United States Patent

[11] **3,565,001**

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[21] Appl. No. **704,775**
[22] Filed **Feb. 12, 1968**
[45] Patented **Feb. 23, 1971**
[32] Priority **Feb. 15, 1967**
[33] **Austria**
[31] **A1471/67**

[54] **ROTARY SCREEN PRINTING MACHINE**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **101/116,** 101/248, 101/378; 29/115
[51] **Int. Cl.** **B41f 13/44**
[50] **Field of Search** 101/115, 116, 117, 118, 119, 114, 378, 250, 375, 209, 252, 286, 260; 310/190, 191, 205, 215; 29/110, 115

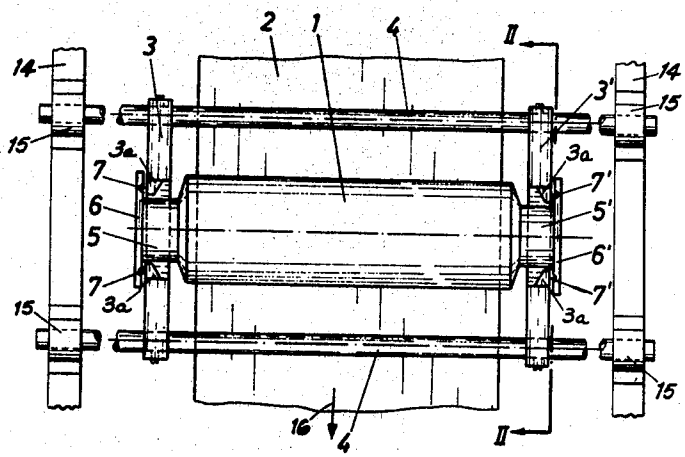
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ABSTRACT: Support discs are arranged normal to the screen axis and on opposite end pieces of the cylindrical screen, and portions of the screen holder are disposed in the space between the axially normal support discs of the screen end pieces and the cylindrical screen per se, whereby the support discs of the screen end pieces are rotatably supported adjacent the cylindrical screen by axial bearings carried preferably by the discs and engaging on portions of the screen holder as interposed between the axially normal support discs and the cylindrical screen. The support discs are preferably interchangeable on different screens and are preferably formed as radially projecting annular discs. Furthermore the support disc of at least one of the two screen end pieces can have outer peripheral serrations to serve as a ratio wheel and/or synchronous driving wheel of the cylindrical screen.



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Fig. 2

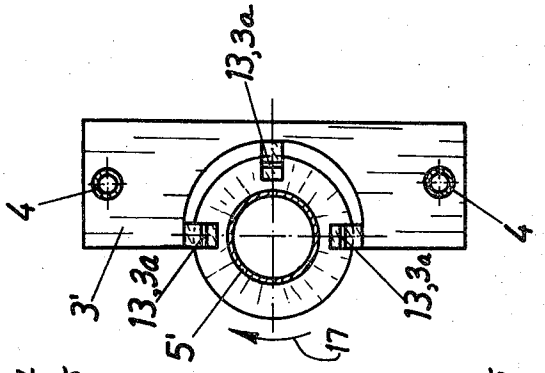
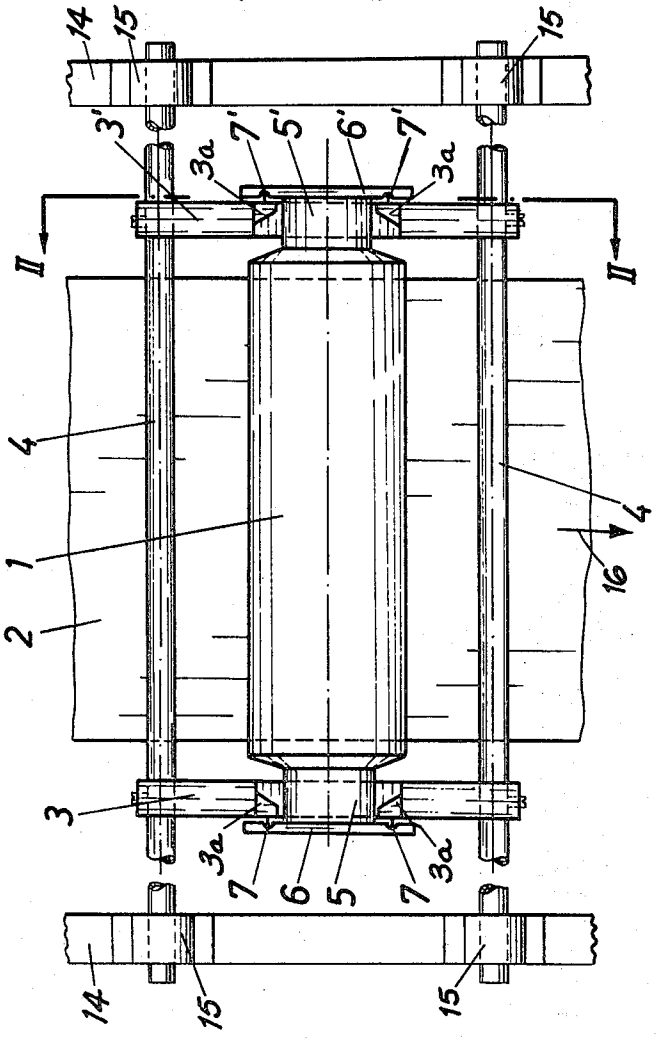


Fig. 1



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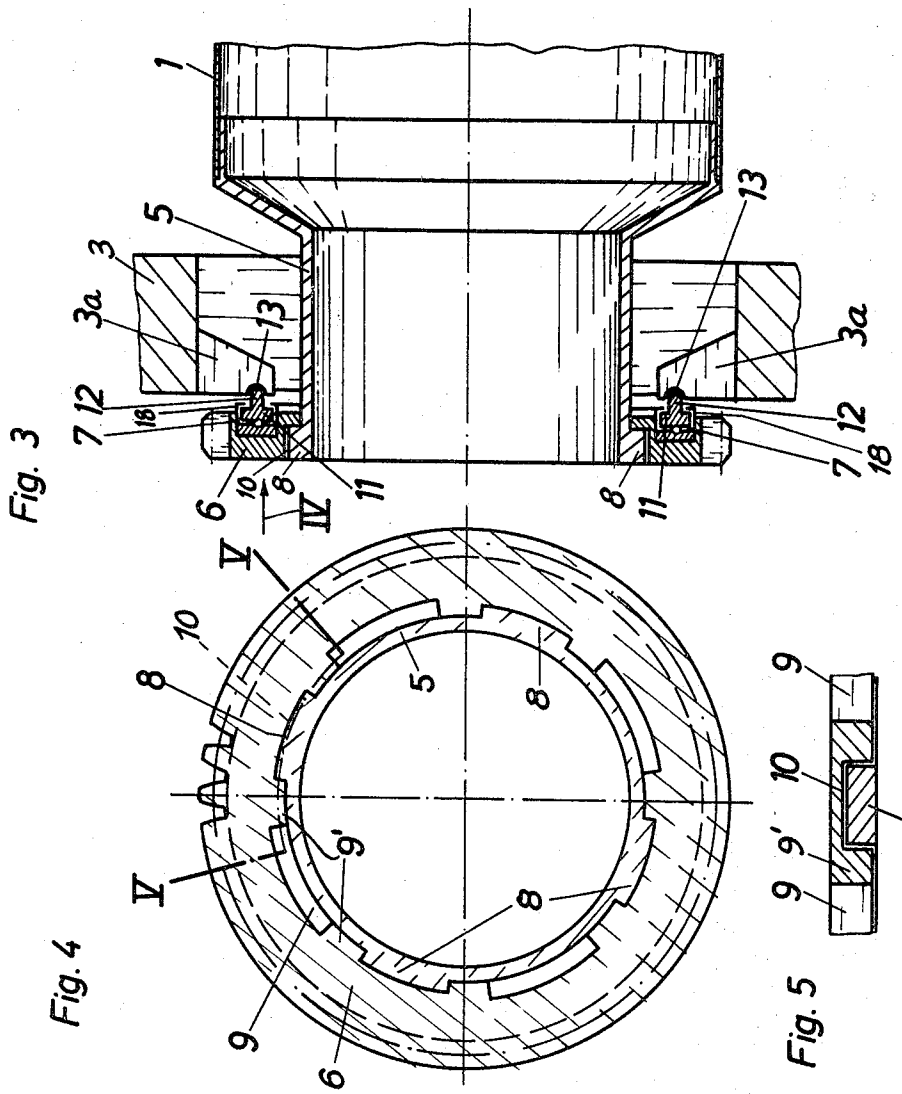


Fig. 3

Fig. 4

Fig. 5

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ROTARY SCREEN PRINTING MACHINE

The invention relates to a rotary screen printing machine in which the cylindrical screen is axially supported at its opposite ends in screen holders connected with the machine frame.

An axial support for the cylindrical screen of a rotary screen printing machine by means by suitable screen holders connected with the machine frame is most necessary with cylindrical screens of a type which have no inner supporting body, since by means of the axial support (mostly connected with a device for the adjustable length span of the cylindrical screen) the thin and flexible screen material is tensioned smoothly cylindrically and free from creases.

All hitherto proposed devices for the mounting of the cylindrical screens on the machine are either complicated in construction or in manipulation or not sufficiently functionally safe (insofar as it is a question of simple release problem; for example tension rollers engaging in an annular groove of the screen end pieces).

This deficiency is obviated in accordance with the present invention by an arrangement whereby a support disc and at least part of an axial bearing is provided on each transverse end piece of the cylindrical screen, and in a manner concentric with and transverse to the axis of the rotary screen. Complemental bearing-engaging portions of the screen holder are disposed in the space between each of the end support discs of the screen.

The support discs of the screen end pieces are preferably formed as radially projecting annular discs whereby at least one of the two screen end pieces can have outer peripheral serrations or teeth to thereby serve as a ratio wheel and/or synchronous driving wheel of the cylindrical screen.

It is furthermore suitable and preferable that at least one of the two screen holders be adjustably disposed and movable in the longitudinal direction of the screen. Accordingly one of the screen holders is not only an abutment for the axial support but also a tensioning member for the cylindrical screen. In addition the movable screen holder enables an adaptation to different lengths of screen to be undertaken.

The axial bearing is preferably an axial roller bearing. In order to advantageously simplify the interchange of cylindrical screens, and to preclude the necessity of the axial roller bearings being always separately disassembled and reassembled the axial roller bearing with all functional parts (ball race, roller body, cage) is fixedly mounted as a unit on one of the two mutually or complimentary supporting machine machine parts, i.e., either on the screen's end disc of the end piece or on the cylindrical holder. In the preferred case where the axial roller bearing forms a unit with the support disc of the screen end piece, it is moreover convenient if the said end support disc is arranged interchangeably as a separate machine part on the end pieces, since then only one set of support discs, which are relatively costly because of the built-in axial roller bearing, is required for several sets of differently printed cylindrical screens.

It is also advantageous if the free-lying or rotary ball race of the axial roller bearing has an axially projecting annular boss, and if corresponding recesses for the reception of the axial annular bosses are provided on the outward of each of the screen holder, and preferably at three circumferentially spaced positions thereof. In this way a simple centering of the cylindrical screen is attained and the hitherto usual separate guiding and centering rollers which engaged the screen periphery can be dispensed with.

One embodiment of the invention is explained in more detail with reference to the drawing without the invention being limited thereto.

FIG. 1 shows in plan view a cylindrical screen with the appropriate screen holders fitted relative thereto and to machine;

FIG. 2 is a section along the lines II–II of FIG. 1;

FIG. 3 shows in longitudinal section a fragmentary part of the screen with an enlarged detail of a screen end piece and its support in the screen holder;

FIG. 4 shows a view in the direction IV of FIG. 3; and

FIG. 5 is a fragmentary cross section taken substantially on line V–V.

For reception of the cylindrical screen 1 in the machine, screen holders 3,3' are arranged at each side of the printing blanket 2 and are secured to support tubes 4 running transversely to the printing blanket 2. The support tubes 4 are suitably connected with the machine frame, as seen in FIG. 1.

The cylindrical screen 1 is provided with opposite end pieces 5,5' usually of smaller diameter than the screen diameter, and these are fitted with radially projecting annular discs 6,6'. Axial roller bearings 7,7' are fitted as a unit to these annular discs 6,6' whereby the annular discs 6,6' are externally supported on the screen holders 3,3'.

At least one screen holder 3' is movable and adjustable in the longitudinal direction of the screen on the support tubes 4. Furthermore, at least the one annular disc 6 is formed as a toothed wheel and serves as ratio wheel and/or as synchronous driving wheel, which is adapted to be connected with a ratio drive and/or synchronous drive (not shown) arranged on the machine frame.

As can be seen from the enlarged detail according to FIG. 3, the annular disc 6 formed as a toothed wheel is arranged interchangeably on the screen end pieces 5, for which purpose a so-called, snap closure secure against rotation and against axial movement is constructed between the annular disc 6 and the screen end piece 5.

The essential features of the snap closure are to be seen principally from FIGS. 4 and 5. Accordingly, the cylindrical peripheral edge of the end piece 5 has several circumferentially spaced radial projections or segments 8. In the central bore of the annular disc 6 are corresponding radial notches 9. The arcuate parts or segments 9' lying between the notches 9 are provided with axial outwardly opening recesses 10, U-shaped in cylindrical section. In effecting this snap closure the annular disc 6 is first axially fitted, or applied to the end piece 5 via the notches 9, then rotated circumferentially and finally again axially drawn back so that the U-shaped recesses 10 internally embrace the radial projections 8 on the edge of the screen end pieces 5.

The described interchangeable arrangement has special significance for the ratio wheel or synchronous drive wheel of the cylindrical screen, if the ratio wheel or synchronous drive wheel is not directly the carrier of an axial roller bearing for the axial screen support. In this case one and the same ratio wheel or synchronous drive wheel, represented by the annular disc 6, is used for several screens, which screens are fitted interchangeably in the machine, and wherein it is preferably if such ratio wheels or synchronous drive wheels, whose pitch diameter is the same as the that of the screen diameter, are always fitted on the screens. On the other hand the interchangeable arrangement of the support discs is also advantageous if these have no teeth and do not serve as ratio wheel or synchronous drive wheel.

The free-lying or rotary ball race 11 of the axial roller bearing 7 (and likewise of the roller bearing 7' not shown in FIG. 3) has an axial projecting boss 12 and engages in corresponding recesses 13 provided in each of the triple radial lugs 3a formed on the outside of the screen holder 3 (or 3').

The recesses 13 are somewhat slightly curved in profile like the profile curvature of the axial annular boss 12. Furthermore the recesses 13 are arcuately curved in plan view and exist at the three illustrative positions of the screen holder 3 (three-point-support) as shown in FIG. 2. Thus arranged the cooperating annular bosses 12 and recesses 13 provide for the required centering of the cylindrical screen 1. The support tubes 4 are connected by any suitable means, such as bearings or clamps 15 to the frame 14, shown only fragmentarily in FIG. 1. The direction of travel of the blanket 2 is indicated by the arrow 16, in FIG. 1, while the rotation direction of the rotary screen is indicated by arrow 17 in FIG. 2. Elements 18 help retain the bearing in place.

Accordingly, it is apparent that a novel form of rotary screen with improved mounting and adjusting means has been

evolved for use with rotary screen printing machines, and which provides the advantage of interchangeability of and with various screens, by utilization of a common mounting support disc member preferably on opposite screen ends. The disc is selectively attachable and detachable and generally unitarily mounts the bearing therewith; and, by the unique adjustable support members cooperating therewith provides for improved predetermined mounting and for selective tensioning of the selected screen being mounted.

I claim:

1. In a rotary screen printing machine having a frame to support the machine components, a printing support blanket with means on said frame to drivingly support the blanket and the material thereon to be printed, said blanket disposed for travel in a longitudinal direction relative to said frame, with the axis of the cylindrical rotary printing screens used for printing in said machines being disposed generally transversely normal to and above the longitudinal travel direction of said blanket, means on said frame for imparting drive to the rotatable screens mountable on said machine, characterized by improved mounting and adjusting means for the rotary screens whereby a given variety of said screens are adapted to be interchangeably individually mounted on the machine, said improved mounting and adjusting means comprising in combination:

a. means (**4, 15**) connectable with the machine frame and extending transversely to the longitudinal blanket for providing operative support of rotary screen means above said blanket;

b. rotary screen means including a rotary cylindrical screen per se constituting a generally central printing screen portion and having opposed end pieces (**5, 5**) connected to and each projecting in opposite axial directions beyond the respective ends of the central screen portion for supporting said rotary screen;

c. a pair of support discs (**6, 6'**) with means interconnectably mounting them on said respective end pieces spaced axially from the ends of the central screen portion, and transversely normal to, and concentric with the axis of said screen adapted to transmit printing rotation to said axis;

d. a pair of screen holders (**3, 3'**) each mounted adjacent opposite ends of said screen end pieces and on said first operative support means of par *a* with means for laterally adjusting at least one of the holders thereon transversely relative to said blanket travel;

e. each of said screen holders having means (**7, 11, 12**) for centrally axially orienting and supporting the screen via said screen end pieces of par *b*, by being interposed in said space between each end of the central screen portion and its said support disc;

f. and the axial roller bearing means interposed between each support disc and screen holder and adapted to provide rotation of said rotary screen relative to the screen holders; and

g. said screen being held within said screen holders (**33'**) in an axially stretched manner by the relative adjustment of said at least one laterally adjustable screen holder **3** forcing said screen holders axially against said support discs.

2. Rotary screen mounting and adjusting means as defined in claim **1**, wherein said roller bearing means of par *f* include a roller bearing assembly with means to unitarily mount it on said support disc.

3. Rotary screen mounting and adjusting means as defined in claim **1**, wherein the means for interconnecting the support discs on said end pieces as per par *c* include means for interchangeably mounting same thereon in a manner providing limited relative rotative and axial interlocking movement resulting in a common rotation of said support discs with said rotary screen responsive to drive rotation being imparted thereto from the said drive means.

4. Rotary screen mounting and adjusting means as defined in claim **3**, wherein said interchangeable mounting means include a plurality of circumferentially spaced, transversely radial projections on the outer periphery of said end pieces **5**, and said support disc **6** having a central opening sufficiently large and also having circumferentially-spaced radial notches corresponding to and for passing over the said radial projections during assembly thereon, and wherein the disc's circumferentially-spaced portions which are between said radial notches have axially-directed recesses spaced and so formed as to receive the radial projections on the support disc responsive to relative axial and rotative and subsequent reverse axial shifting movement of the support disc relative to said end piece.

5. Rotary screen mounting and adjusting means as defined in claim **1**, wherein a support disc **6** on one of the end pieces is provided with outer peripheral radial serrations or teeth for cooperative driving engagement by the drive means, which is operatively connectable therewith to impart printing rotation to said rotary screen.