

PATENT SPECIFICATION

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- (21) Application No. 42027/75 (22) Filed 14 Oct. 1975
 (31) Convention Application No. 2 518 334 (32) Filed 25 April 1975 in
 (33) Federal Republic of Germany (DT)
 (44) Complete Specification published 2 Nov. 1977
 (51) INT. CL.² B41F 21/00
 (52) Index at acceptance
 B6C 18S3
 B8R 222 288
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(54) SHEET-CARRYING DISC FOR SHEET TRANSFER DRUMS

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 corporate, organised under the laws of
 the Federal Republic of Germany, of 69
 5 Heidelberg, Alte Eppelheimer Strasse
 15-21, Germany, do hereby declare the in-
 vention, for which we pray that a patent
 may be granted to us, and the method by
 which it is to be performed, to be particu-
 10 larly described in and by the following
 statement:—

The invention relates to sheet-carrying
 discs for sheet transfer drums of printing
 machines.

15 In multi-colour rotary printing presses,
 the sheet to be printed is conveyed during
 the passage of the sheet by means of one
 or more sheet transfer drums from one
 printing unit to the next. In this process
 20 the carrying peripheral surfaces or support-
 ing devices of these sheet transfer drums
 may come into contact with wet printed
 surfaces of the freshly printed sheet, as a
 result of which the quality of printing may
 25 be substantially impaired through set-off or
 even blurring of the still-wet ink.

To obviate these disadvantages an
 arrangement has been disclosed in U.S.
 Patent Specification No. 2,965,026 wherein,
 30 to one side of a substantially flat disc in
 the shape of an arc of a circle, parts are
 disposed which are of segmental con-
 struction and which can be shifted in
 radial plane parallel to the disc. To locate
 35 these segmental parts in their inoperative
 (retracted) or operative (extended) positions
 it is necessary to provide supplementary
 arresting means in the form of spring-
 loaded ball-notches. In spite of the provi-
 40 sion of these ball-notches the arc-shaped
 segmental parts are not held positively in
 their respective positions and secured
 against radial shifting so there is the risk
 that, owing to the tension as the sheet is
 45 pulled off the rubber cylinder, the support

elements may be pressed into their in-
 operative position. Radial shifting of the
 segmental parts which serve as sheet sup-
 ports by means of pins fastened in the lat-
 ter and projecting laterally needs adequate
 space which can only be obtained by main-
 taining relatively large distances between
 the adjacent sheet transfer discs disposed
 on the shaft of the transfer drum.

German Offenlegungsschrift 2,002,877 55
 describes a sheet transfer roller for a
 multi-colour rotary press which is also
 provided with adjustable elements which
 serve to support a sheet during its transfer
 between the individual printing units. In 60
 this arrangement, the adjustable elements
 consist of a plurality of sets of elements
 in the form of arcs of a circle which are
 disposed slidably and fixably on guides,
 concentrically with the axle of the roller 65
 and which act as carriers for the actual
 sheet support elements. The sheet support
 elements are in the form of generally
 rectangular loops and are disposed
 laterally in the vicinity of the external per- 70
 iphery of the circular arc shaped elements,
 movable on a pitch circle thereof, and
 radially sprung. Here the adjustment of the
 sheet support loops is effected by lateral
 swinging thereof round their mounted sides 75
 through an angle of more than 180°.

Although the disadvantage of imperfect
 fixing of the sheet support elements of the
 aforementioned arrangement in their in-
 operative or operative position respectively 80
 is eliminated by this known arrangement,
 there is a risk that if the absolutely essen-
 tial angle of swing of the sheet support
 loops is not completed, they will take up
 an orientation gently inclined outwardly 85
 towards the carrier elements. As a result
 the latter may be pushed away outwardly
 during the rotation of the sheet, even if not
 into the inoperative position yet to such an
 extent that they no longer assume their in- 90

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tended supporting position. It is probably easy to swing the sheet support loops from their operative position into the inoperative position, but much more difficult to lift them up from their inoperative position because they have restricted access, particularly when it is necessary to put several sheet transfer segments close together.

10 In another sheet transfer drum for multi-colour rotary presses disclosed in German Patent Specification No. 1,761,714, sheet support elements with a pointed support surface are disposed, so as to be adjustable radially, on circular arc segments which can be slid along and fixed on the drum axle. Here the sheet support elements are U-shaped with two arms of unequal length, of which the long arms serving for guidance and mounting are radially sprung by means of compression springs and the short arms are used for holding up and fixing. Spring force keeps the sheet support elements in both their operative and also their released position.

25 This arrangement has the disadvantage that adjustment of the sheet support elements is extremely complicated and so entails a correspondingly lengthy operation. 30 Indeed, to bring them from their released position into the operative position it is necessary to lift their short arms out of arrest holes against the action of the compression springs, rotate them through 90° round their long arms and lower them again into an arresting groove. Thus changeovers have to be carried out with care and can involve the use of the whole hand, depending on the strength of the compression springs. The big radius of swing round the long arms necessitates keeping certain minimum distances between the individual sheet support elements and furthermore constructing the circular arc segments carrying the sheet support elements to a corresponding width.

45 The present invention seeks to provide a sheet carrying disc wherein the sheet carrying elements are readily accessible on the supporting disc, can be moved simply and quickly with little expenditure of energy, between their inoperative and operative positions.

50 According to the invention there is provided a sheet carrying disc for a sheet transfer drum of a printing machine comprising a plurality of carrying elements mounted on the periphery of the disc for movement between a radially extended position and a radially retracted position, stops on the disc for engaging with and retaining each of the carrying elements in their extended and retracted positions, each carrying element being tiltable about an axis extending in a plane

being biased into engagement with the perpendicular to the axis of the disc and transversely to the direction of radial movement of the said element in order to effect disengagement of the said element from the stops and each carrying element being biased into engagement with the stops.

70 In a preferred form of the invention, the paper carriers are disposed, so as to be radially slidable, between the supporting disc and a spring ring which is fastened to the latter, and which biases the carriers into engagement with the stops. In this way, good guiding is obtained for the paper carriers as they slide. Furthermore there is no longer any need to spring the paper carriers, or to construct them as self-springing parts.

75 Preferably the spring ring defines a plurality of radially extending recesses on its circumference, one wall of each recess being slotted to form a spring element and the paper carriers are received in the recesses so that the recesses guide the movement of the carriers and the spring elements bias the carriers into engagement with the stops. This gives automatic engagement and simultaneous axial arresting of the paper carriers.

90 Conveniently, the movement of the paper carriers between their extended and retracted positions after tilting takes place in a direction inclined with respect to the plane of the disc.

100 Desirably, the paper carriers are in the form of bars having generally rectangular transverse cross-sections. On the side facing the supporting disc they are preferably provided with a stop collar running concentrically with the axis of the disc in the circumferential direction and also with a drop-in collar. These collars secure the carriers in their operative and inoperative position, the stop collar being in operative connection with an externally situated wall of a recess let into the supporting disc and the drop-in collar with the stops provided on the supporting disc. As a result, it is impossible for the paper carriers, during rotation of the transfer drum, either to be flung outwards by the centrifugal forces which occur or to be forced inwards by the pull of the sheet.

110 In order that the invention may be better understood, a preferred embodiment thereof will now be described by way of example only, with reference to the accompanying drawings in which:—

125 Figure 1 a front elevation of a sheet carrying disc according to the invention with its paper carriers in their extended or operative positions and their retracted inoperative positions;

Figure 2 a section taken along the line 130

A-A of Figure 1 in the operative position of a paper carrier;

Figure 3 a section taken along the line A-A in the inoperative position of a paper carrier;

Figure 4 a section taken along the line A-A of Figure 1 during adjustment of a paper carrier; and

Figure 5 a section taken along the line B-B of Figure 3.

On the shaft 1 of a sheet transfer drum there is disposed, so as to be axially slidable and fixable, a number of supporting discs 2 in the shape of circular arc segments with semi-circular guide 3. Formed in the semicircular guides 3 are fitting grooves 4 in which engages a fitting key 5 inserted in the shaft 1, thereby preventing the supporting discs 2 from twisting.

The supporting discs 2 are fastened to the shaft 1 by way of tension springs 6 which are mounted on one side of the extended, semicircular guides 3 so as to move round pins 7. The other side of the semicircular guides 3, likewise extended, is provided with catches 8 under which engage the tension springs 6 in the stretched state.

The front end of each supporting disc 2 is provided with a recess 9 and, between this recess 9 and the peripheral surface 10 of the supporting disc 2 in the vicinity of its outer circumference with an arresting groove 11.

Single or multi-part spring rings 13 are fixed to the supporting discs 2 in the recesses 9 by means of screws 12 in such a way that their circumference coincides with that of the supporting discs 2. Formed in the outer circumference of the spring rings 13 is any desired number of radial, rectangular recesses 14 at selectable intervals, the base surface of which runs circumferentially. Thus in the region of these recesses 14 there remain only thin external walls of the spring ring 13 concerned which, at the lateral faces of the recesses 14 are slit up to approximately two-thirds of the depth, and are thereby subdivided into elastic spring elements 15.

Inserted in the recesses 14 of the spring rings 13 screwed onto the supporting discs 2 are compression springs 16 for which the recesses 14 thus act as a spring cage. In this connection, the compression springs 16 are taken through the lateral faces of the recesses 14 and also through their spring elements 15 and the supporting discs 2. Above the compression springs 16, bar-shaped paper carriers 17 are inserted in the recesses 14. The bar-shaped paper carriers 17 have a rectangular cross-section and have a circumferentially-extending base surface. Each of the paper carriers 17 is provided on the side facing the supporting

disc 2, at its lower end, with a stop collar 18 of which the upper side strikes the externally situated wall of the recess 9 of the supporting disc 2 in the operative position of the paper carrier 17. Thus the stop collar 18 acts as a protection for the operative position 19 of the paper carriers 17 to ensure that during adjustment these cannot come out of the recesses 14 under the action of the compression springs 16 or under the action of the centrifugal force of the rotating sheet transfer drum.

Moreover, each of the paper carriers 17 has, on the side facing the supporting disc 2, a drop-in collar 21 running concentrically with the drum axle 20 which, in the operative position 19 of the paper carrier 17, comes to rest on the peripheral surface 10 of the associated supporting disc 2 and, in the inoperative position 22 of the paper carrier 17 engages in the arrest groove 11 of this supporting disc 2. On the one hand, through the fact that the drop-in collar 21 of the paper carriers 17, in their inoperative position 22, rests on the peripheral surfaces 10 of the supporting discs 2, the paper carriers 17 cannot be pushed into their inoperative position 22 through the tension resulting from the pulling of the sheet 23 off the rubber cylinder while the machine is running, while on the other hand, in their inoperative position 22 through the arresting of the drop-in collar 21 in the respective arrest groove 11, the paper carriers 17 cannot be forced out of their operative position 19 by the action of the compression spring 16 or the centrifugal forces occurring during rotation of the sheet transfer drum.

The faces 24 forming the support edges 25 of the paper carriers 17 are angular in cross-section. The actual support edges 25 thus also run concentrically with the drum axle 20 and are radiussed at their tips.

The above-described device is adjusted in the following manner.

To move the paper carriers 17 of the sheet carrying disc 26 from their operative position 19 into their inoperative position 22 they are first tilted round a tilting axis 27 running transversely to their longitudinal axis 28 in the plane of the sheet carrying disc 30 at the edge of the externally situated wall of the recess 9 by finger pressure on the support edges 25 against the force of the spring elements 15 to such an extent out of the plane of the transfer segments 28 that the lower face of the drop-in collar 21 is no longer resting on the peripheral surface 10. With the paper carrier 17 in this inclined position 29 its drop-in collar 21 can no longer check any shift directed radially relative to the drum axle 20.

Starting from this inclined position 29

the paper carriers 17 are then pushed in by gentle radial pressure, the sliding movement taking place not plane parallel to the supporting disc 2 but in a plane 5 lying at an acute angle to the supporting disc. When the inoperative position 22 is reached the drop-in collar 21 of the paper carriers 17 engages in the arrest groove 11 of the supporting disc 2 automatically, 10 through the spring action of the spring elements 15 directed against the respective supporting disc 2, whereby the paper carriers 17 are again arrested and prevented from radial sliding during the running of 15 the machine.

Adjustment of the paper carriers 17 from their inoperative position 22 into their operative position 19 takes place in the same sequence only with the difference 20 that the paper carriers 17 are pressed radially outwards through the force of the compression springs 16 until the upper side of their stop collar 18 strikes against the outer margin of the recess 9 in the sup- 25 porting disc 2, preventing any further shifting of the paper carriers 17. At the same time the drop-in collar 21 of the paper carriers 17 comes into a position on the peripheral surface 10 of the associated sup- 30 porting disc 2.

The invention is naturally not restricted to the form of construction represented in Figures 1 to 5 and embodied in the description. For example the construction of 35 the supporting disc 2 and of the spring ring 3, the shape of the paper carriers 17, and the choice of springing means may all be varied.

The embodiment of the invention described above enables the paper carriers to be operated easily and ensures quick and time-saving adjustment since the paper carriers can be moved with a simple gentle pressure of the finger into their operative 40 and also into their inoperative position. The automatic arresting of the paper carriers makes it unnecessary to provide additional arresting means and eliminates the risk of incorrect or incomplete changing 45 over of the paper carriers. The arresting device also gives the advantage that the paper carriers cannot be shifted again by radial pressure alone, thus eliminating the risk of accidental engagement thereof in 50 their inoperative position through the tension resulting from pulling the sheet off the rubber cylinder.

WHAT WE CLAIM IS:—

1. A sheet carrying disc for a sheet 60 transfer drum of a printing machine comprising a plurality of carrying elements mounted on the periphery of the disc for movement between a radially extended position and a radially retracted position, 65 stops on the disc for engaging with and re-

taining each of the carrying elements in their extended and retracted positions, each carrying element being tiltable about an axis extending in a plane perpendicular to the axis of the disc and transversely to the direction of radial movement of the said element in order to effect dis- 70 engagement of the said element from the stops and each carrying element being biased into engagement with the stops. 75

2. A sheet carrying disc according to claim 1, wherein the carrying elements are slidably mounted between the disc and a spring ring which is fastened to the disc and biases the carrying elements into en- 80 gagement with the stops.

3. A sheet carrying disc according to claim 2, wherein the spring ring defines a plurality of radially extending recesses on its circumference, one wall of each recess being slotted to form a spring element, and the carrying elements are received in the recesses, so that the recesses guide the movement of the carrying elements be- 85 tween the extended and retracted positions and the spring elements bias the carrying elements into engagement with the stops. 90

4. A sheet carrying disc according to claim 3, wherein compression springs inserted in the recesses of the spring ring radially inwardly of the carrying elements bias the carrying elements towards their extended position. 95

5. A sheet carrying disc according to any one of claims 1 to 4, wherein the movement of the carrying elements be- 100 tween the extended and retracted positions after they have been tilted takes place in a direction which is inclined with respect to the plane of the disc. 105

6. A sheet carrying disc according to any one of claims 1 to 5, wherein each carrying element is in the form of a bar having a generally rectangular transverse cross-section. 110

7. A sheet carrying disc according to claim 6, wherein each carrying element is provided with a stop collar on the side facing the disc and running in the circumferential direction of the disc concentrically with the axis of the disc, the stop collar being engageable with a wall of a recess in the disc which defines the said stop and which limits the radial movement of the element. 115 120

8. A sheet carrying disc according to claim 6 or claim 7, wherein each carrying element is provided with a drop-in collar on the side facing the disc, and the stops on the disc comprise a groove in the disc, in which the drop-in collar engages in the retracted position, and a peripheral surface of the disc, with which the drop-in collar engages in the extended position of the element. 125 130



the paper carriers 17 are then pushed in by gentle radial pressure, the sliding movement taking place not plane parallel to the supporting disc 2 but in a plane lying at an acute angle to the supporting disc. When the inoperative position 22 is reached the drop-in collar 21 of the paper carriers 17 engages in the arrest groove 11 of the supporting disc 2 automatically, through the spring action of the spring elements 15 directed against the respective supporting disc 2, whereby the paper carriers 17 are again arrested and prevented from radial sliding during the running of the machine.

Adjustment of the paper carriers 17 from their inoperative position 22 into their operative position 19 takes place in the same sequence only with the difference that the paper carriers 17 are pressed radially outwards through the force of the compression springs 16 until the upper side of their stop collar 18 strikes against the outer margin of the recess 9 in the supporting disc 2, preventing any further shifting of the paper carriers 17. At the same time the drop-in collar 21 of the paper carriers 17 comes into a position on the peripheral surface 10 of the associated supporting disc 2.

The invention is naturally not restricted to the form of construction represented in Figures 1 to 5 and embodied in the description. For example the construction of the supporting disc 2 and of the spring ring 3, the shape of the paper carriers 17, and the choice of springing means may all be varied.

The embodiment of the invention described above enables the paper carriers to be operated easily and ensures quick and time-saving adjustment since the paper carriers can be moved with a simple gentle pressure of the finger into their operative and also into their inoperative position. The automatic arresting of the paper carriers makes it unnecessary to provide additional arresting means and eliminates the risk of incorrect or incomplete changing over of the paper carriers. The arresting device also gives the advantage that the paper carriers cannot be shifted again by radial pressure alone, thus eliminating the risk of accidental engagement thereof in their inoperative position through the tension resulting from pulling the sheet off the rubber cylinder.

WHAT WE CLAIM IS:—

1. A sheet carrying disc for a sheet transfer drum of a printing machine comprising a plurality of carrying elements mounted on the periphery of the disc for movement between a radially extended position and a radially retracted position, stops on the disc for engaging with and re-

taining each of the carrying elements in their extended and retracted positions, each carrying element being tiltable about an axis extending in a plane perpendicular to the axis of the disc and transversely to the direction of radial movement of the said element in order to effect disengagement of the said element from the stops and each carrying element being biased into engagement with the stops.

2. A sheet carrying disc according to claim 1, wherein the carrying elements are slidably mounted between the disc and a spring ring which is fastened to the disc and biases the carrying elements into engagement with the stops.

3. A sheet carrying disc according to claim 2, wherein the spring ring defines a plurality of radially extending recesses on its circumference, one wall of each recess being slotted to form a spring element, and the carrying elements are received in the recesses, so that the recesses guide the movement of the carrying elements between the extended and retracted positions and the spring elements bias the carrying elements into engagement with the stops.

4. A sheet carrying disc according to claim 3, wherein compression springs inserted in the recesses of the spring ring radially inwardly of the carrying elements bias the carrying elements towards their extended position.

5. A sheet carrying disc according to any one of claims 1 to 4, wherein the movement of the carrying elements between the extended and retracted positions after they have been tilted takes place in a direction which is inclined with respect to the plane of the disc.

6. A sheet carrying disc according to any one of claims 1 to 5, wherein each carrying element is in the form of a bar having a generally rectangular transverse cross-section.

7. A sheet carrying disc according to claim 6, wherein each carrying element is provided with a stop collar on the side facing the disc and running in the circumferential direction of the disc concentrically with the axis of the disc, the stop collar being engageable with a wall of a recess in the disc which defines the said stop and which limits the radial movement of the element.

8. A sheet carrying disc according to claim 6 or claim 7, wherein each carrying element is provided with a drop-in collar on the side facing the disc, and the stops on the disc comprise a groove in the disc, in which the drop-in collar engages in the retracted position, and a peripheral surface of the disc, with which the drop-in collar engages in the extended position of the element.

9. A sheet carrying disc according to any one of claims 1 to 8, wherein each carrying element includes end faces which converge to form a support edge which runs concentrically with the axis of the disc and which is curved in the axial direction.

10. A sheet carrying disc substantially as hereinbefore described with reference to the accompanying drawings.

11. A sheet transfer drum for a printing machine comprising a plurality of similar sheet-carrying discs according to any one of claims 1 to 10 mounted concentrically on an axle.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1977.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.



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