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ROTARY TRANSFER MECHANISM FOR PRINTING MACHINES

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Fig. 1

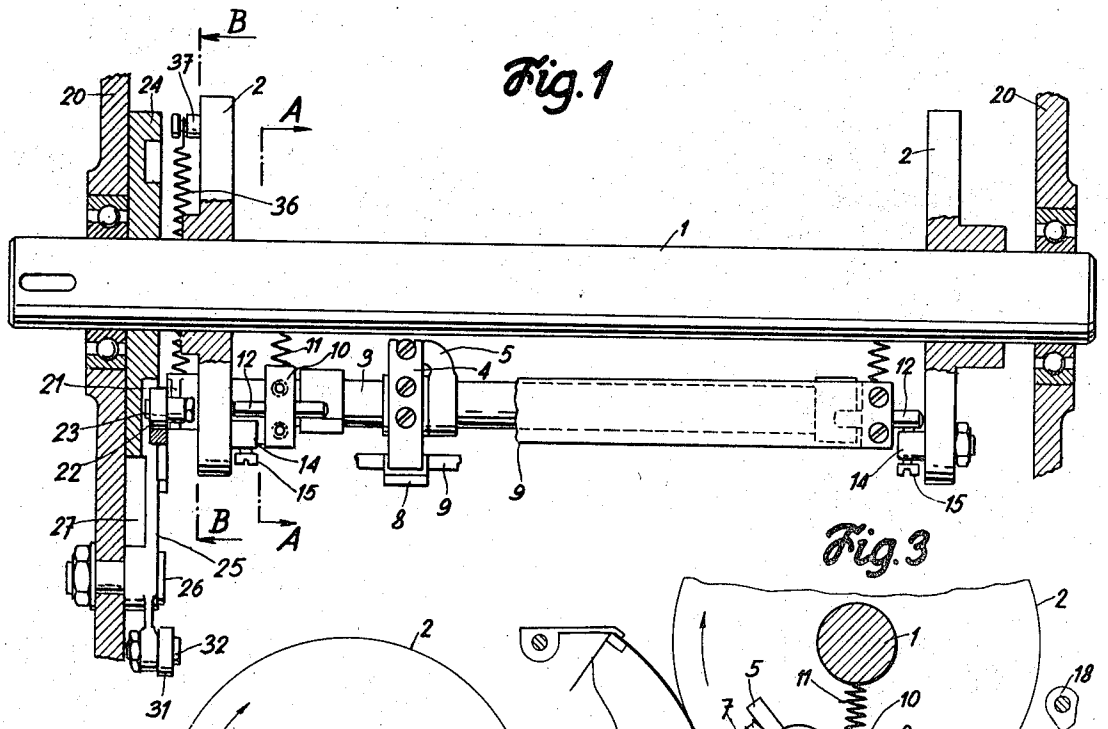


Fig. 2

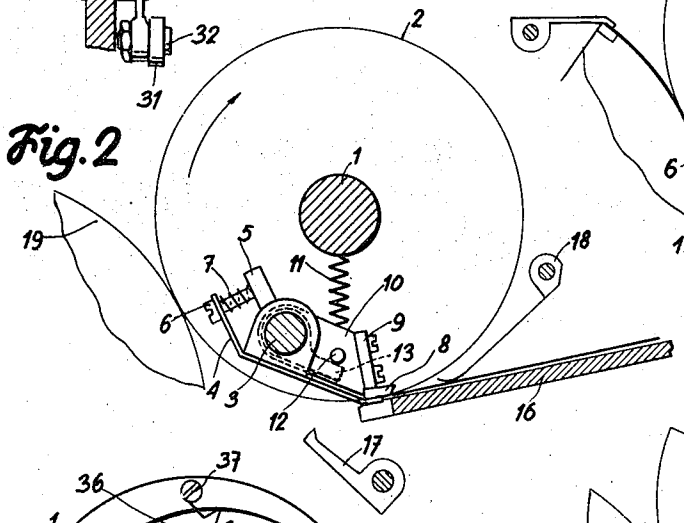


Fig. 3

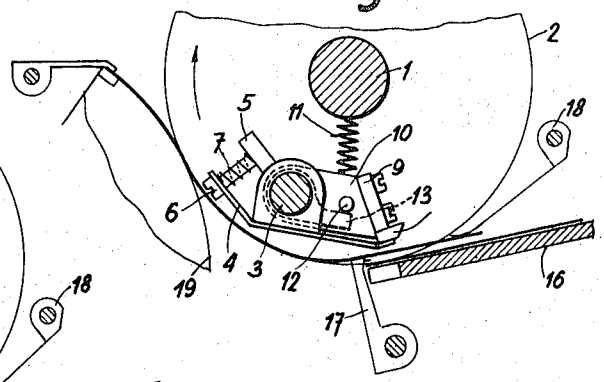


Fig. 4

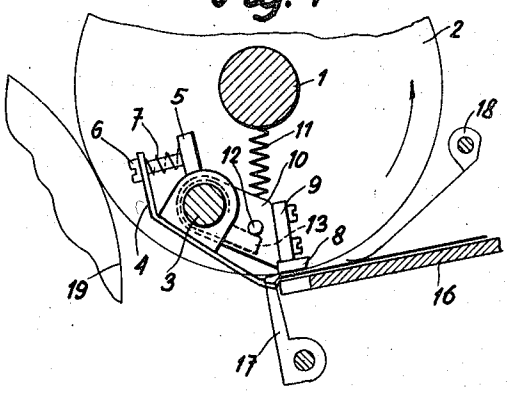
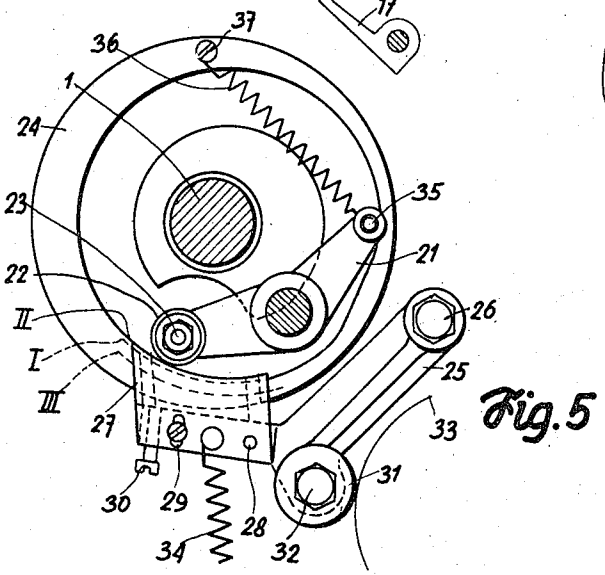


Fig. 5



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ROTARY TRANSFER MECHANISM FOR PRINTING MACHINES

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Int. Cl. B65h 29/06
U.S. Cl. 271—82 3 Claims

ABSTRACT OF THE DISCLOSURE

The grippers of the transfer mechanism are actuated by a swingable axle carrying a control lever with a roller travelling in the groove of a cam. A guide member is slidably mounted in the cam and is operated by a bent lever actuated by a cam plate so as to impart rocking movement to the swingable axis. The latter carries sleeves with abutments for gripping the paper sheet and with fingers, adapted to engage abutment pins cooperating with set screws to control the deflection of the grippers.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention relates to a rotary transfer mechanism constituting a device for the transfer of paper sheet into the grippers of a printing roller in rotary sheet printing machines.

(2) Description of the prior art

One of the known devices comprises a swingable transfer mechanism with grippers which, having transferred the sheet to the printing roller, return to their original position along a different and slightly elevated path, in order to permit the return movement of the swingable grippers without interference with the passage of the preceding paper sheet over the feeder table. This operation is performed by means of rotary excentric bushings, housing the main shaft of the swingable grippers. This coupled with an independent control of the transfer mechanism, renders the respective mechanism highly intricate. Moreover, during each operative cycle of the transfer mechanisms the latter have to be accelerated from their position of rest when gripping the sheet, to the peripheral speed of the printing roller, then decelerated until they are completely stopped. Thereupon they must be again greatly accelerated during their return movement and again slowed down until they are completely stopped. The rate of acceleration is unfavourable particularly with an arrangement of the machine in which the angle of transfer from the feeder table exceeds 120°, as for example in five-roller systems as are used in two-colour printing machines.

For this reason it is necessary to use swingable transfer mechanisms placed at a lower level and having a small angle of oscillation as well as a further transfer drum.

These disadvantages are eliminated by the arrangement of rotary transfer mechanisms, which after acceleration continue their rotary movement until they are stopped. The return movement necessary for gripping the sheet is negligible and connected with a minimum amount of acceleration. Consequently the respective mechanism as well as the proper transfer mechanisms can be lighter in weight, so that at high speed they do not cause such a large impact as the previously mentioned heavy devices. Rotary transfer mechanisms can be employed advantageously also for large angles of transfer, with the result that the further transfer drum may be dispensed with. In connection with such known rotary transfer mechanisms a tiltable

conveyor table, comprising feed guides, is used. Thus the grippers of the transfer mechanism may be stopped in the position, in which they pick up the sheet, at the instant when the rest of the preceding sheet traverses the feed table. At the moment when the end of the sheet leaves the plane of the front gauge, the whole conveying table is lifted again into the correct plane for transfer of the sheet by means of the grippers of the rotary transfer mechanisms.

It is a disadvantage of this latter device that the entire conveying table, having a large mass, has to be moved within a relatively short time. This is the cause of considerable impact and harmful application of force on the machine.

SUMMARY OF THE INVENTION

The present invention aims at removing the aforementioned disadvantages of the known rotary transfer mechanisms. The invention provides a swingable axle carrying, on the one hand pivotally mounted sleeves to each of which is fixed a bar with an abutment plate and, on the other hand, fixed fingers adapted to bear on abutment pins fitted in the sleeves and bearing on set screws, which are arranged in holder secured to carrier discs supporting the axle. Fixed to the swingable axle is a control lever, provided with a roller adapted to travel in the groove of a cam and along a track provided on a guide member placed in a slot of said cam. The guide member is pivotally mounted on a pin fixed to one end of a bent lever. This bent lever, rotatably mounted on a pivot fixed in the sidewall of the machine, is provided at one end with a control screw and with a groove for a safety screw, its other end carrying an eccentric pivot with a follower.

It is an advantage of the rotary transfer mechanisms according to the invention that it is possible to execute the respective mechanisms as well as their drive in a lighter weight than before, so that impacts occuring at higher revolutions of operation are minimized. The conveying table is stationary and the abutments are made tiltable in order to allow the passage of the grippers through the feeding plane. This arrangement is simple, light in weight and due to the fact that the centre of rotation of the abutment bar is identical with the centre of the gripper mounting, it is sufficiently accurate. Moreover the gap between the abutments of the grippers of the rotary transfer mechanisms and the abutments of the printing roller can easily be adjusted in accordance with the thickness of the sheet to be printed, with the result that its accurate transfer is ensured.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings show, by way of example, one of the possible arrangements of the transfer mechanism according to the invention in a diagrammatic representation.

FIG. 1 is an elevation, partially in section, of the transfer mechanism, the grippers assuming a slightly deflected position,

FIG. 2 is a side view, partly in section taken along the line A—A and showing the parts in a position marked I in FIG. 5, and illustrates the position at the moment when the sheet is picked up and the transfer movement begins,

FIG. 3 is a partial section along the line A—A from FIG. 1 and represents the position II of the parts, as shown in FIG. 5, and illustrates the tiltable grippers with the abutments prior to leaving the feed plane,

FIG. 4 is a partial section along the line A—A from FIG. 1 at the moment when the grippers are opened, and

FIG. 5 shows the device in a section along the line B—B from FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The rotary transfer mechanism according to the invention comprises a main shaft **1** journalled in the sidewalls **20** of a printing machine. Rigidly secured to the main shaft **1** are spaced carrier discs **2**, on which a swingable axle **3** is mounted for rotation. As seen in the figure, the axle **3** is parallel to but offset from the axis of the shaft **1**. Rockably fitted on the swingable axle **3** are spaced sleeves **10** supporting a bar **9** on which abutment plates **8** are located. Firmly secured to the swingable axle **3** are fingers **13** and holders **5**, which are provided with screws **6**, springs **7** and swingably mounted grippers **4**. Fixed to one end of the swingable axle **3** is a control lever **21** carrying a roller **22** which is journalled on a pin **23** and with a tensile spring **36**, suspended on a stud **35** and on a suspension pin **37**, which is secured to the carrier disc **2**. Each of the sleeves **10** accommodate abutment pins **12**, the outer sides of which are engaged by set screws **15** housed in holders **14**. Springs **11** are fitted in the sleeves **10** resting against the main shaft **1**.

The swingable axle **3** supports the control lever **21** with the roller **22**, so that it travels in the groove of a cam **24**. A guide member **27** extends into the cam **24** and is rockably mounted on a pin **28**, secured in one arm of a bent lever **25**. The guide member **27** is further secured in position by a safety screw **29**, screwed in said arm of the bent lever **25** and passing through a slot, provided in the guide member **27**, so as to allow the adjustment of its position by tilting the guide member **27** about the pin **28**. The arm of the bent lever **25** houses further a control screw **30**. The bent lever **25** is journalled on a pivot **26** rigidly secured in the sidewall **20** of the printing machine. One end of the bent lever **25** carries an eccentric pivot **32** on which a follower **31** is mounted for rotation, the roller being pressed by a spring **34** against a control cam plate **33**. The paper sheets are supplied along a feed table **16** and are held in position by pressure belts **18**. Mounted opposite the discharge end of the feed table **16** is a rockable front gauge **17**.

The rotary transfer mechanism embodying the invention operates as follows:

The paper sheets having been initially placed and adjusted in proper position, the bent lever **25** (FIG. 5) is shifted by means of the follower **31** during rotation of the cam plate **33** from a position marked III to a position I. Simultaneously the guide member **27** with the aid of the roller **22** and control lever **21** causes the swingable axis **3** to turn in such a way, that the grippers **4**, under the action of the pressure spring **7**, press the edge of the prepared sheet against the abutment plates **8**. In this position a gap remains between the fingers **13** and the abutment **12**. The gap secures the engagement of the abutment pin **12** with the set screw **15** so as to ensure the basic position of the bar **9**. After the sheet has been clamped, the front gauge **17** is deflected and the rotary transfer mechanisms start an accelerating movement. The roller **22** passes smoothly from the operative surface of the guide member **27** in position I to the groove, positioned in the cam **24** at the point where the curvature of the groove forms a wave-line, causing the control lever **21** and thus the swingable axle **3** to turn and open the grippers **4**, when transferring the sheet to the printing roller **19**. The smooth blending of the operative surface of the guide member **27**, when in position I, into the groove of the cam **24** is adjusted by means of the eccentric pivot **32**. The spiral shape of the groove in the cam **24** causes during further movement of the control lever **21** another partial rotation of the swingable axle **3**, in such a way that the grippers **4** are reclosed. The continuing rotation of the swingable axis **3** causes the finger **13** to abut against the abutting pins **12**.

In this way the springs **11** are depressed and the sleeves **10**, together with the bar **9** and abutment plates **8**, begin

to effect a tilting motion so that at the moment when the grippers **4** are in a position above the front gauge **17**, they are tilted to a position II (see FIG. 3), to enable the passage of the remaining part of the withdrawn sheet, while the following sheet is already prepared and properly positioned on the tiltable front gauge **17**. The roller **22** of the control lever **21** travels in this position along the operative surface of the guide member **27** in the position II, which joins the groove provided in the cam **24**; the smooth blending can be adjusted by means of the set screw **30**.

At the moment when the end of the preceding paper sheet has left the feed plane, the rotary transfer mechanisms are already at rest and it is only the bent lever **25** which is in motion by the action of the control cam plate **33** and follower **31** in such a way that the operative surface of the guide member **27** drops from position II into position III. By the action of the roller **22** and control lever **21** the swingable axis **3**, as well as the fingers **13**, are slightly rotated. This movement causes the abutment pins **12** to engage the set screws **15**, with the result that the movement of the sleeve **10**, bar **9** and abutment plates **8** is stopped. As, however, the rotary movement of the swingable axis **3** and of the holders **5** continues, the grippers **4** are opened (FIGS. 4 and 5) and after the rotary transfer mechanisms have been turned back and the grippers closed in the manner described above, the whole cycle of operation is repeated.

The drive of the main shaft **1** and consequently also of the transfer mechanisms is derived from a not-illustrated mechanism consisting of cam discs, rollers and toothed segments, which transmit the movement from the printing roller. In order to eliminate any inaccuracy in the transfer which may be caused by the undulation of a thin paper sheet, the gap between the abutment plates **8** may be adjusted by means of the set screws **15** provided with a scale, so as to alter the distance of the abutment plates **8** from the axis of the main shaft **1**.

I claim:

1. In a device for the transfer of pre-positioned paper sheets into the grippers of a printing roller in rotary sheet printing machines, a rotary transfer mechanism, comprising a machine frame, a main shaft mounted for rotation in said machine frame, means for imparting rotary movement to the main shaft, spaced carrier discs firmly secured to the main shaft, a swingable axle parallel to said shaft and mounted for rotary movement in said carrier discs, means for imparting partial rotary movement to the swingable axle in relation to the carrier discs, spaced sleeves mounted for rocking movement on the swingable axle, a supporting bar having an abutment plate fixed to each of said sleeves for rocking movement therewith, an abutment pin fixedly mounted in each of said sleeve, a pair of spaced fingers rigidly fixed to the swingable axle and adapted to engage each of the abutment pins respectively, screw means carried by said carrier discs and adapted to engage each of said abutment pins respectively.

2. In a device for the transfer of pre-positioned paper sheets into the grippers of a printing roller in rotary sheet printing machines, a rotary transfer mechanism, comprising a machine frame, a main shaft mounted for rotation in said machine frame, means for imparting rotary movement to the main shaft, spaced carrier discs firmly secured to the main shaft, a swingable axle parallel to said shaft and mounted for rotary movement in said carrier discs, means for imparting partial rotary movement to the swingable axle in relation to the carrier discs, spaced sleeves mounted for rocking movement on the swingable axle, a supporting bar having an abutment plate fixed to each of said sleeves for rocking movement therewith, an abutment pin fixedly mounted in each of said sleeve, a pair of spaced fingers rigidly fixed to the swingable axle and adapted to engage each of the abutment pins respectively, screw means carried by said carrier discs and

adapted to engage each of said abutment pins respectively, a control lever is fixed to the swingable axle carrying a roller and includes a grooved cam and a guide member located in a slot formed in said cam, said roller adapted to travel, on the one hand, in the groove provided in a cam and, on the other hand, along the operative surface of a guide member, the guide member being further mounted for adjustment on one arm of a bent lever, controlled by a control cam plate.

3. A rotary transfer mechanism as in claim 2, wherein the bent lever is journalled on a pin fixed in the frame of

the machine, and is provided at one end with a control screw and with a groove for a safety screw, its other end being provided with an eccentric pivot carrying a follower, cooperating with said control cam plate.

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