

Sept. 29, 1959

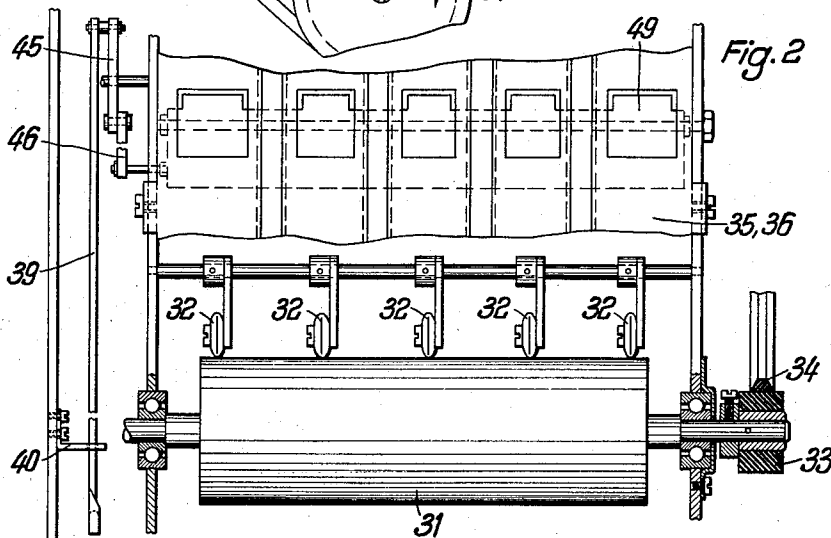
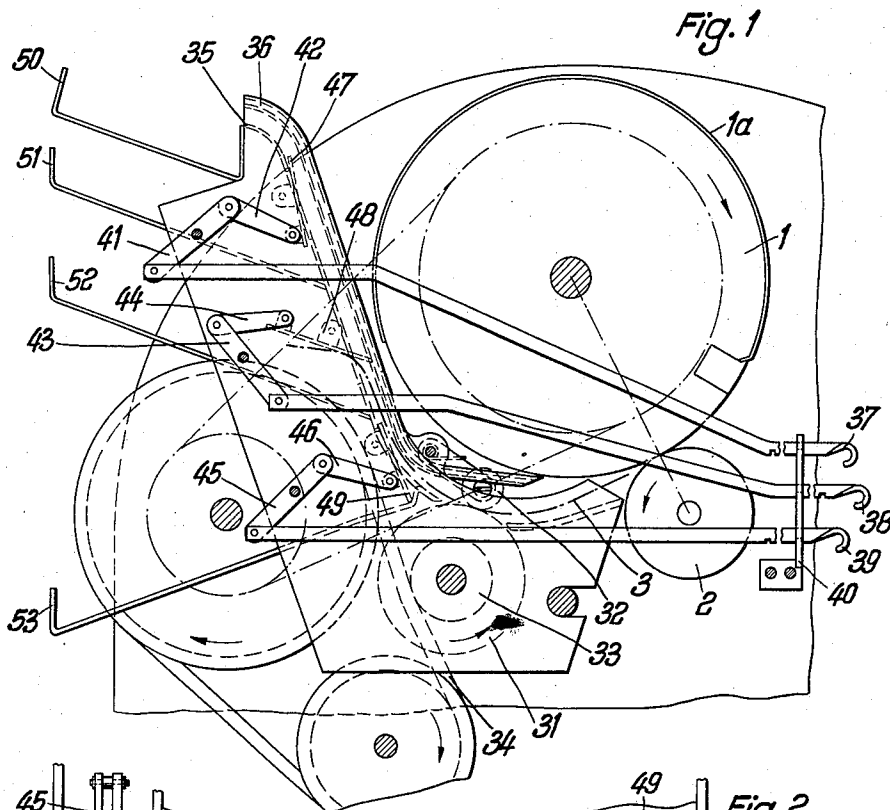
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2,906,196

EJECTOR AND SORTING MECHANISM FOR PRINTING MACHINES

Original Filed March 2, 1955

4 Sheets-Sheet 1



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2,906,196

EJECTOR AND SORTING MECHANISM FOR PRINTING MACHINES

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4 Sheets-Sheet 2

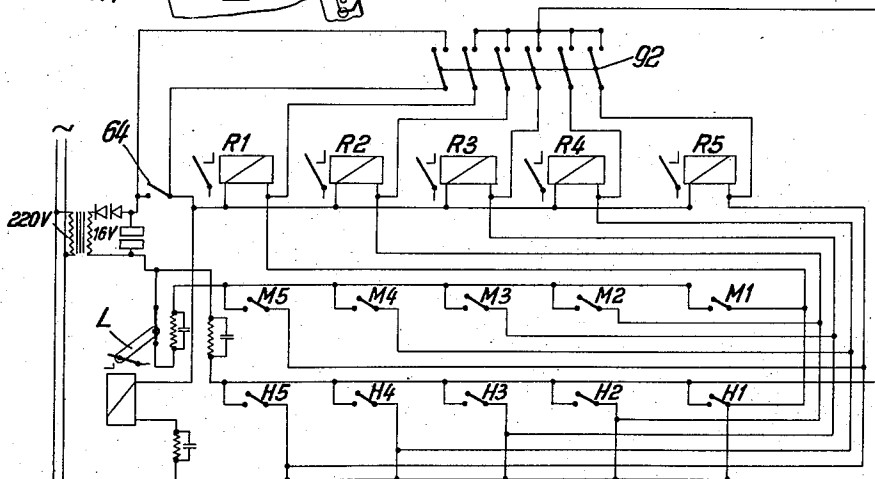
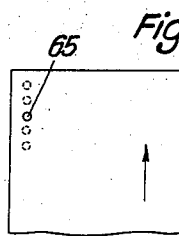
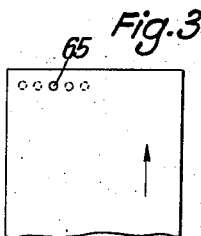
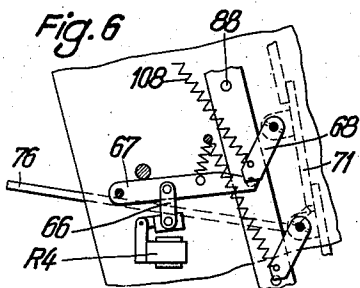
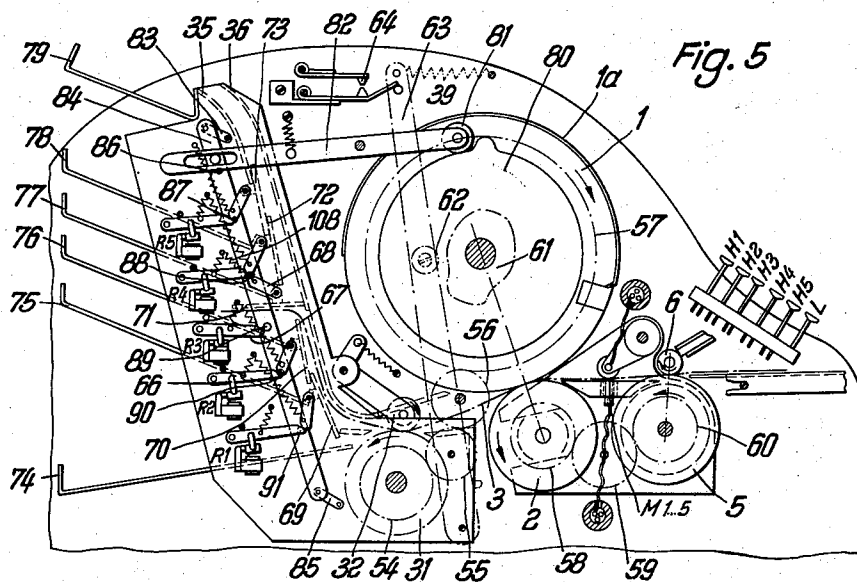


Fig. 10

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Sept. 29, 1959

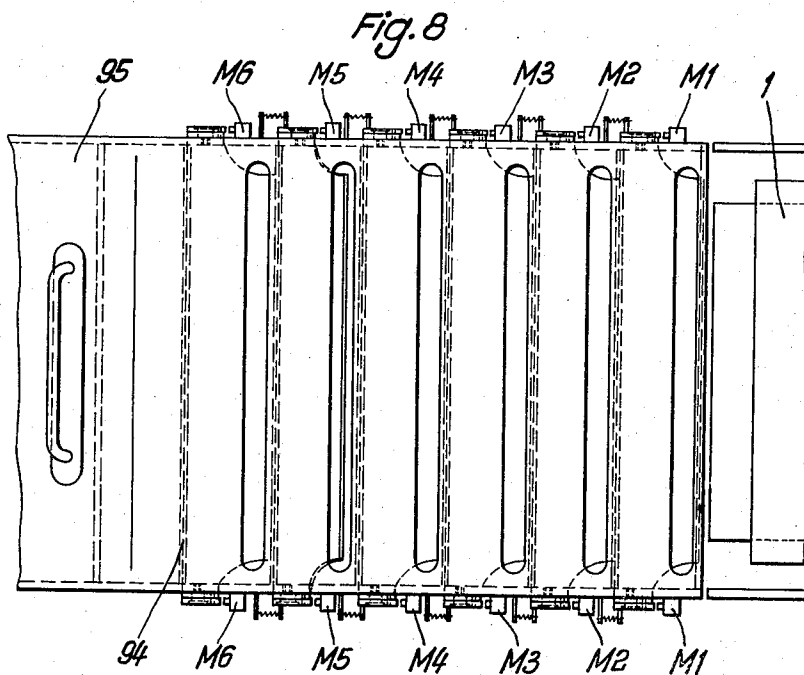
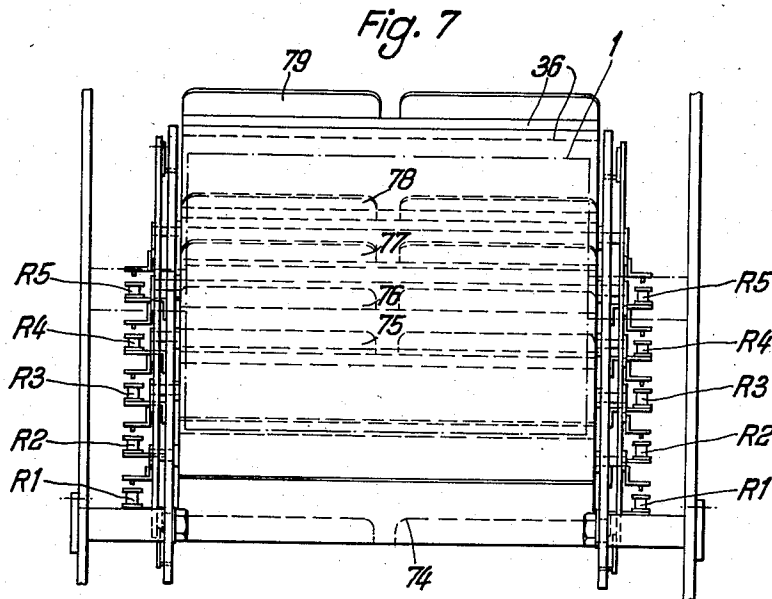
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2,906,196

EJECTOR AND SORTING MECHANISM FOR PRINTING MACHINES

Original Filed March 2, 1955

4 Sheets-Sheet 3



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Sept. 29, 1959

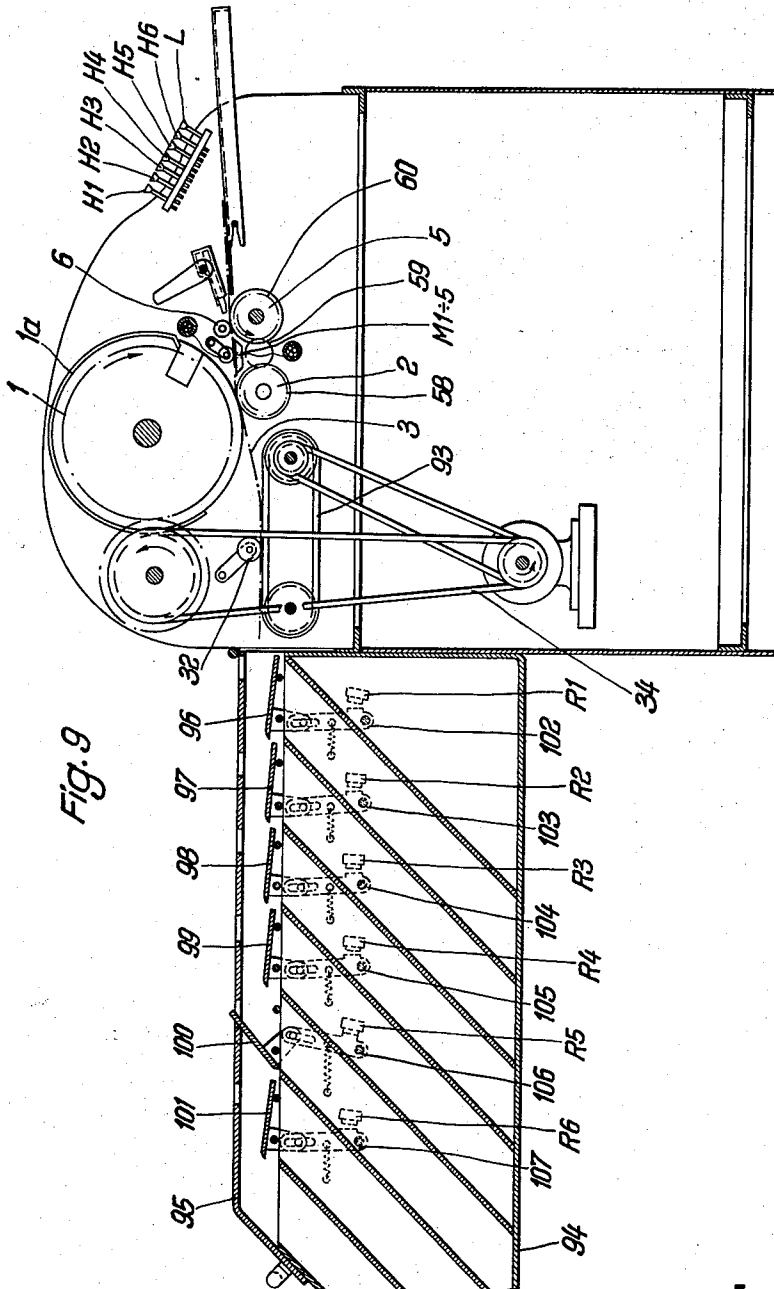
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2,906,196

EJECTOR AND SORTING MECHANISM FOR PRINTING MACHINES

Original Filed March 2, 1955

4 Sheets-Sheet 4



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2,906,196

EJECTOR AND SORTING MECHANISM FOR PRINTING MACHINES

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Original application March 2, 1955, Serial No. 491,574, now Patent No. 2,847,214, dated August 12, 1958. Divided and this application July 28, 1958, Serial No. 751,377

2 Claims. (Cl. 101—2)

The present invention relates to ejector and sorting mechanism for printing machines and more particularly to ejector and sorting mechanism for rotary duplicating machines.

The present invention is a divisional application of our copending application Serial No. 491,574, filed March 2, 1955, entitled "Ejector Mechanism for Printing Machines," now U. S. Patent No. 2,847,214.

It is one object of the present invention to provide an ejector mechanism which rapidly ejects printed sheets.

It is another object of the present invention to provide an ejector mechanism by which printed sheets are selectively deposited in different receiving means.

It is also an object of the present invention to provide side-tracking switch means in an ejector passage for selectively guiding ejected printed sheets into a plurality of receiving compartments.

It is a further object of the present invention to provide sensing means for automatically and selectively operating the side-tracking switch means in accordance with control marks on the supplied sheets.

With these objects in view the present invention mainly consists in a printing machine which comprises a pair of rotary printing rollers, movable ejector means receiving sheets printed by the printing rollers and moving at a speed higher than the peripheral speed of the printing rollers to throw printed sheets into a guide passage provided with side tracking means which are selectively operable to guide sheets to receiving means.

According to a preferred embodiment of the present invention, the guide passage which is provided with a plurality of side-tracking switch means associated with a plurality of receiving compartments for receiving assorted printed sheets. The side-tracking switch means are either manually operated, or operated by sensing means sensing control perforations in the supplied sheets.

This arrangement permits printing of various forms which are distinguished by a suitable control mark. The sensing means sense the control marks and operate side-tracking switches in the ejector passage so that, for instance, bills, order blanks, shipping papers, and similar forms can be automatically assorted in different receiving compartments. Considerable time is saved in this manner since the assorting of printed forms is a tedious and time-consuming operation. Each department of an organization may receive all the printed copies automatically deposited in one receiving compartment.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevation of a modified embodiment of the present invention;

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Fig. 2 is a fragmentary side view of the embodiment shown in Fig. 1;

Fig. 3 illustrates a sheet provided with control perforations;

Fig. 4 illustrates a sheet having another arrangement of control perforations;

Fig. 5 is a side elevation of an electrically controlled embodiment of the present invention;

Fig. 6 is a fragmentary side view of a detail of Fig. 5 shown on an enlarged scale;

Fig. 7 is a plan view of the embodiment shown in Fig. 5;

Fig. 8 is a plan view of a modified embodiment;

Fig. 9 is a side elevation partly in section of the modified embodiment of an electrically controlled arrangement of Fig. 8; and

Fig. 10 is a diagram illustrating the electrical circuit for operating the embodiments shown in Figs. 5 and 10.

In the embodiment illustrated in Figs. 1 and 2, the duplicating roller 1 is provided with attaching means for attaching a printing foil 1a and cooperates with the counter roller 2 along a printing line so that moistened copy sheets receive imprints from the printing foil 1a when passing through the printing line. This arrangement is known, and described in greater detail with reference to Fig. 5. Transporting roller means 32 are urged by resilient means, not shown, into engagement with a drum-shaped ejector roller 31, as best seen in Fig. 2. The ejector roller 31 is driven from roller 1 by friction transmission means 33, 34 at such rotary speed that its peripheral speed exceeds the peripheral speed of the printing rollers 1 and 2. The printed sheet is ejected by the ejector roller means 31 and 32 directly after passing through the printing line defined by the engaging surfaces of the printing rollers 1 and 2. The ejecting roller means grip the copy sheet with lesser pressure than the printing pressure between rollers 1 and 2, so that ejector rollers 31, 32 do not transport the sheet while the same passes through the printing line. When the sheet is released by rollers 1 and 2, the pressure between rollers 31, 32 is sufficient to rapidly accelerate the sheet. Due to the high speed of the ejector roller means 31, 32, the sheet is ejected at high speed into the passage defined by the guide means 35, 36 which are illustrated to comprise a guide wall 36 and another wall 35 which is partly formed of adjacent guide plates. These plates are portions of side-tracking switch means 47, 48 and 49. Each side-tracking switch means is movable between an inoperative position in which its guide plate is located in the general plane of the wall 35 and a position blocking the passage between the walls of the guide means 35, 36. The switches 47 and 49 are shown in inoperative positions, and the switch 48 is shown in operative position blocking the passage between the walls 35 and 36 for side-tracking sheets passing through the passage. Each side-tracking switch 47, 48, 49 is associated with the receiving means 51, 52, 53, and it will be understood that the operative switch 38 will guide the sheet into the receiving means 52. At the end of the guide means 35, 36, another receiving means 30 is provided. The switches 47, 48, 49 are operated by operating means comprising the levers 41—46 and manually operated members 37, 38 and 39 which may be locked by a locking member 40 engaging cutouts in members 37—39.

In the embodiment illustrated in Figs. 5, 6 and 7 the ejector roller 31 is driven by gear means 54, 55, 56, 57 from the printing roller 1, and its peripheral speed is greater than the peripheral speed of the printing rollers 1 and 2. The sheet is either automatically or manually supplied to the supply rollers 5 and 6. The supply rollers 5 and 6 are also driven from the drive means of the printing roller 1 and are rotated by the gear

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means 58, 59, 60. A supplied sheet is transported from the supply rollers 5 and 6 to the printing line defined by the printing rollers 1 and 2 and passes through the sensing means M1 to M5 which at the start of the operation are disconnected from the source of voltage shown in Fig. 10 by the open switch 64.

During rotation of the printing roller 1, the cam means 61 engages the cam follower roller 62 of the lever 63 and closes through lever 63 the main switch 64 so that all sensing means M1 to M5 are connected to the source of voltage when the sheet to be printed has passed into a position in which its leading edge is located a few millimeters forwardly of the sensing means M1 to M5.

During further movement of the supplied sheet, the circuit of the sensing means associated with a perforation 65 in the sheet, for instance the sensing means M4, is closed so that the associated electro-magnetic relay means R4 is energized. The attracted armature of the relay operates through a link 66 a spring loaded lever 67 so that the lever 68 is turned by its associated spring 108, best seen in Fig. 6, and turns the associated side-tracking switch 71 into blocking position. Five side-tracking switch means 69 and 73 are provided in the embodiment of Fig. 7 which cooperate with receiving compartment means 74 to 78, and an additional receiving means 79 is provided at the end of the passage of the guide means 35, 36 for receiving the sheets when all side-tracking switches are in operative positions. Similar to the embodiment shown in Fig. 1, the ejecting roller means 31, 32 eject the sheets with such force into the passage 35, 36 that an ejected sheet passes through the entire passage unless side-tracked by a switch. The ejecting roller means grip the copy sheet with lesser pressure than the printing pressure between rollers 1 and 2, so that ejector rollers 31, 32 do not transport the sheet while the same passes through the printing line. When the sheet is released by rollers 1 and 2, the pressure between rollers 31, 32 is sufficient to rapidly accelerate the sheet.

The cam means 61 has a cam track shaped in such manner that the main contact 64 is opened after the sensing means M1 to M5 have sensed the perforations 65 in a supplied sheet, so that during the same revolution of the printing roller 1, the sensing means M1 to M5 cannot become effective after a sheet has passed through the same and in the interval before the next sheet is fed to the sensing means. Shortly before a revolution of the printing drum 1 is terminated, the cam 80, which is fixedly connected to the printing roller 1, actuates the lever 82 by raising its cam follower roller 81. The operating lever system 83, 84, 85 is downwardly moved and the pins 86 to 91 return the raised operating levers 68 of previously actuated switches to initial position. For instance, the lever 68 in Fig. 5 points upwardly, since the associated switch 71 is in its operative position. When the bar 84 moves downwardly, the pin 88, best seen in Fig. 6, engages the raised lever 68 and pushes the same into the position shown in Fig. 6 in which the lever 67, acting as a catch, holds the lever 68 until the relay R4 is again energized. The clearance means 84 to 91 act simultaneously on all switch means.

The control perforations 65 in the sheets are best seen in Figs. 3 and 4, however, in order to assort sheets which are not perforated, or in order to eject a sheet into a receiving means other than the one associated with the perforation of the sheets, manually operated keyboard switch means H1 to H5 are provided. For operating the keyboard switches H1 to H5, it is first necessary to clear the machine by actuating the clearance key L, see diagram of Fig. 10, whereby the sensing means M1 to M5 are rendered inoperative. Thereupon, any one of the switches H1 to H5 may be manually operated to eject sheets into the receiving means R1 to R5 associated with the keys H1 to H5. A multiple switch 92 is provided which permits operation of all switch means 69 to 73 while the machine is running or at a standstill.

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Figs. 8 and 9 illustrate an embodiment substantially corresponding to the embodiment described with reference to Fig. 5. However, the sheet is not ejected in upward direction, but in horizontal direction, and the ejector means are provided in the form of a conveyor belt cooperating with pressure and transporting roller means.

The sheet is supplied by the transporting rollers 6, 60 to the printing rollers 1, 2 and passes through the sensing means M1 to M5 which are connected to a set of relays R1 to R6 in the manner illustrated in Fig. 10.

The printed sheets fall onto the ejector belt means 93 which is driven by a belt and pulley drive from a motor which also drives printing roller 1. Conveyor belt 93 moves at a speed higher than the peripheral speed of the printing rollers 1 and 2 and, cooperating with the roller means 32, ejects the printed sheets into an assorting receiving means 94, 95. The side-tracking switches 96 to 101 constitute in inoperative position the bottom wall of a guide passage, while the top wall thereof is constituted by a cover 95 which is pivotally mounted on the casing. When the cover 95 is opened, the compartments of the receiving means 94 are easily accessible for removal of printed and assorted sheets. When the multiple bridging switch 92 is operated, see Fig. 10, the electro-magnetically controlled side-tracking switches 96 to 101 are opened by the operating levers 102 to 107 due to the action of the energized relays R1 to R6 so that all receiving compartments in the receiving means 94 are accessible.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of printing machines differing from the types described above.

While the invention has been illustrated and described as embodied in a sheet ejector and assorting mechanism for a rotary duplicating machine, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a printing machine, in combination, a pair of rotary cooperating printing rollers for printing sheets passing between the same in one direction; movable ejector means located in said one direction behind said printing rollers for receiving and conveying printed sheets; elongated guide means located on a side of said ejector means remote from said printing rollers for receiving sheets ejected by said ejector means; a plurality of receiving means for sheets located spaced from each other along said guide means; a plurality of side-tracking switch means associated with said receiving means and arranged spaced from each other along said guide means, each of said switch means being movable independently of the other of said switch means between an inoperative position, and an operative position blocking said guide means for passage of sheets and connecting said guide means with the receiving means associated therewith for guiding sheets into the respective receiving means; operating means for selectively operating said side-tracking switch means; and clearance means controlled by one of said printing rollers for moving at the end of each revolution of said one printing roller all side-tracking switch means

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previously shifted from said operative position to said inoperative position.

2. In a printing machine, in combination, a pair of rotary cooperating printing rollers for printing sheets passing between the same in one direction; movable ejector means located in said one direction behind said printing rollers for receiving and conveying printed sheets; elongated guide means located on a side of said ejector means remote from said printing rollers for receiving sheets ejected by said ejector means; a plurality of receiving means for sheets located spaced from each other along said guide means; a plurality of side-tracking switch means associated with said receiving means and arranged spaced from each other along said guide means, each of said switch means being movable independently of the other of said switch means between an inoperative position, and an operative position blocking said guide means for passage of sheets and connecting said guide means with the receiving means associated therewith for guiding

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sheets into the respective receiving means; operating means for selectively operating said side-tracking switch means; and clearance means controlled by one of said printing rollers for moving at the end of each revolution of said one printing roller all side-tracking switch means previously shifted from said operative position to said inoperative position, said clearance means including a cam connected to said one printing roller for rotation therewith, and an articulated lever system including a cam follower, cooperating with said cam, and a plurality of clearing members cooperating with said side-tracking switch means.

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