

PATENT SPECIFICATION

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(54) TURNING DRUM FOR A PERFECTING PRINTING PRESS

(71) We, HEIDELBERGER DRUCK-
 MASCHINEN AKTIENGESSELLSCHAFT,
 a body corporate organised under the laws
 of Germany, of Alte Eppelheimer Strasse
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 Federal Republic of Germany, do hereby
 declare the invention, for which we pray
 that a patent may be granted to us, and the
 method by which it is to be performed, to be
 particularly described in and by the
 following statement:—

The invention relates to turning drums for
 perfecting printing presses.

Conventional turning drums for perfect-
 ing printing presses carry grippers for
 gripping a sheet while in contact with the
 drum, the grippers being operated by
 pivotable drive elements. Each drive
 element carries a cam follower which is
 selectively applicable to mutually coaxial
 control cams so that the turning drum can
 be changed over from perfecting to recto-
 (one side) perfecting.

In a known construction of this type
 (German Printed Specification No.
 24 14 998) cam followers at the end faces of
 the turning drum are individually adjustable
 with respect to the control cams. In this case
 it is necessary, when changing over from
 recto-printing to perfecting or *vice versa*,
 for a cam follower on each end face of the
 turning drum to be applied to the corres-
 ponding control cams. The disadvantage of
 this change-over is that when only one cam
 follower is adjusted, faults can occur in
 gripper movement and hence in sheet
 transport.

Another device for changing over gripper
 movement is disclosed in German Printed
 Specification 2,133,693, wherein the control
 cams are displaced relative to the cam
 followers and the drum bearings. This
 construction has the disadvantage that in
 order to reduce bearing play between
 control cam and drum bearing, the parts
 have to be made to very high precision.
 Furthermore this change-over necessitates a
 complicated adjusting mechanism, likewise

involving bearing play, which is expensive
 and prone to faults.

According to the invention there is
 provided a turning drum for a perfecting
 printing press comprising drive elements for
 effecting movement of grippers for gripping
 a sheet while in contact with the drum, each
 drive element including a cam follower
 adapted for selective engagement with two
 mutually co-axial control cams for actuating
 the grippers, the drive elements being
 pivotal on a bridge which extends parallel to
 the axis of the drum the bridge being
 mounted in a cavity in the drum body and
 slidable parallel to the axis of the drum by a
 distance corresponding to the distance
 between the two control cams.

Preferably, the drive elements are
 mounted by axially aligned pivot pins in end
 faces of the bridge and are mutually
 tensioned by means of a torsion bar spring.
 This enables the change-over device to be
 accommodated in a minimum space within
 the drum.

In order to permit easy and rapid sliding
 of the bridge by an operator, the sliding
 movement can be produced by rotating an
 eccentric bolt one end of which is
 connected to the bridge, and the other end
 of which is connected to the drum. For
 example, the bolt can include an eccentric
 pin which engages a slotted plate fastened in
 the cavity of the drum. By rotating the
 eccentric bolt, the bridge can be slid into
 one of its two limit positions in each case.

In an alternative embodiment, a simple
 and reliable adjustment of the bridge is
 provided by a threaded spindle mounted in
 bearings on the bridge and on the drum, the
 spindle being threadedly mounted in one of
 the bearings which, for example, can be
 fastened in the drum cavity, and rotatably
 mounted, but secured against axial
 movement in the other bearings.

Advantageously the bridge is guided in the
 cavity on slides or wheels which may be
 adjusted by eccentric bolts, and can be
 fastened by means of screws after sliding. By

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this means, and accurate guidance of the bridge in the drum, and a secure fastening of the same are achieved.

5 A preferred turning drum of the invention will now be described, by way of example only, with reference to the drawings, in which:—

10 Figure 1 shows a side elevation of a turning device for perfecting printing presses in the recto-printing position, and including the drum;

Figure 2 shows a longitudinal section through the turning drum of Figure 1;

15 Figure 3 shows a plan of an adjusting device of the drum of Figure 1;

Figure 4 shows a section through the adjusting device on line A—A;

20 Figure 5 shows a longitudinal section through an alternative adjusting device for the drum of Figure 1; and

Figure 6 shows a partial cross-section through the turning drum of Figure 1 and including a still further adjusting device.

25 The printing press illustrated in the drawings has, as Figure 1 shows, a looping or transfer drum 1 and a turning drum 2, the latter being arranged between the looping drum 1, and an impression cylinder 3. Further cylinders of the printing press, between which the three drums 1, 2, 3 are positioned, are not shown. A further transfer drum, which must lie between the previous printing unit and the looping drum 1, is also omitted from the drawing for reasons of clarity.

35 The looping drum 1 has two sheet guide surfaces 4 and 5. They are mutually separated by two mutually diametrically opposite drum channels 6 (only one being shown in Figure 1). On a wall of each drum channel 6 there are arranged grippers 7 and on the opposite wall, a suction bar 8 extends across the total drum width. A sheet 9 printed on one side is present on the sheet guide surface 4 of the looping drum 1, its front edge being retained by the grippers 7 and its rear end by the suction bar 8 arranged at the end of the sheet guide surface 4.

50 Because the turning drum 2 exhibits only half the diameter of the looping drum 1, it has only one drum channel 10, in which bearings 11 for tongs gripper halves 12, 12' are fitted. Grippers are likewise provided in a channel, not shown, of the impression cylinder 3.

55 As Figure 2 shows, the drums or cylinders 1 to 3 of the turning device are mounted in side walls 13 and 14 of the printing press, which carry the turning drum 2 through the intermediary of journals 15 and 16. The turning drum 2 is driven through a driving gear wheel fastened on its shaft, not shown.

65 Between an end wall 17 of the turning drum 2 and the side wall 13 on the drive side

of the drum 2 there is a drive element 18 for the tongs gripper half 12. It is mounted rotatably on a pin 19. On the operator's side a corresponding drive element 21 for the tongs gripper half 12' is present between the other end wall 20 of the turning drum 2 and the side wall 14. It is likewise mounted pivotably on a pin 22. Both drive elements 18 and 21 encircle the journals 15 and 16 respectively of the turning drum 2.

The construction of the drive elements 18 and 21 can be seen in detail from Figure 1. The two drive elements each have a tooth segment 23 or 24 at their ends opposite the pins 19, 22.

80 According to Figure 1 a slitted eye-bearing 25 is provided in the drive element 18 above the pin 19, in which a bolt 26 can be clamped by means of a clamp screw 27 or pinned in the case of an unslitted eye-bearing. A cam follower 28 is mounted rotatably on this bolt 26. This cam follower can co-operate selectively with two control cams 29 or 30. The two control cams are fastened to the inside of the side wall 13 co-axially with the turning drum 2.

85 Identical control means are provided on the operator's side. The slitted eye-bearing 25 for the bolt 26 of the cam follower 28 however is not located above but below the pin 22 because the drive element 21 on the other side of the drum is arranged in mirror image relationship. Between the side wall 14 and the drive element 21 two control cams 31 and 32 are likewise fastened on the side wall 20 co-axially with the turning drum 2. The cam follower 28 can be applied against one at a time of the two control cams 31 and 32.

100 A torsion bar spring 33 extending within a bridge acts upon the drive elements 18 and 21 so that their cam followers 28 are always urged against the control cams 29 or 30 and 31 or 32. The torsion bar spring 33 is mounted in spring bearings 34 which are in turn fastened to the pins 19 and 22. The two drive elements 18 and 21 are mutually tensioned through the pins 19, 22 by the torsion of the torsion bar spring 33.

105 The tooth segment 23 of the drive element 18 meshes with a gear wheel 35 which is firmly connected to a gripper shaft 36. This gripper shaft 36 extends co-axially with and through a gripper tube 37 and is mounted rotatably in the latter, as may be seen in detail from Figure 2. The gripper tube 37 extends along the channel 10 of the turning drum 2 and is arranged rotatably in the bearings 11 already mentioned. On the operator's side there is fastened on the free end of the gripper tube 37 a gear wheel 38 which meshes with the tooth segment 24 of the drive element 21 and corresponds fully to the previously mentioned gear wheel 35. 130

as regards number of teeth. The two drive elements 18, 21 control, through the tooth segments 23, 24 and the gear wheels 35, 38, the movement of the tongs gripper halves 12, 12' in conformity with the respective control cams 29 and 30 or 31 and 32.

The drive elements 18, 21 are mounted through the intermediary of the pins 19, 22 and the bearing bushings 39 in the bridge 40 which extends along the length of the drum body. The bridge 40 is fastened in a cavity 41 in the drum body 2 by means of screws 42. The screws 42 are arranged in slits 43 which admit a longitudinal sliding of the bridge 40. By this means it is possible to adjust both cam followers 28 in common from the cams 30, 32 on to the cams 29, 31.

For the longitudinal sliding of the bridge 40 there is mounted rotatably in an eye-bearing 44 on its underside an eccentric bolt 45 which engages by its eccentric pin 46 a slotted plate 47 fastened in the cavity 41 (Figures 3 and 4). The slot 48 in the slotted plate 47 is dimensioned so that the eccentric bolt 45 can execute a rotation of 180° and in doing so slides the bridge 40 by a distance correspondingly to the interval between the two control cams 29 and 30 or 31 and 32. The slotted plate 47 is fastened in the cavity 41 by means of screws 49.

Another construction for the longitudinal sliding of the bridge 40 employs a screw threaded spindle 50 which is screwed by its screw thread into a bearing 51 which is fastened in the cavity 41. It is arranged rotatably by its other end in a further bearing 52 which is fastened to the other side of the bridge 40. A set collar 53 serves to secure the screw-threaded spindle axially in the bearing 52. By rotating the screw threaded spindle 50 of Figure 5, the bridge 40 can be slid to the right by the amount of the interval of the control cam. When the bridge 40 is returned to the position illustrated, the adjustment is limited by the length of the slot 43. With both embodiments of adjusting device, the bridge 40 and hence the cam follower 28 can be adjusted with reference to the control cams 29, 31 or 30, 32 in a simple and reliable manner. After each adjusting operation the bridge 40 is firmly clamped in the cavity 41 by means of screws 42, so that a reliable and accurate positioning of the drive elements 18, 21 is ensured.

For easier sliding the bridge 40 may be guided in the cavity 41 on slides 54 or wheels 55. The slides or wheels in this case are adjustable through the intermediary of eccentric bolts 56. After adjustment the eccentric bolts 56 are secured against rotation by means of a check nut 57. In this case the slides 54 or wheels 55 are arranged in pairs in each case in the regions of both

ends of the bridge 40, while the eccentric bolts 56 are mounted rotatably in bores 58 in the body of the turning drum 2 and recesses 59 are provided for the check nuts 57 in each case. With this means of support the bridge 40 can be adjusted without play in the cavity and can be slid with ease. After sliding, the bridge 40 is secured by tightening the screws 42, so that an accurate and stable support of the drive element 18, 21 is likewise ensured.

The embodiments of the invention described above obviate disadvantages of the known turning drums described previously and provide simple and inexpensive change-over devices for the gripper movement, with which faults in sheet transport can be eliminated and the change-over from recto-printing to perfection is simplified without prejudicing the sheet transfer in correct register.

WHAT WE CLAIM IS:—

1. A turning drum for a perfecting printing press comprising drive elements for effecting movement of grippers for gripping a sheet while in contact with the drum, each drive element including a cam follower adapted for selective engagement with two mutually co-axial control cams for actuating the grippers, the drive elements being pivotal on a bridge which extends parallel to the axis of the drum, the bridge being mounted in a cavity in the drum body and slidably parallel to the axis of the drum by a distance corresponding to the distance between the two control cams.

2. A turning drum according to claim 1, wherein the drive elements are mounted in end faces of the bridge through the intermediary of axially-aligned pivot pins and are mutually tensioned by a torsion bar.

3. A turning drum according to claim 1 or claim 2, wherein the bridge is slidable by rotating an eccentric bolt one end of which is mounted in the bridge, and the other end of which is mounted in the drum.

4. A turning drum according to claim 1 or claim 2, wherein the bridge is slidable by rotating a threaded spindle mounted in bearings on the bridge and the drum, the spindle being threadedly mounted in one of the bearings and rotatably mounted but secured against axial movement in the other bearings.

5. A turning drum according to any one of claims 1 to 4, wherein the bridge is guided in the cavity on slides or wheels and the drum has screw means for fastening the bridge to the drum after sliding.

6. A turning drum for a perfecting printing press substantially as hereinbefore described with reference to Figures 1 to 4 or

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as regards number of teeth. The two drive elements 18, 21 control, through the tooth segments 23, 24 and the gear wheels 35, 38, the movement of the tongs gripper halves 12, 12' in conformity with the respective control cams 29 and 30 or 31 and 32.

The drive elements 18, 21 are mounted through the intermediary of the pins 19, 22 and the bearing bushings 39 in the bridge 40 which extends along the length of the drum body. The bridge 40 is fastened in a cavity 41 in the drum body 2 by means of screws 42. The screws 42 are arranged in slits 43 which admit a longitudinal sliding of the bridge 40. By this means it is possible to adjust both cam followers 28 in common from the cams 30, 32 on to the cams 29, 31.

For the longitudinal sliding of the bridge 40 there is mounted rotatably in an eye-bearing 44 on its underside an eccentric bolt 45 which engages by its eccentric pin 46 a slotted plate 47 fastened in the cavity 41 (Figures 3 and 4). The slot 48 in the slotted plate 47 is dimensioned so that the eccentric bolt 45 can execute a rotation of 180° and in doing so slides the bridge 40 by a distance correspondingly to the interval between the two control cams 29 and 30 or 31 and 32. The slotted plate 47 is fastened in the cavity 41 by means of screws 49.

Another construction for the longitudinal sliding of the bridge 40 employs a screw threaded spindle 50 which is screwed by its screw thread into a bearing 51 which is fastened in the cavity 41. It is arranged rotatably by its other end in a further bearing 52 which is fastened to the other side of the bridge 40. A set collar 53 serves to secure the screw-threaded spindle axially in the bearing 52. By rotating the screw threaded spindle 50 of Figure 5, the bridge 40 can be slid to the right by the amount of the interval of the control cam. When the bridge 40 is returned to the position illustrated, the adjustment is limited by the length of the slot 43. With both embodiments of adjusting device, the bridge 40 and hence the cam follower 28 can be adjusted with reference to the control cams 29, 31 or 30, 32 in a simple and reliable manner. After each adjusting operation the bridge 40 is firmly clamped in the cavity 41 by means of screws 42, so that a reliable and accurate positioning of the drive elements 18, 21 is ensured.

For easier sliding the bridge 40 may be guided in the cavity 41 on slides 54 or wheels 55. The slides or wheels in this case are adjustable through the intermediary of eccentric bolts 56. After adjustment the eccentric bolts 56 are secured against rotation by means of a check nut 57. In this case the slides 54 or wheels 55 are arranged in pairs in each case in the regions of both

ends of the bridge 40, while the eccentric bolts 56 are mounted rotatably in bores 58 in the body of the turning drum 2 and recesses 59 are provided for the check nuts 57 in each case. With this means of support the bridge 40 can be adjusted without play in the cavity and can be slid with ease. After sliding, the bridge 40 is secured by tightening the screws 42, so that an accurate and stable support of the drive element 18, 21 is likewise ensured.

The embodiments of the invention described above obviate disadvantages of the known turning drums described previously and provide simple and inexpensive change-over devices for the gripper movement, with which faults in sheet transport can be eliminated and the change-over from recto-printing to perfection is simplified without prejudicing the sheet transfer in correct register.

WHAT WE CLAIM IS:—

1. A turning drum for a perfecting printing press comprising drive elements for effecting movement of grippers for gripping a sheet while in contact with the drum, each drive element including a cam follower adapted for selective engagement with two mutually co-axial control cams for actuating the grippers, the drive elements being pivotal on a bridge which extends parallel to the axis of the drum, the bridge being mounted in a cavity in the drum body and slidably parallel to the axis of the drum by a distance corresponding to the distance between the two control cams.

2. A turning drum according to claim 1, wherein the drive elements are mounted in end faces of the bridge through the intermediary of axially-aligned pivot pins and are mutually tensioned by a torsion bar.

3. A turning drum according to claim 1 or claim 2, wherein the bridge is slidable by rotating an eccentric bolt one end of which is mounted in the bridge, and the other end of which is mounted in the drum.

4. A turning drum according to claim 1 or claim 2, wherein the bridge is slidable by rotating a threaded spindle mounted in bearings on the bridge and the drum, the spindle being threadedly mounted in one of the bearings and rotatably mounted but secured against axial movement in the other bearings.

5. A turning drum according to any one of claims 1 to 4, wherein the bridge is guided in the cavity on slides or wheels and the drum has screw means for fastening the bridge to the drum after sliding.

6. A turning drum for a perfecting printing press substantially as hereinbefore described with reference to Figures 1 to 4 or

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as modified by Figures 5 and 6 of the drawings.

7. A perfecting printing press including a turning drum according to any one of claims 1 to 6.

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