United States Patent

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[33] **Austria**
[31] **4885 and 4889**

[54] **DEVICE ON ROTARY PRINTING MACHINES**
19 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **101/116,** 101/127.1
[51] **Int. Cl.** **B411 13/06**
[50] **Field of Search** ..... 101/116-—120, 127.1, 216, 219, 328

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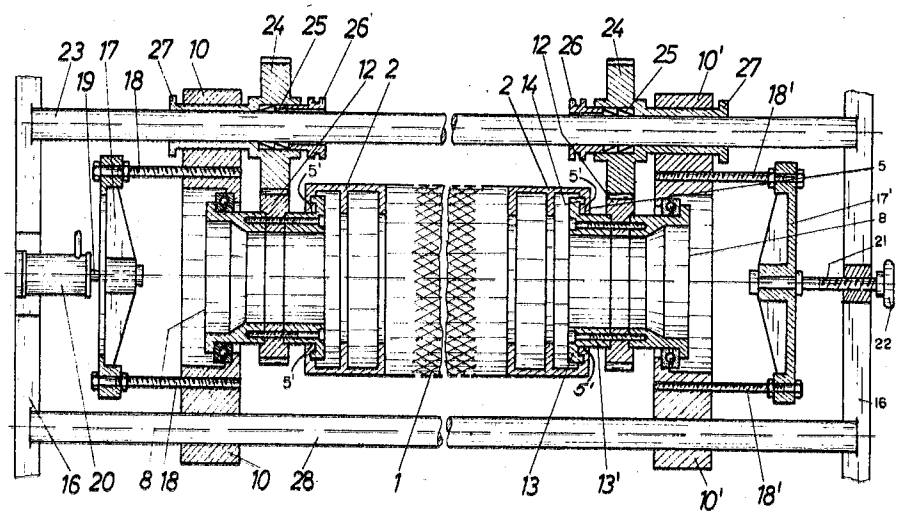
ABSTRACT: A device for a screen printing machine for exchangeably receiving and longitudinally stretching a rotary screen having end pieces. Rotary heads are arranged on the frame of the machine on both sides for connection to the end pieces. One of the rotary heads is adjustable in the longitudinal direction of the screen. Connecting means for the endpieces and rotary heads are provided essentially perpendicular to the axis of the screen for releasably coupling the end pieces and rotary heads. Such connecting means of the endpieces extend radially and the cooperating connecting means of the rotary heads also extend radially so that, when mounting the rotary screen on the rotary heads transversely to the screen axis, the connecting means are movable in axial direction for engaging over the cooperating connecting means. Means are provided for force-locking the connection by axial displacement of one of said rotary heads.



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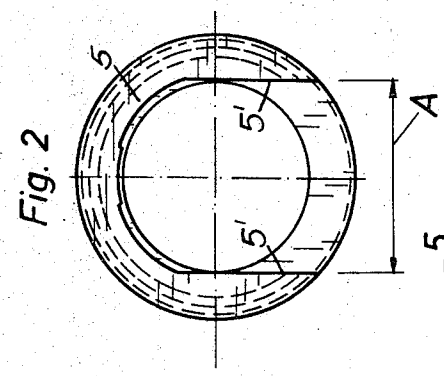

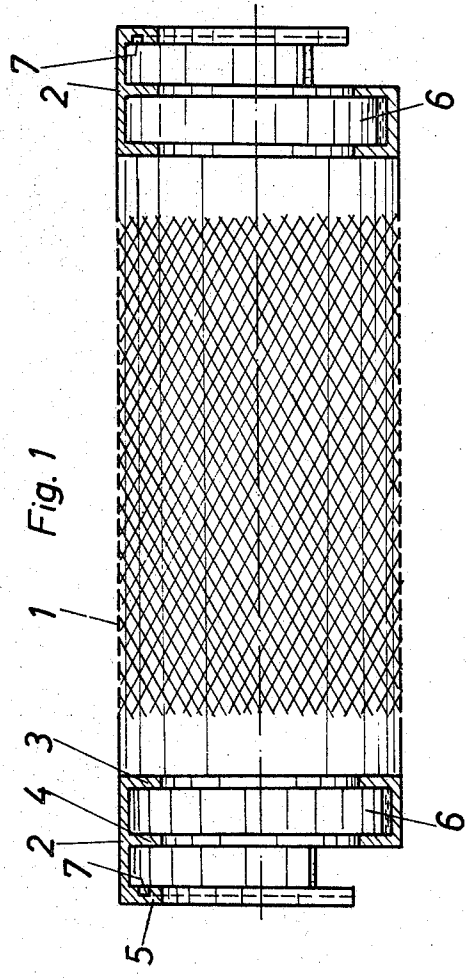

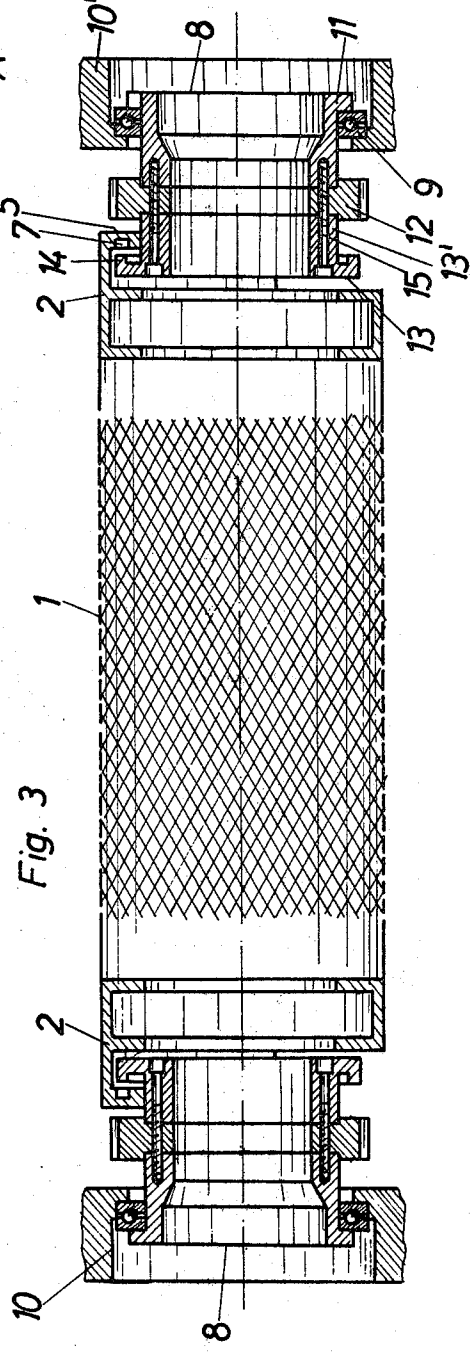

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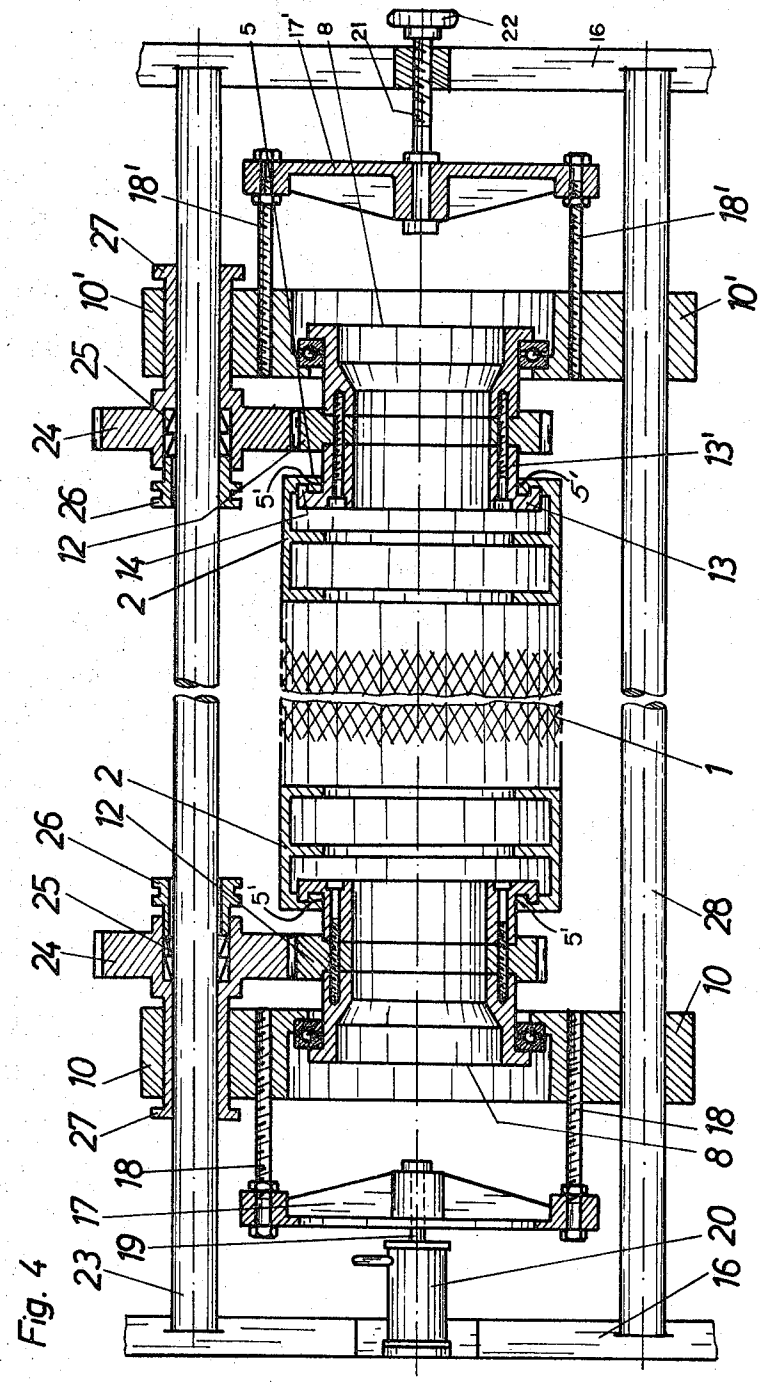

Fig. 4

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Fig. 5

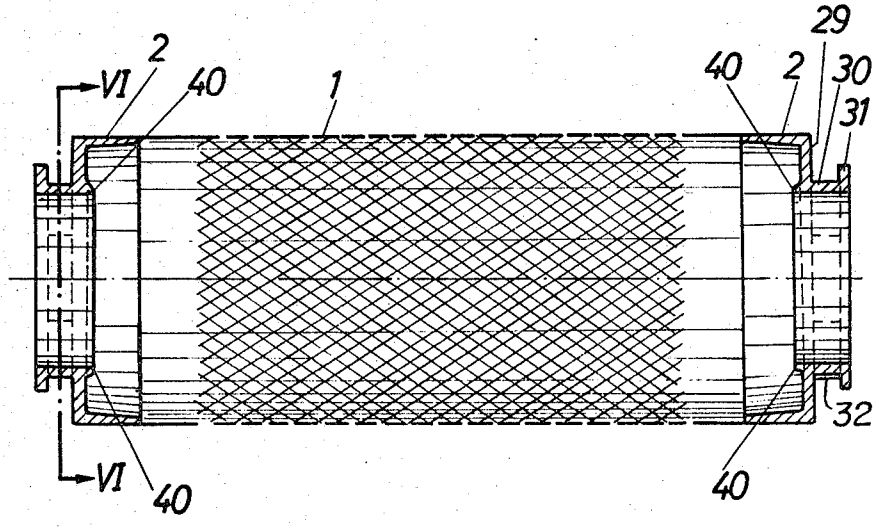

Fig. 6

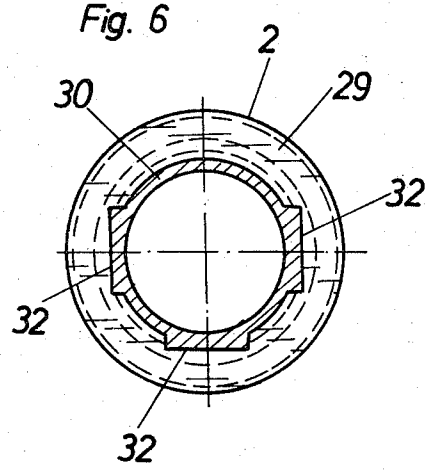

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Fig. 7

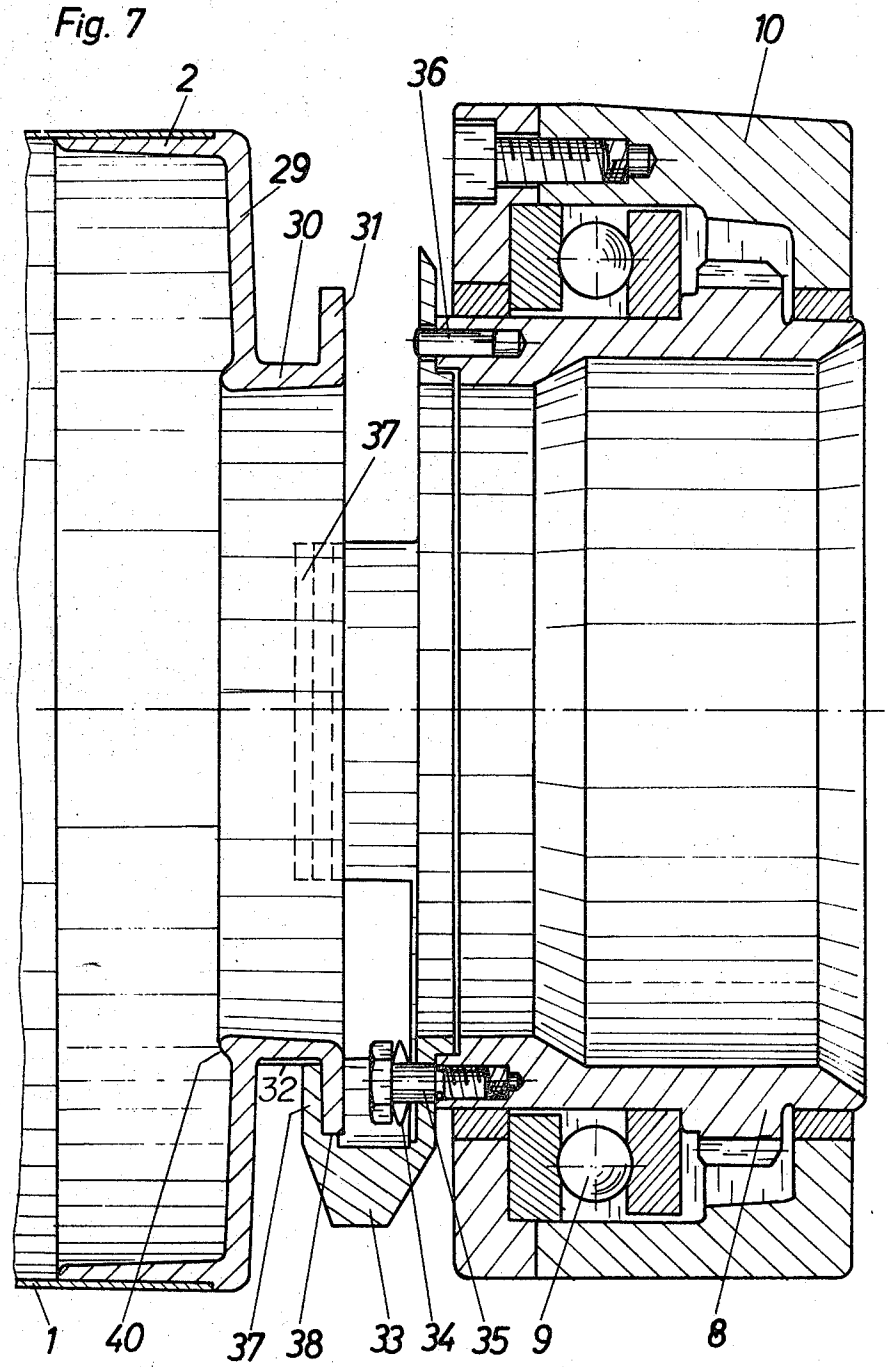

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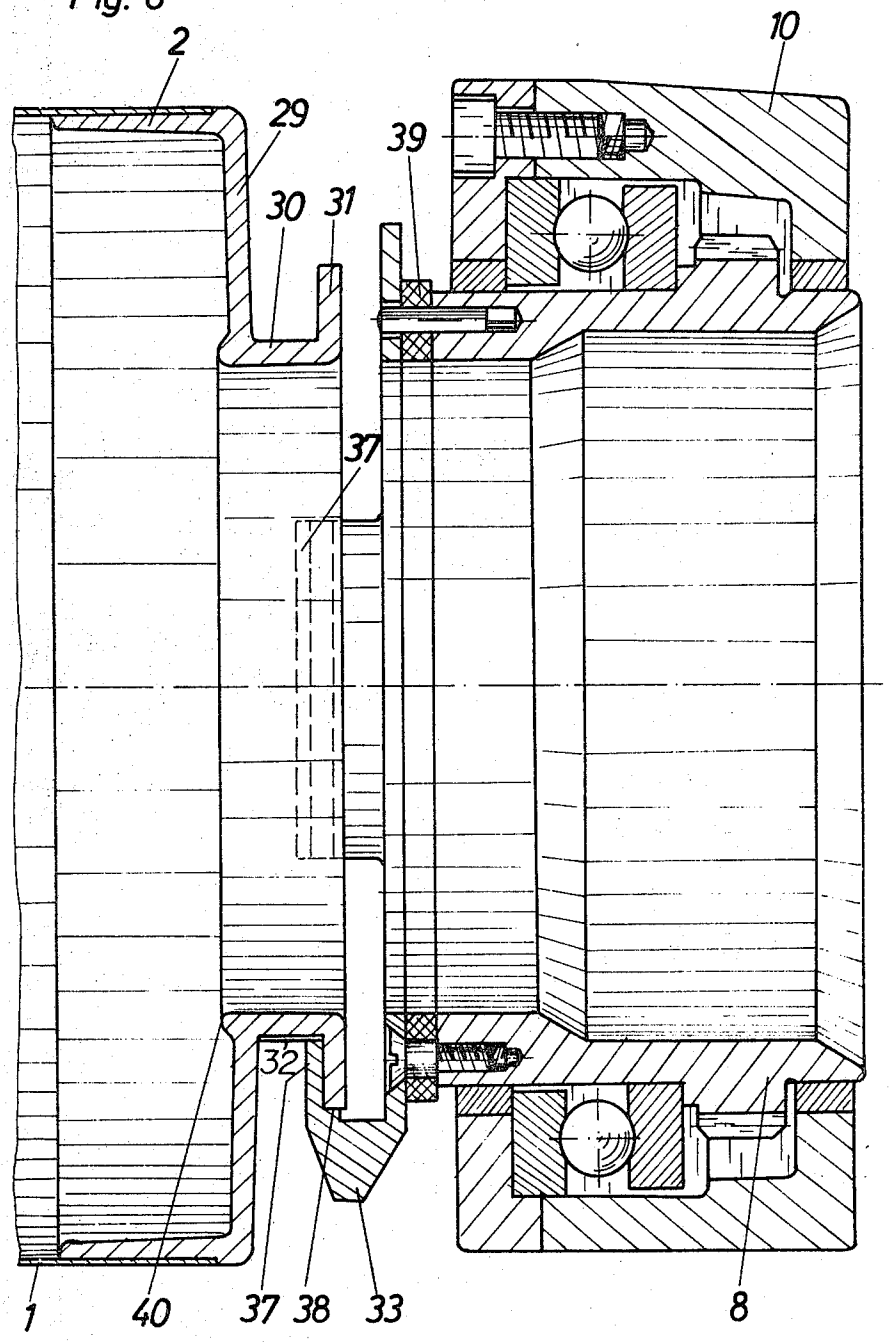
Fig. 8



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DEVICE ON ROTARY PRINTING MACHINES

This invention relates to a device on rotary printing machines for the exchangeably receiving and longitudinally stretching rotary screens which are suitable for connection with their endpieces on rotary heads coordinated to the machine frame on both sides.

In order to insured a frictionless working of the rotary screens of stencil printing machines, the tine walled screen cylinder of flexible, permeable material must be stretched in axial direction. For this purpose various stretching devices which are arranged inside the screen and, on the other, stretching devices which are worked from the machine frame.

In the case of stretching devices arranged inside the rotary screen, certain parts of the stretching body are disadvantageous, for example the bars connecting the two endpieces extending across the screen inside in longitudinal direction, said bars affecting the inserting of the squeegee and the arrangement of devices for level controlling of printing color, in the case of small screen diameters. Besides, printing color is raised by said bars, said color dropping on the screen inwall, coming through to the screen outside and thus involving an incorrect print.

According to a known device in which the screen is stretched from the machine frame, the screen cylinders are provided with end rings having a thread. The rotary screen is screwed into the rotary heads coordinated to the machine far frame on both sides by means of said end rings and is stretched in longitudinal direction by axial displacement of one of the tow rotary heads. Thus the disadvantages of the inner stretching device are eliminated, but the exchange of the rotary screens required upon each change of the pattern demands much time, which involves long setting periods.

Accordingly, an object of the present invention is to provide a device for receiving rotary screens which not only permits a longitudinal stretching of the latter from the machine frame, but also a rapid inserting and exchanging of said rotary screens.

This is obtained according to the invention in that at least one of said both rotary heads of each rotary screen is adjustable in longitudinal direction of said screen, both screen endpieces and rotary heads being provided with connecting means essentially perpendicular to the axis of said screens for releasably coupling said endpieces and said rotary heads, said connecting means of said screen endpieces radially extending from inside outwardly and said coordinate connecting means of said rotary heads radially extending from outside inwardly or vice versa, said connecting means radially extending from outside inwardly being shaped or arranged like a fork in such manner that, when mounting said rotary screen on said rotary heads transversely to the screen axis, said connecting means radially extending from outside inwardly are suitable in axial direction for engaging over said coordinate connecting means radially extending from inside outwardly and are in a force-locking connection by axial displacement of one of said rotary heads.

Thus a very simple and rapid connection between the rotary heads and the rotary screen upon a simultaneous longitudinal stretching of the rotary screen is guaranteed. The required manipulations are limited to the mounting of the two screen endpieces on the rotary heads (both screen endpieces can be mounted at the same time) transversely to the screen axis and to the operating of the stretching device so as to axially displace outwardly one of the two rotary heads in longitudinal direction.

It is convenient that the force-locking connection of the connecting means coordinate to each other of the screen endpieces and of the rotary heads not excludingly serves for the transmission of the moment of rotation, and that corresponding form-closed elements are provided on the screen endpieces and on the rotary heads, said elements causing a form-closed transmission of the moment of rotation and thus a non-slip coupling of the rotary screen by means of the rotary heads.

It is further convenient that centering elements are provided on the screen endpieces and on the rotary heads.

In screen printing machines comprising rotary screens it is important that the rotary screen as a whole is adjustable in axial direction for the side repeat adjustment and that it is possible to receive rotary screens of different lengths. According to the invention this adjustment or setting device is conveniently combined with the longitudinal stretching of the rotary screen in such manner that the bearing body of one of the two rotary heads on both sides is connected with the piston of a stretching cylinder, said piston being moved outwardly in longitudinal direction of the screen upon admission of the pressure medium, whereas the bearing body of the other rotary head is connected with an adjusting device adjustable in both directions preferably comprising an adjusting screw, for example operated by a handwheel. It is particularly convenient that the stretched rotary screen is driven on both sides through a driving gear provided in each rotary head, said driving gear being in mesh with a gear adjustably mounted on a driving shaft projecting across the machine in parallel with the screen.

Embodiments of the invention are hereinafter described with reference to the accompanying drawings without being limited to them.

FIG. 1 is a longitudinal section of a rotary screen and FIG. 2 is an end view.

FIG. 3 is a vertical section of a rotary screen according to FIGS. 1 and 2 and of the rotary heads coordinate to the machine frame, when inserting the rotary screen into the machine.

FIG. 4 is a horizontal section of a rotary screen inserted into the machine comprising the rotary heads coordinate to the machine frame, the screen stretching elements and parts of the screen drive.

A further embodiment of a rotary screen is shown in FIG. 5 in vertical section and in FIG. 6 in a section along VI–VI of FIG. 5, FIG. 7 is a vertical section of a frontal zone of the rotary screen according to FIGS. 5 and 7 comprising a coordinate rotary head. In FIG. 8 the frontal zone of the same rotary screen is shown, but comprising another rotary head.

In the embodiment according according to FIGS. 1 to 4, the rotary screen consists of a screen cylinder 1 which is mounted on one endpiece on both frontal sides. Said endpieces 2 are provided with three ring ribs or ring discs 3, 4, 5 perpendicular to the axis, a ring-shaped groove 6 being formed between the two inner ring ribs 3, 4. The outer ring rib forms the connecting means of said screen endpiece perpendicular to the axis and is provided with a radial recess, particularly a notch of the breadth A which is equal to the inner diameter of the ring rib 5. On the side of the ring rib 5 directed towards the screen cylinder 1 a ring nut 7 concentric to the screen axis is formed. When connecting, particularly gluing, the screen cylinder 1 onto the endpiece 2, special care has to be taken that the notches of the ring ribs 5 of the two opposite endpieces 2 are precisely in alignment.

The pieces of construction which serve for receiving and longitudinally stretching the rotary screen in the machine, are the opposite rotary heads 8 which are revolubly mounted in the bearing bodies 10, 10' through axial bearings 9. The rotary heads 8 consist of three parts:—as shown in detail in FIG. 3—the bearing sleeve 11, the driving gear 12 and the connecting means 13 for the rotary screen. On the connecting means 13 a ring projection 14 concentric to the axis of the rotary head 8 is provided, said ring projection having the same diameter as the ring nut 7 in the outer ring rib of the endpieces 2 of the screen. The three parts of the rotary head are connected by means of connecting screws 15.

The two bearing bodies 10, 10' are adjustable in longitudinal direction of the screen relative to the machine frame 16, as can be seen in FIG. 4, i.e. by means of bolts 18 or 18'. The piston bar 19 of a stretching cylinder 20 acts upon one stretching yoke 17, the other stretching yoke is operated by an adjusting screw 21 by means of the hand wheel 22.

When inserting the rotary screen into the machine, as can be seen in FIG. 3, first the end rings 2 or the outer ring ribs 5 provided with radial notches are mounted on the connecting means 13 of the rotary heads 8. In order to insure a connection not capable of rotation between the rotary screen and the rotary heads two opposite, axis-parallel, even driving faces are provided on a projection 13' of the connecting means 13, the distance between said driving faces corresponding to the breadth A of the notch of the ring ribs 5 of the endpieces having bearing faces 5', thus extending correspondingly to the inner edge of the ring rib. The ring nuts 7 in the ring ribs 5 and the ring projections 14 on the connecting means 13 of the rotary head 8 are opposite in axial distance.

The piston of the stretching cylinder 20—as in FIG. 4—is acted upon with a pressure medium, for example pressure air or oil, and the left bearing body 10 is shifted to the left, which causes the ring projections 14 on the connecting means 13 of the rotary heads to engage in the ring nuts 7 of the ring ribs 5 of the screen endpieces 2, the stretching forces being thus transmitted to the screen cylinder 1 of the rotary screen. Owing to the concentric arrangement of the ring nuts 7 and the ring projections 14, the rotary screen is simultaneously centered by the thus produced force-locking connection between the rotary screen and the rotary heads 8.

When the rotary screen is to be removed from the machine, the pressure on the piston of the stretching cylinder 20 is eliminated the right bearing body 10' comprising the rotary head 8 is shifted to the left so as to disengage again the ring projections 14 and the ring nuts 7. Thus the rotary screen can be removed from the machine in one manipulation. The left as well as the right bearing body are adjustable for the purpose to permit a side displacement of the rotary screen as a whole for the side repeat adjustment. In the embodiment according to FIG. 4 a displacement can be effected in both directions by a manipulation of the handwheel 22, when the rotary screen is inserted and the piston of the stretching cylinder 20 is acted upon with a pressure medium, in accordance with the direction of rotation of the hand wheel 22.

The displacement of the right bearing body 10' also permits an easy adoption of the device to different screen lengths.

In the embodiment according to FIGS. 1 to 4, the rotary screen is driven by the gears 24 mounted on a driving shaft 23 projecting across the machine in parallel with the screen axis, said gears 24 being in mesh with driving gears 12 of the rotary heads 8. The driving shaft is conveniently driven by a repeat gear not shown. The gears 24 can be axially adjusted and connected with the driving shaft 23 by means of a clamping ring 25 and an adjusting nut 26. Bearing sleeves 27 are joined to the gears 24 through which the driving shaft 23 and the bearing bodies 10, 10' are revolvably mounted. Thus the driving shaft 23 together with the opposite guide rod 28 serves for the longitudinal guide of the bearing bodies 10, 10'.

It is the object of the ring-shaped groove 6 provided in accordance with the embodiment of FIGS. 1 to 4 between the two ring ribs 4, 5 perpendicular to the axis, which could in principle be substituted by another ring groove open towards the screen axis, that an excess of color inside the screen can penetrate outside. The excess of color is collected in said ring groove without penetrating outside. Usually only a small excess of color flows off the screen inside during operation; thus there is no risk that the color collected in the ring groove penetrates outside.

In the embodiment according to FIGS. 5 to 7, the rotary screen is formed by the screen cylinder 1 and both endpieces 2. The endpieces 2 comprise a shoulder 29, an adjacent projection 30 and a ring disc 31 perpendicular to the axis radially projecting from said projection 30 outwardly which form the connecting means perpendicular to the axis of the screen endpieces 2 according to the invention. The projection 30 has only partially a cylindrical outer surface. Three partial zones of the outer surface of the projection 30 are even driving faces 32 (FIG. 6).

FIG. 7 shows the connection, according to the invention, of the rotary screen in accordance with FIGS. 5 and 6, with one of the two rotary heads 8 which are revolvably mounted in the bearing body 10 through axial bearing 9. An axially elastic ring 33 is mounted, not capable of rotation, on the frontal side of the rotary head 8 directed towards the rotary screen. The axial elasticity is caused by cup springs 34 which are arranged below the screw head of the clamping screws 35. Apart from the clamping screws 35, bolts 36 are provided opposite to the rotary head 8 so as to insure the ring against rotation. On the ring 33, connecting means 37 essentially perpendicular to the axis radially extending inwardly, i.e. in direction of the screen axis, are provided, said connecting means, however, not forming a ring disc with closed circumference; they show a shaped arrangement, which permits to give the rotary screen the position shown in FIG. 7 by simply mounting it transversely to the screen axis.

The inner edges, i.e. the edges of the connecting means 37 directed towards the screen axis, have linearly extending side faces appropriate for resting on the driving faces 32 of the projection 30 of the screen endpieces 2. The rotary screen is taken along in rotation upon the rotation of the rotary head 8, since the inner edges of the connecting means 37 and the driving faces 32 work together. The connecting means 37 are provided with a recess 38 concentric to the screen axis, the diameter of said recess being equal to the outer diameter of the ring disc 31 of the screen endpieces 2. This recess 38 serves for centering the rotary screen, the ring disc 31 coming in mesh in the recess 38 upon the axial stretching (by axial displacement of the bearing body 10 of one of the rotary heads 8).

In the embodiment according to FIG. 8 the rotary screen has the form as in FIGS. 5 and 6. The screen cylinder is provided on both sides with screen endpieces 2 comprising the shoulder 29, the projection 30 and the ring disc 31.

Another ring 33 is axially elastic, not capable of rotation, mounted on the frontal side directed towards the rotary screen of the rotary body 8 mounted in the bearing body 10. The axial elasticity is caused according to FIG. 8 by an elastically deformable ring 39, for example of rubber, between the ring 33 and the frontal face of the rotary head 8. As in the embodiment according to FIG. 7, connecting means 37 perpendicular to the axis, radially extending inwardly in direction of the screen axis are provided on said ring 33, said connecting means comprising a recess 38 concentric to the screen axis. The inner edges of the connecting means directed towards the screen axis extend linearly.

The elastic elements in FIGS. 7 and 8, i.e. the cup springs 34 or the elastically deformable ring 39, serve for compensating eventual deviations of the ring disc 31 from an exact position perpendicular to the axis as in the case of screen endpieces 2 obliquely glued in the screen cylinder 1.

In the embodiment according to FIGS. 4 to 8, the screen endpieces 2 are not provided with a ring groove 6 (FIG. 1) for collecting the excess of color. A ring edge 40 projects instead from the inner edge of the shoulder 29 of the screen endpieces 2 into the screen inside, on which the color rising at the side can drop off again inside the screen upon the rotation of the rotary screen.

We claim:

1. A device in combination with screen printing machines for exchangeably receiving and longitudinally stretching a rotary screen having endpieces comprising a frame, rotary heads arranged on said frame on both sides for connection to said endpieces, one of said rotary heads being adjustable in the longitudinal direction of said screen, connecting means for said endpieces and rotary heads essentially perpendicular to the axis of said screen for releasably coupling said endpieces and said rotary heads, said connecting means of said endpieces extending radially and said cooperating connecting means of said rotary heads extending radially, said connecting means on said rotary heads being spaced so that, when mounting said rotary screen on said rotary heads transversely to the screen

axis, said connecting means on said rotary heads are movable in axial direction for engaging over said cooperating connecting means and means for force-locking the connection means by axial displacement of one of said rotary heads in a direction away from the other.

2. A device according to claim 1, wherein corresponding form-closed faces are provided for the nonslip coupling of said endpieces and said rotary heads on said screen endpieces and on said rotary heads.

3. A device according to claim 2, wherein a projection is joined to said connecting means of said rotary heads and axis-parallel driving faces are provided on said projection, the inner edge of said spaced connecting means of said screen endpieces extending correspondingly to the driving faces on said rotary heads.

4. A device according to claim 1, wherein a projection is joined to said connecting means of said endpieces, axis-parallel driving faces being provided on said projection, the inner edge of said spaced connecting means of said rotary heads extending correspondingly to the driving faces on said endpieces.

5. A device according to claim 3, wherein the inner edges of said spaced connecting means of said endpieces of a rotary screen are in alignment.

6. A device according to claim 5, wherein the driving faces of said endpieces are precisely in alignment.

7. A device according to claim 1, wherein corresponding centering elements are provided on said endpieces and on said rotary heads.

8. A device according to claim 7, wherein corresponding ring nuts and ring projections are provided on said connecting means.

9. A device according to claim 7, wherein said connecting means of said rotary heads are provided with a recess concentric to the screen axis on the side away from the rotary screen, the diameter of said recess being equal to the diameter of the circular disc-shaped connecting means.

10. A device according to claim 1, wherein said connecting means of said rotary heads are non rotatably and resiliently mounted in axial direction on said rotary heads.

11. A device according to claim 10, wherein said resilient mounting comprises screws and cup springs are provided below the heads of said screws.

12. A device according to claim 10, wherein a resiliently deformable ring is provided between said connecting means.

13. A device according to claim 1, wherein a ring groove open towards the screen axis is provided in an end piece.

14. A device according to claim 13, wherein said ring groove is formed by a pair of ring ribs perpendicular to the axis of said end piece.

15. A device according to claim 1, wherein said screen end pieces have a shoulder extending in the direction of the screen axis and a ring edge projects inside the screen from the zone at the inner edge of said shoulder.

16. A device according to claim 1, wherein a bearing body of one of said rotary heads is connected with the piston of a stretching cylinder, said piston being radially moved outwardly upon the admission of a pressure medium in longitudinal direction of the screen and the bearing body of the other rotary head has a device adjustable in both directions.

17. A device according to claim 16, wherein said adjusting device adjustable in both directions is provided with an adjusting screw operated by a handwheel.

18. A device according to claim 1, wherein the stretched rotary screen is driven on both sides through a driving gear provided in each rotary head, said driving gear being in mesh with a gear adjustably mounted on the driving shaft projecting across the machine parallel to said screen.

19. A device as set forth in claim 1, wherein said connecting means of said endpieces extends radially from inside the machine outwardly and said cooperating connecting means of said rotary heads extends radially from outside inwardly.