RECTO-VERSO PRINTING DEVICE

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This invention relates to printing devices employed in business machines, and particularly to such devices that are capable of accomplishing recto- verso printing.

Devices are known in which hortographic carbon tape or paper is advanced horizontally or vertically with respect to the printing machine in a continuous manner. In this arrangement the hortographic tape is located between the platen and the form to be printed, thereby permitting printing to be accomplished on both sides of the form. However, these prior art devices required that all the printing done on the recto side also be accomplished on the verso side. Furthermore, no provision was made for discouraging falsification of documents through the corrugation of the form involved in recto-verso printing.

Therefore, the principal object of this invention is to provide an improved recto-verso printing device.

More specifically the object of this invention is to provide a device that is capable of selective verso printing.

Another object of this invention is to provide a device that is capable of making a hortographic carbon tape active in the predetermined printing position and inactive in some other predetermined printing position.

Another object of this invention is to provide a device for retracting the hortographic carbon tape from the printing position during a predetermined time interval in which recto printing is being accomplished.

Another object of this invention is to provide a device for corrugating the sheet bearing verso printing.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of examples, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a perspective view of the invention as applied to a conventional business machine.

Fig. 2 is a vertical view of the invention.

Fig. 3 is a plan view of the invention.

Fig. 4 shows the device in position for recto-verso printing.

Fig. 4a shows the hortographic carbon tape in the retracted position.

Fig. 1 illustrates the invention as applied to a conventional accounting machine, and for that reason only the mechanical parts required for an understanding of the invention will be described. A form or sheet 1 that is shown in dotted lines is vertically shifted before a printing position represented by the type bar. The ink ribbon and feed thereof for accomplishing recto printing on sheet 1 are not shown since they do not come within the scope of the invention.

The vertical shift of sheet 1 is accomplished by the simultaneous rotation of platen 2 and the two drive rollers 3, which have pins 4 that penetrate holes 5 along the margins of sheet 1. The platen 2 is mounted on drive shaft 6, which through the gear system 7, 8 and 9, transmits a rotary motion to shaft 10 and then to rollers 3 mounted thereon. Each roller 3 forms a part of a mobile assembly 11 which may be located in a particular position on rod 13 by locking screw 12. Shafts 6, 10 and rod 13 are supported by the frame of the paper feed block of which only side flange 14 has been shown.

The device for accomplishing the selective verso printing is labeled 15 in Fig. 1. It comprises a guide 16 for carbon tape 17 which is wound and unwound upon two spools 18. The tape guide 16 is in a vertical plane by the action of arm 29 on pin 33 of mobile plate 34. Roller 28 at the end of arm 29 is moved along the high and low surfaces of cam 27 during a paper feeding operation. The tape guide control assembly is described in detail with regard to Figs. 4 and 4a.

Reference to Figs. 2 and 3 will show that control shaft 10 is supported by sleeve bearings 19, 20 mounted on flanges 21, 22 of the frame. Shaft 10 has a key gear 23 which drives gear 24 on shaft 25. In the disclosed embodiment, the ratio of pinions 23, 24 is so designed that the ratio between platen shaft 6 and shaft 25 is 2:1. On shaft 25 journalined in a sleeve bearing 26 is mounted a cam 27. A roller 28 mounted at one end of arm 29 is pressed against this cam under the action of spring 30. Arm 29 swings around shaft 31, and its other end 32, in the form of a fork, meshes with a stud 33, fixed to a mobile plate 34. Figs. 4 and 4a show that plate 34 has a slot 35 that is traveled by two screws 36, 37 mounted in flange 22 of the frame. The screws are so positioned with relation to the length of the slot as to permit flange 34 to travel a sufficient distance.

Returning to Fig. 3, it will be seen that a roller 28 which swivels around shaft 31 meshes through its fork-shaped end 39 with a stud 40 fixed upon a mobile plate 41, which like plate 34, slides freely between two extreme positions. The motion of plate 41 is controlled by screws 42, 43 that are fixed upon flange 21. Plates 34, 41 are connected by brace 44 to which is fixed tape guide 16 by screws 45, 46. Tape guide 16 has its ends 47, 48 bent back sufficiently to provide effective guiding action for the moving tape.

The tape control assembly which forms a part of this invention is capable of being moved laterally along shafts 10, 13 when screws 49, 50 (Fig. 3) are loosened. Similarly, the assembly may be fixed in a selected position on shaft 13 by tightening screws 49, 50.

Reference to Figs. 4 and 4a will show that plate 2 has two small detachable corrugated plates 51, 52 located 180° apart. These corrugated plates cause the form to be selectively wrinkled during verso printing, as will now be explained. In the selected example of operation a feed cycle corresponds to the half-rotation of the platen. Inasmuch as a single line is to be printed on the reverse side (verso) of the sheet during each half rotation of the platen, a single corrugated plate is provided for each half of the platen, which explains the 180° position of the two plates 51, 52 on the platen. Similarly, it is understood that cam 27 performs a complete cycle when the platen rotates through a 180° cycle. This operative relationship is accomplished by the existing gear ratio between shafts 6 and 25.

When the device is in the position shown in Fig. 4 for verso printing, roller 28 is pressed against the grooved portion of cam 27 by spring 30. Arm 29, which is controlled by the position of roller 28, has its forked end 32 in the low position thereby maintaining stud 33 and the mobile plate 34 also in a low position. Mobile plate 41 (Fig. 3) is also in a low position at this time. Therefore, tape guide 16 is in the low position or printing position such that the hortographic tape 17 is in line with corrugated plate 51 to permit verso printing of sheet 1 at the same time that the printed area is wrinkled by plate 51.

After the completion of the verso printing, roller 28
leaves the groove portion of cam 27 in the direction away from shaft 25. The resulting clockwise rotation of arm 29 causes stud 33 to be moved to the high position. That is to say, the slotted plate 34 is moved upwards such that the lower portion of slot 35 is occupied by screw 36. The movement of plate 34 in the upward direction causes a simultaneous withdrawal of tape guide 16 from the printing position. In this position verso printing cannot be performed and only recto printing is possible. It may be seen from the position of cam 27 and plate 2 that there has been a 90° rotation since the verso printing of Fig. 4.

In the disclosed embodiment of the invention a single line of verso printing is accomplished on each particular sheet. Of course, it is understood that by replacing cam 27 by another cam having a plurality of grooves a number of lines may be printed in verso on each sheet. The platen, likewise, may carry a plurality of detachable corrugated plates in positions corresponding to the plural lines of verso printing. Furthermore, provision might be made in the form of, for example, clamping devices for controlling the continuous rotation of cam 27, providing for selective rotation. Similarly provision could be made for making the corrugated plates selectively inoperative.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a business machine for recto-verso printing, of the kind wherein type impressions are produced at a printing station, in reverse on the back of a sheet, by horizontally feeding a ribbon tape between a platen and a sheet, the combination comprising a platen, means for driving said platen, gearing means controlled by said platen drive means, means for controlling said gearing means, means for moving the printed sheet in a vertical direction, and means for controlling said gearing means for selectively placing said guide means in printing position.

2. The invention according to claim 1 wherein said platen includes means for corrugating the printed sheet when said guide means is in printing position.

3. In a machine for recto-verso printing in which a ribbon tape is fed horizontally between a platen and a sheet, a platen drive means, means for guiding the tape through the printing station, gearing means controlled by said platen drive means, means for guiding the ribbon tape, means controlled by said gearing means for moving the printed sheet in a vertical direction, and means for controlling said gearing means for selectively placing said guide means in position to accomplish recto-verso printing and withdrawing said guide means to accomplish only recto printing at predetermined locations of the sheet.

4. In a machine for recto-verso printing having a platen, means for driving said platen, a hectographie tape feed means, means for guiding said tape by the printing station, gearing means controlled by said platen control means, a plurality of pin feed means controlled by said gearing means for moving a sheet at the end of a particular printing sequence, and means located between said plural pin-feed means and synchronously operated with said pin-feed means by said gearing means, with said last-mentioned means controlling said tape guide means in a manner to present the tape at the printing station at predetermined intervals of platen rotation.

5. In a machine for recto-verso printing of the kind wherein type impressions are produced at a printing station, in reverse on the back of a sheet, by horizontally feeding a ribbon tape between a platen and a sheet, a tape guide, a first shaft for driving said platen, a first gear mounted on said first shaft, a second gear operated by said first gear to provide a predetermined gear ratio, a second shaft fixed to said second gear, a plurality of paper feed assemblies mounted on said second shaft for rotation therewith, a tape guide control assembly mounted on said second shaft between the plurality of said paper feed assemblies for selectively positioning the tape guide in and out of the printing position, and detachable strips located on said platen for wrinkling the tape when said tape guide control assembly presents the tape guide in printing position.

6. In a printing machine having a platen and a shaft geared to operate with said platen, a hectographie tape guide control assembly comprising a first gear mounted on said shaft, a second gear operating with said first gear, a cam, a rod for mounting said second gear and said cam, a movable plate, a tape guide fixedly attached to said movable plate, and a lever controlled by said cam for imparting translation motion to said movable plate for the purpose of raising and lowering said tape guide with relation to the printing position.

7. The invention according to claim 6, wherein said platen includes detachable metal strips that are placed in any predetermined relationship to each other to permit the wrinkling of the printed sheet when said tape guide is lowered to the printing position.

8. In a printing machine having a platen and a shaft geared to operate with said platen, a hectographie tape guide control assembly comprising gearing means controlled by said shaft, means for guiding the hectograph tape through the printing position, and means controlled by said gearing means for moving said tape guide means into and out of the printing position at predetermined intervals of platen rotation.

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