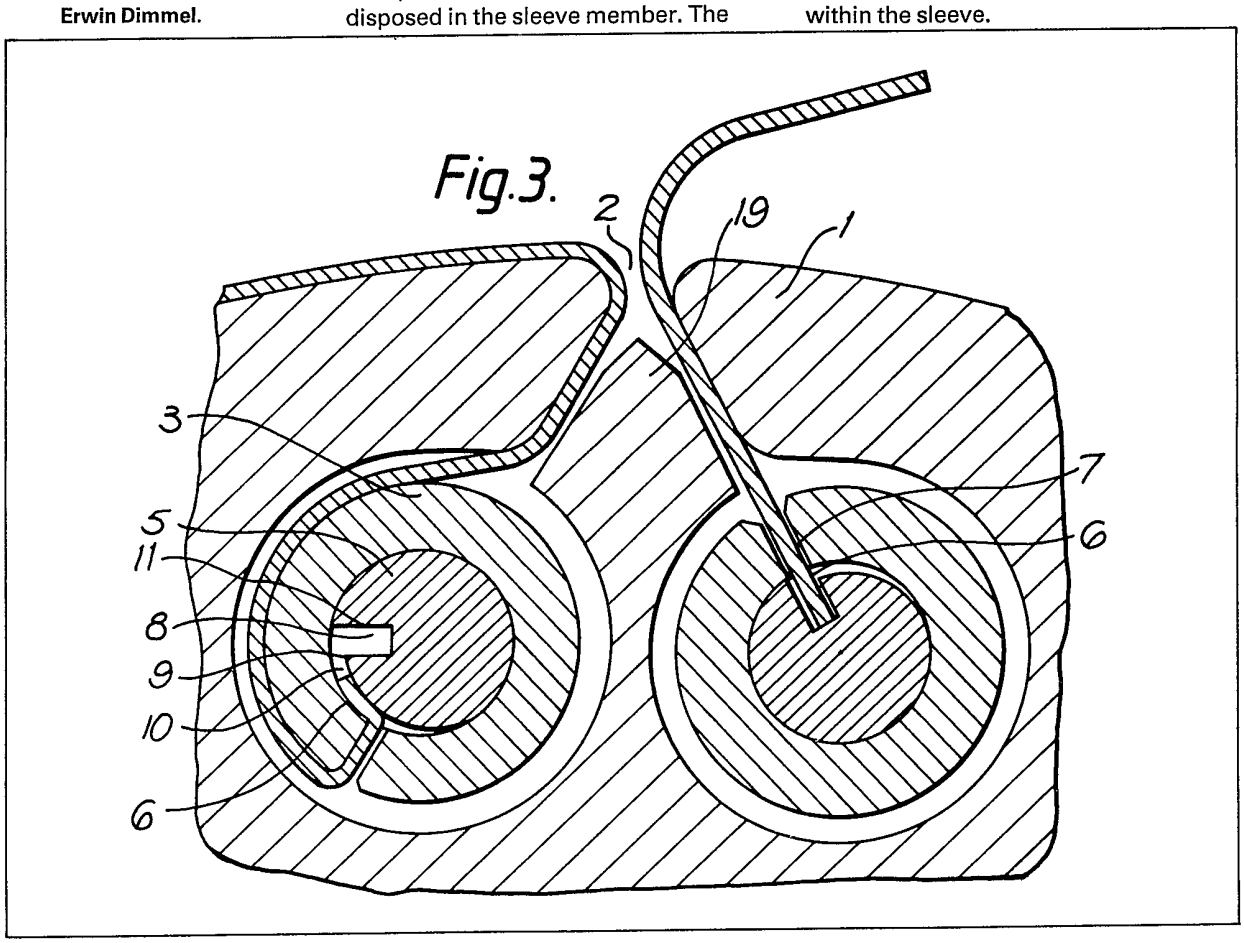

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Fig.1.

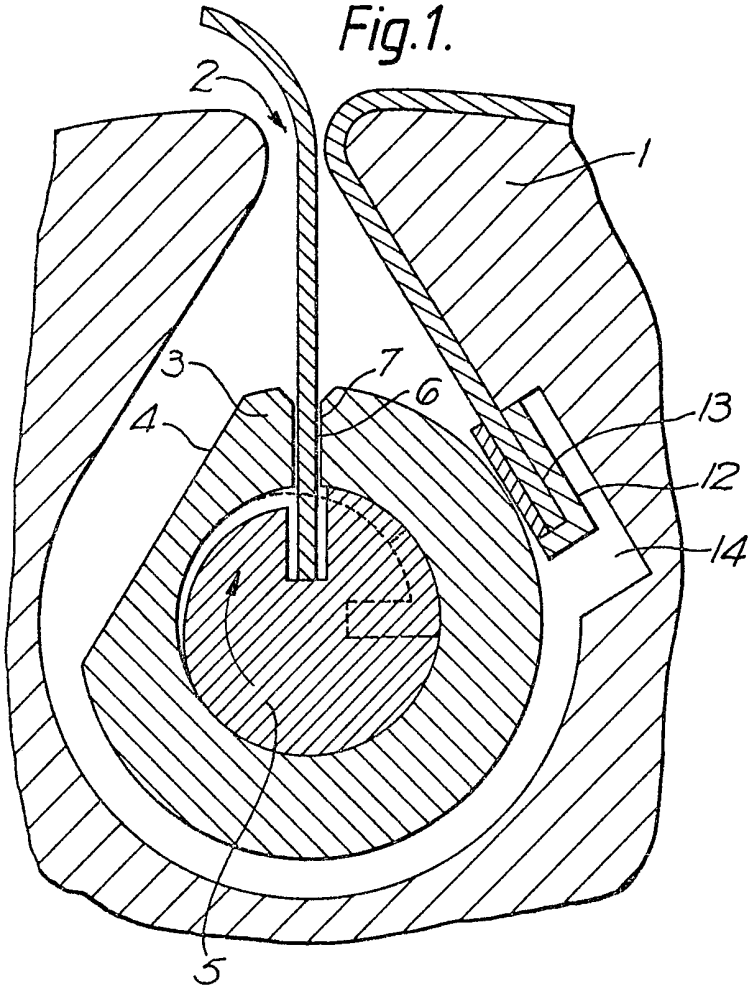


Fig.2.

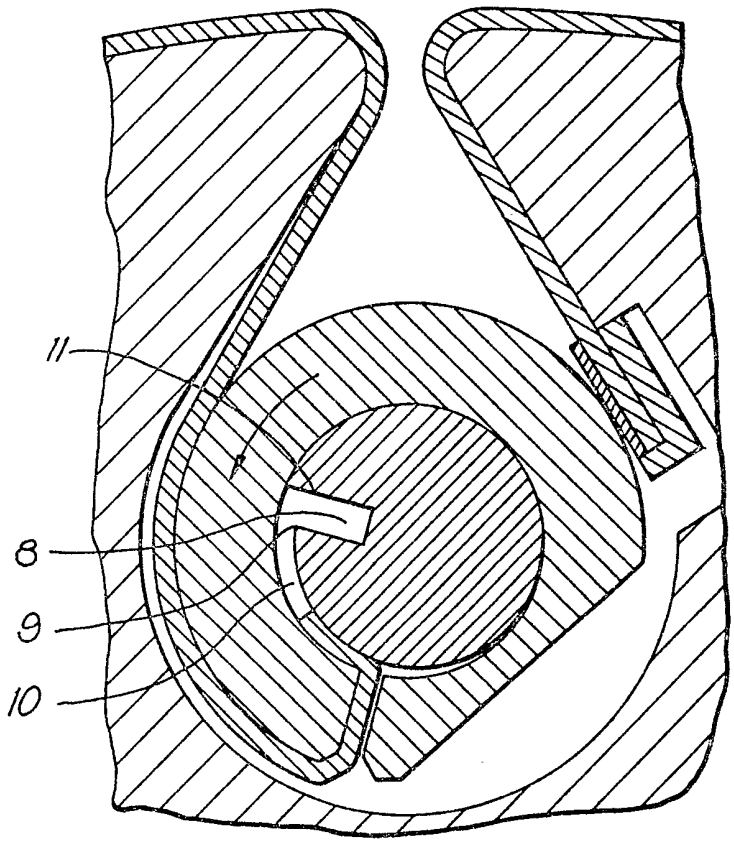


Fig.3.

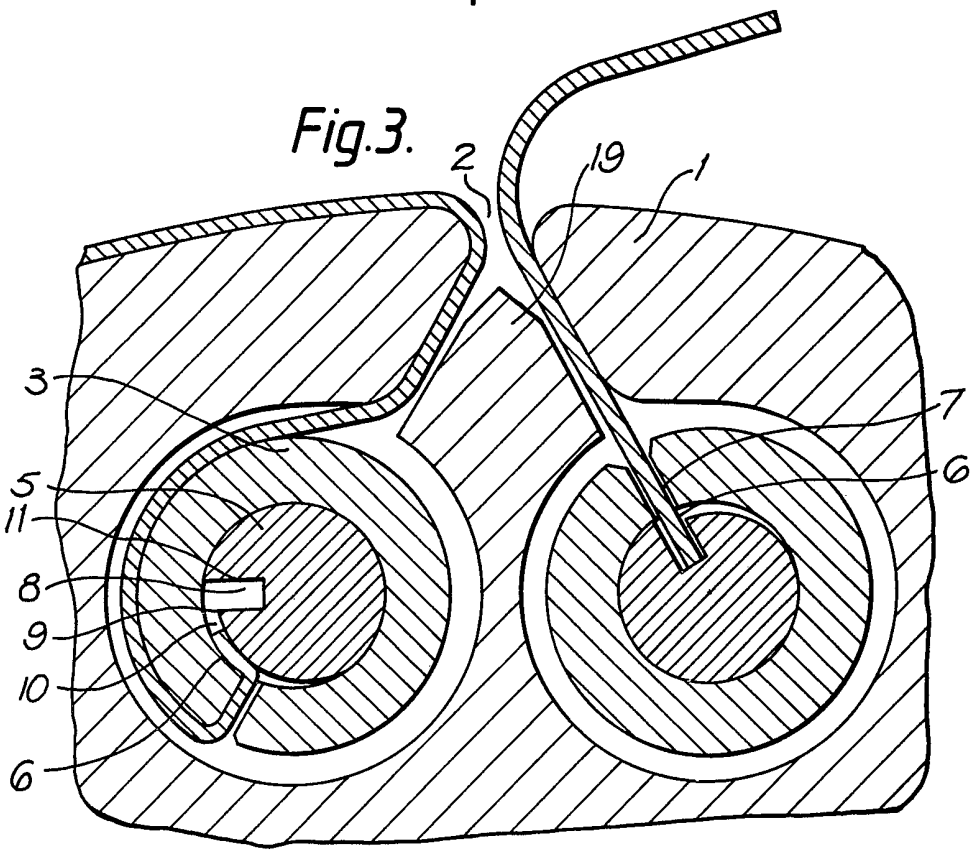


Fig.4.

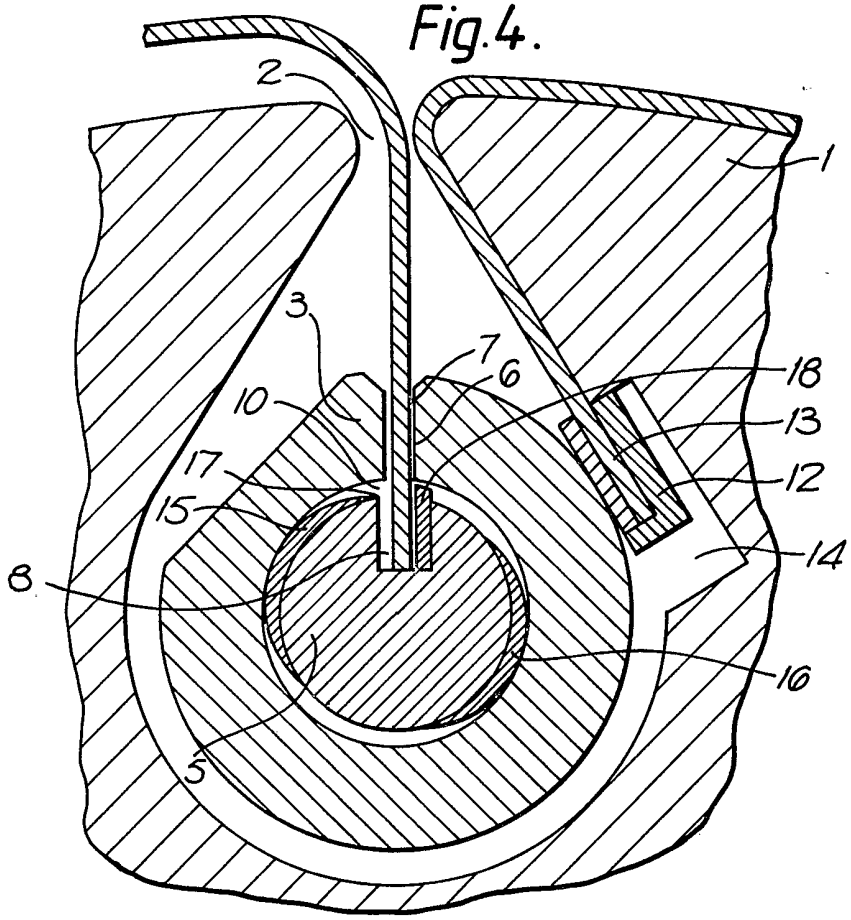
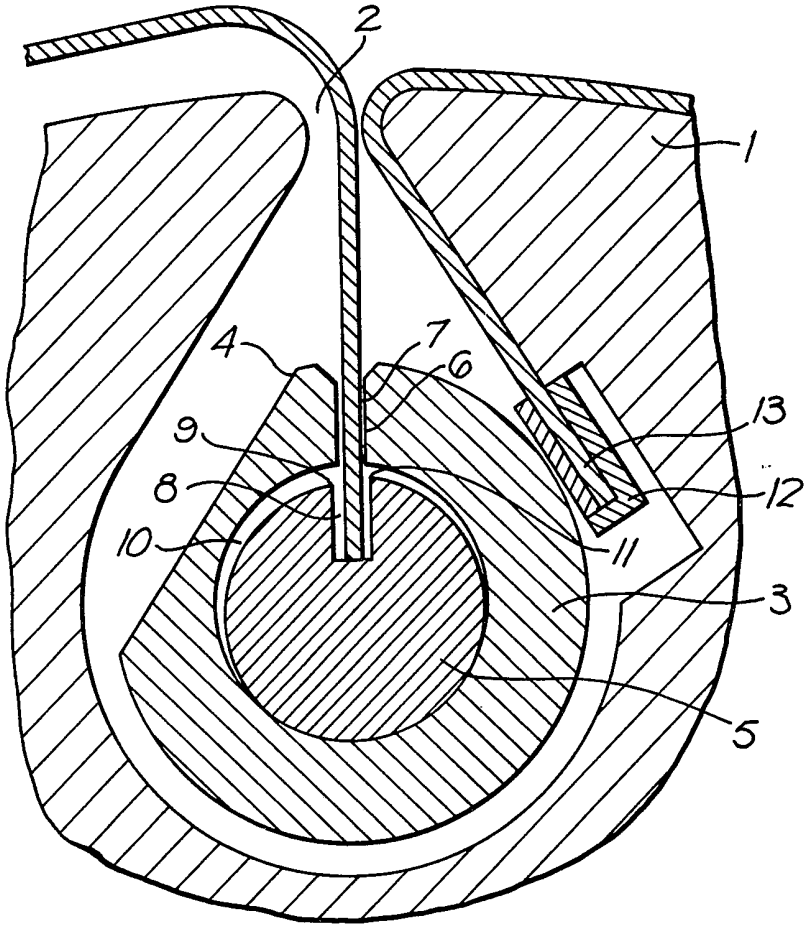


Fig.5.



SPECIFICATION

Printing cylinder

The present invention relates to a printing cylinder provided with means for retaining and tensioning a printing blanket therearound, and has particular reference to a rubber cylinder of an offset rotary printing machine.

In DD-WP 50 627 there is disclosed a blanket retaining device comprising a three times slit hollow shaft disposed in an axial bore of a channel for the reception of the blanket ends. A similarly slit shaft, centrally or eccentrically journalled therein, is provided for the purpose of pushing through an end of the blanket. The eccentric mounting of this device is not described in detail.

If, however, as proposed in DD-WP 50 627 the hollow shaft is to be mounted eccentric to the bore of the channel and the shaft eccentric to the bore of the hollow shaft, then tensioning of the blanket ends is not possible, because each shaft can be rotated only until the blanket is clamped by the eccentricity of the relevant shaft. A further rotation of the shafts in order to carry out the actual tensioning of the printing blanket is not possible.

The more fully explained concentric mounting of the two shafts relative to each other and to the bore of the channel has the disadvantage that different thicknesses of blanket cannot be used, because thinner blankets cannot be clamped in the concentric gap of uniform width, but only in the immediate kink region. The clamping action which can be achieved at these positions is not, however, sufficient for a non-slip fixing of the blanket end when the blanket is being tensioned.

If, however, in order to achieve an additional clamping effect in the gap a thicker printing blanket is used, then due to the frictional force to be ovecome in the gap when the shaft is rotated the necessary tensioning force becomes so high that in the most favourable case a more robust construction of the tensioning means would become necessary, and in the most unfavourable case the friction force can become so high that any rotation of the tensioning means is impossible.

With the named device it is not only impossible to ensure that the blanket is held without slipping, but it is also extremely difficult to remove the printing blanket end once clamped in the gap between the shaft and hollow shaft bore. The cause of this is that during changing the kinked points of the blanket do not completely reform, so that the remaining kink stays jammed during the releasing and turning back of the shaft and can be removed from this position only with considerable force.

Due to the last-named disadvantage, it is not possible to use a thicker printing blanket in order to increase the slip resistance of the blanket in the gap.

A further disadvantage of the device is that when inserting the blanket ends, a defined position of their transverse edge is not possible due to the slit shafts, so that it is only by a number of correcting clamping and tensioning operations of the blanket that it can be tensioned in the correct position on the circumferential surface of the cylinder.

The concentric gap between the wall of the bore of the hollow shaft and the peripheral surface of the shaft has the further disadvantage that no support of the shaft is present for preventing possible deflections.

It is also a drawback that a separate tensioning of one end of the blanket is possible only in the bore of the hollow shaft with the shaft of small cross-section and thus with a small tensioning travel.

If, however, the hollow shaft is used as tensioning shaft, then a separate tensioning of end of the blanket cannot be carried out, because as the hollow shaft is rotated both ends of the blanket are simultaneously pulled into the tensioning channel and thus also the end of the printing blanket, moving ahead and already tightened by the rolling action of the cylinder, is simultaneously tensioned so that a uniform distribution of tension in the blanket cannot be achieved.

There is accordingly a need for means for the retaining and tensioning of a printing blanket, particularly on a rubber cylinder of an offset rotary printing press, whereby with simple, material-saving means a printing blanket can be tensioned with a tension uniformly distributed around the circumference of the cylinder in a reliable manner. Preferably, such retaining and tensioning means should secure a blanket end in a non-slip manner and provide a usefully long tensioning travel, with accommodation for printing blankets of varying thickness. The tensioning force required should preferably be relatively low and an adversely acting deflection of parts of the retaining and tensioning means should be avoided. For preference, the end of a blanket should be capable of being laid with its transverse edge at a defined plane and, if the blanket is to be changed, of being easily removed.

According to the present invention there is provided a printing cylinder provided with means for retaining and tensioning a printing blanket therearound, the retaining and tensioning means comprisng a sleeve member rotatably disposed in a channel open at the periphery of the cylinder and provided in its wall with a longitudinal slot, and a shaft member rotatably disposed in the bore of the sleeve member and provided with a longitudinal groove for receiving one end portion of such blanket inserted therein by way of the slot and the channel, the shaft member being so arranged that a portion of its circumferential surface bears against the wall of the bore and a further portion of said surface adjoining the groove at one longitudinal edge thereof is so spaced from the wall of the bore as to define therewith a substantially wedge-shaped recess for reception and retention therein of said end portion of the blanket on relative rotation of the sleeve and shaft members, and the sleeve member being rotatable together with the shaft member to draw the blanket into the channel for tensioning thereof, means being provided for retaining the other end portion of the blanket.

Depending on requirements, the other end portion of the blanket can be furnished with a batten, which can be laid into a coverable recess of the channel.

Altlernatively, the other end portion of the blanket can be retained and tensioned in the channel in the same manner as the first-mentioned end portion of the blanket.

In a preferred embodiment, the shaft member is disposed in a singly slit sleeve member and bears against the wall of the bore of the sleeve member with a portion of its cylindrical surface so that bending of the shaft member is prevented. A portion of the circumferential surface of the shaft member which includes said one longitudinal edge of the groove is so machined down that a gap with an axially uniform, wedge-shaped cross-section exists between the machined-down surface portion and the wall of the bore. The longitudinal edge of the groove included in the machining-down may be lower than the other edge by somewhat more than the thickness of a printing blanket. The groove in the shaft member is preferably wider than the thickest blanket.

By means of the groove provided in the shaft member of said embodiment, the printing blanket end portion can be laid, by contrast to the known straight-through slit, against a defined plane represented by the base of the groove and the length of the end portion to be folded around can be determined. By means of the wedge-shaped gap produced by the machining-down of the shaft membe peripheral surface it is possible to clamp, in a non-slip manner, the end portion of printing blankets of varying thicknesses. A further advantage of the wedge-shaped clamping space is that, when the shaft member is rotated back relative to the sleeve member, the machined-down circumferential surface moves out of contact with the blanket end portion with increasing distance.

It is also advantageous for said one longitudinal edge of the groove to be machined down by approximately the blanket thickness. As a result, when the shaft member is rotated back, the blanket end portion situated in the gap is positively pushed by the higher part of the non-machined longitudinal groove edge back into the slot, which is of appropriate width, in the sleeve member.

Moreover, the printing blanket does not have to be tensioned by the shaft member of smaller diameter, as this shaft member only serves for clamping the blanket end portion in the bore of the sleeve member. The tensioning, or retensioning if or when desired, of the clamped end portion of the blanket is effected by the sleeve member of larger diameter, of which the slot is rounded or chamfered at both sides at the transition to the circumferential surface in order to facilitate insertion of the blanket end portion.

The other end of the blanket can optionally either be equipped with a batten and be reliably and immovably laid in a recess of the channel which can be covered by the hollow shaft, or may be clamped and tensioned in the same manner as the first. In the latter case, it would be necessary to provide a further such sleeve member and shaft member, parallel to the first, in the channel.

In another embodiment, the shaft member comprises a rod having a diameter smaller than the diameter of the sleeve member bore and provided at its circumferential surface with two cam-shaped projections opposite to each other, at least one projection bearing against the bore wall to prevent deflection. The other projection can be brought to bear, by rotation of the shaft member, against the blanket end portion so as to clamp this end portion. By means of this cam-shaped projection, there is provided between the bore wall and the shaft member a wedge-shaped gap in which the blanket end portion can be clamped with sufficient security in a non-slip manner. At the longitudinal edge of the groove opposite to the descending portion of the bearing curve of the projection, an expelling strip is mounted. By means of this expelling strip the same positive effect as with the machined-down shaft member having the raised longitudinal groove edge is achieved, namely that, as the shaft member is rotated back, the end portion of the printing blanket is simultaneously pushed back.

In yet another embodiment, the diameter of the shaft member is somewhat smaller than the diameter of the sleeve member bore and the shaft member is disposed eccentrically in the sleeve member by one half of the difference between the two diameters, the circumferential surface of the shaft member which is opposite to the groove now bearing against the wall of the bore.

With this embodiment, with approximately equivalent gap, the necessary machining-down of the circumferential surface of the shaft member can be reduced.

Embodiments of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a cross-section of part of a printng cylinder provided with a printing blanket retaining and tensioning device in accordance with a first embodiment of the invention, showing the relative positions of parts of the device for insertion of an end portion of the blanket thereof and (in dotted lines) the positions of said parts when clamping the blanket end portion;

Figure 2 is a view similar to Figure 1 but showing the parts of the device in their relative positions for tensioning of the blanket end portion;

Figure 3 is a cross-section of part of a printing cylinder provided with two printing blanket retaining and tensioning devices in accordance with a second embodiment of the invention, one of the devices being shown in the position for reception of one end portion of a blanket and the other device in the position for clamping the other end portion of the blanket;

Figure 4 is a cross-section of part of a printing cylinder provided with a printing blanket retaining and tensioning device in accordance with a third embodiment; and

Figure 5 is a cross-section of part of a printing cylinder provided with a printing blanket retaining and tensioning device in accordance with a fourth embodiment.

Referring now to the drawings, there is shown in Figures 1 and 2 part of a printing cylinder 1 provided with a channel 2 at its circumference and with a

device arranged in the channel for retaining and tensioning a printing blanket end portion 6. The device consists of a sleeve member 3 provided at its circumferential surface with a plain flat face 4, at least of printing blanket width, and of a shaft member 5 journalled in the bore of the sleeve member. The two members 3 and 5 are rotatably mounted (not shown) at the ends on the cylinder 1 and can be rotated by means (not shown) at the cylinder ends into the appropriate positions and held in these positions.

To enable insertion of the end portion 6 of the printing blanket, the sleeve member 3 is furnished with a slot 7, which is rounded off or chamfered at both longitudinal sides at the transition into the circumferential surface. The shaft member 5 has a groove 8 which receives the end portion 6 and causes this end portion to be laid against a defined plane thereby to, inter alia, determine the length of the end portion to be clamped. The groove 8 is somewhat wider than the thickest blanket used, in order to facilitate the insertion of the blanket end portion 6 and its sliding out of the groove and wrapping around the shaft member as the members are rotated relative to each other.

The maximum diameter of the shaft member 5 corresponds to the diameter of the bore of the sleeve member 3. The circumferential surface of the member 5 is so machined down on one side of the groove 8, including the longitudinal edge 9 of that groove situated on that side, that between the machined-down surface portion and the wall of the bore there is present a gap 10 having an axially uniform wedge-shaped cross-section. The groove edge 9 is lower than the opposite groove longitudinal edge 11 by somewhat more than the printing blanket thickness. The other blanket end portion 13, provided with an insertion strip 12, is inserted into a recess 14, which can be covered over by the member 3.

If both blanket end portions 6 and 13 are to be separately tensioned then two of the described devices are provided (Figure 3) parallel to each other in the channel 2 of the cylinder 1.

In Figure 4 there is shown an embodiment in which the shaft member 5 comprises a rod having a diameter smaller than the diameter of the bore of the sleeve member. On the circumferential surfce of the rod, two cam-shaped projections 15 and 16 are situated diametrically opposite each other, the projection 15 being so disposed that its descending portion extends as far as or almost to the groove longitudinal edge 17. In this embodiment, the width of the groove 18 is appropriately increased to enable reception of an expelling strip 18, which is fixed to the longitudnal face of the groove facing towards the projection 15. The other projection 16, approximately opposite to the groove 8 on the shaft circumference, bears against the wall of the bore of the sleeve member 3.

It is possible for the rod to possess only the projection 15, the diameter of the rod then being smaller by an amount equal to the height of the projection 15 and the shaft member 5 being disposed eccentrically in the sleeve member bore and bearing thereaginst.

A further embodiment is shown in Figure 5, wherein the diameter of the shaft member 5 is slightly smaller than the diameter of the sleeve member bore. The member 5 is eccentrically arranged in the bore by one half of the difference between the two diameters and bears against the bore wall.

When the end portion 6 of the printing blanket is to be inserted into the cylinder 1 (Figure 1), the sleeve member 3 is rotated until its flat surface 4 faces the recess 14. The blanket end portion 13, provided with the insertion strip 12, is then engaged in the recess 14. The member 3 is thereafter rotated counterclockwise (seen in Figure 1) until the slot 7 is aligned with the opening of the channel 2. As the member 3 is rotated into this position, the recess 14 is covered over by a cylindrical surface portion of the member 3, so that slipping out of the engaged blanket end portion 13 is prevented.

By rotating the shaft member 5, the groove 8 is brought into alignment with the slot 7. The blanket end portion 6 is pushed into the channel 2, through the slot 7 of the member 3, as far as the base of the groove 8 of the member 5. The member 5 is then rotated clockwise (seen in Figure 1) and as this happens the end portion 6 slides out of the groove 8. It is wrapped around in the rotational direction of the shaft member 5 and is pressed in the wedge-shaped gap 10 by the machined-down surface and clamped in a non-slip manner. For tensioning of the blanket, the member 3 together with the member 5 is now rotated counterclockwise until the desired blanket tension is achieved (Figure 2).

When the printing blanket is to be changed, the afore-mentioned steps should be carried out in the reverse sequence.

If two of the clamping and tensioning devices are provided in the channel 2 (Figure 3), then depending upon the rotational direction of the cylinder the blanket tensioning process is commenced with the righthand or the lefthand device. Between the two devices, in this embodiment, there is a guide strip 19.

For receiving the two blanket end portions 6 or 13, in each device, the groove 8 of the shaft member 5 and the slot 7 of the sleeve member 3 should be so arranged relative to the opening of the channel 2 that an aligned entry passage is provided for each blanket end portion 6 and 13. Thereafter, first the one blanket end portion 6 and then the other blanket end portion 13 is pushed through in the described manner as far as the base of the groove 8 and clamped by rotation of the shaft member 5. After the two blanket end portions have been clamped and thus fixed, in order to tension the printing blanket the righthand member 3 is rotated clockwise and the lefthand member 3 counterclockwise, until the desired blanket tension is reached. Changing of the blanket is effected in the reverse sequence.

In the case of the embodiments of Figures 4 and 5, which may be equipped with one device for clamping and tensioning one blanket end portion or with two such devices for clamping and tensioning both end portions, the insertion, clamping, tensioning and changing steps are carried out as already

described.

CLAIMS

1. A printing cylinder provided with means for retaining and tensioning a printing blanket therearound, the retaining and tensioning means comprising a sleeve member rotatably disposed in a channel open at the periphery of the cylinder and provided in its wall with a longitudial slot, and a shaft member rotatably disposed in the bore of the sleeve member and provided with a longitudinal groove for receiving one end portion of such blanket inserted therein by way of the slot and the channel, the shaft member being so arranged that a portion of its circumferential surface bears against the wall of the bore and a further portion of said surface adjoining the groove at one longitudinal edge thereof is so spaced from the wall of the bore as to define therewith a substantially wedge-shaped recess for reception and retention therein of said end portion of the blanket on relative rotation of the sleeve and shaft members, and the sleeve member being rotatable together with the shaft member to draw the blanket into the channel for tensioning thereof, means being provided for retaining the other end portion of the blanket.

2. A printing cylinder as claimed in claim 1, wherein said one longitudinal edge of the groove is disposed inwardly of the other longitudinal edge of the groove by an amount greater than a given thickness of such blanket.

3. A printing cylinder as claimed in either claim 1 or claim 2, wherein the groove is wider than a given thickness of such blanket.

4. A printing cylinder as claimed in any one of the preceding claims, wherein the longitudinal edges of the slot are rounded or chamfered at the outer circumference of the sleeve member.

5. A printing cylinder as claimed in claim 1, wherein the diameter of the shaft member is smaller than the diameter of the bore, the shaft member being so eccentrically arranged in the bore that the axes of the shaft member and bore are spaced apart by an amount substantially equal to half the difference between said diameters.

6. A printing cylinder as claimed in claim 1, wherein the shaft member comprises a rod having a smaller diameter than that of the bore and being provided at its circumference with two diametrically opposite lobes bearing against the wall of the bore, and an ejector element arranged in the groove to project therefrom at the longitudinal side of the groove opposite to said one longitudinal side.

7. A printing cylinder assclaimed in any one of the preceding claims, the means for retaining the other end portion of the blanket comprising a further such sleeve member arranged parallel to the first-mentioned sleeve member and a further such shaft member disposed in the further sleeve member to receive said other end portion of the blanket.

8. A printing cylinder as claimed in any one of claims 1 to 6, the means for retaining the other end portion of the blanket comprising a recess arranged in the channel to receive said other end portion, means being provided to cover the recess to prevent removal of said other end portion.

9. A printing cylinder provided with means for retaining and tensioning a printing blanket therearound, said means being substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

10. A printing cylinder provided with means for retaining and tensioning a printing blanket therearond, said means being substantially as hereinbefore described with reference to any one of Figures 3 to 5 of the accompanying drawings.

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