Feb. 19, 1963 W. RITZERFELD ET AL 3,077,829

ROTARY SELECTIVELY PRINTING DUPLICATOR

Filed Nov. 30, 1961 2 Sheets-Sheet 1

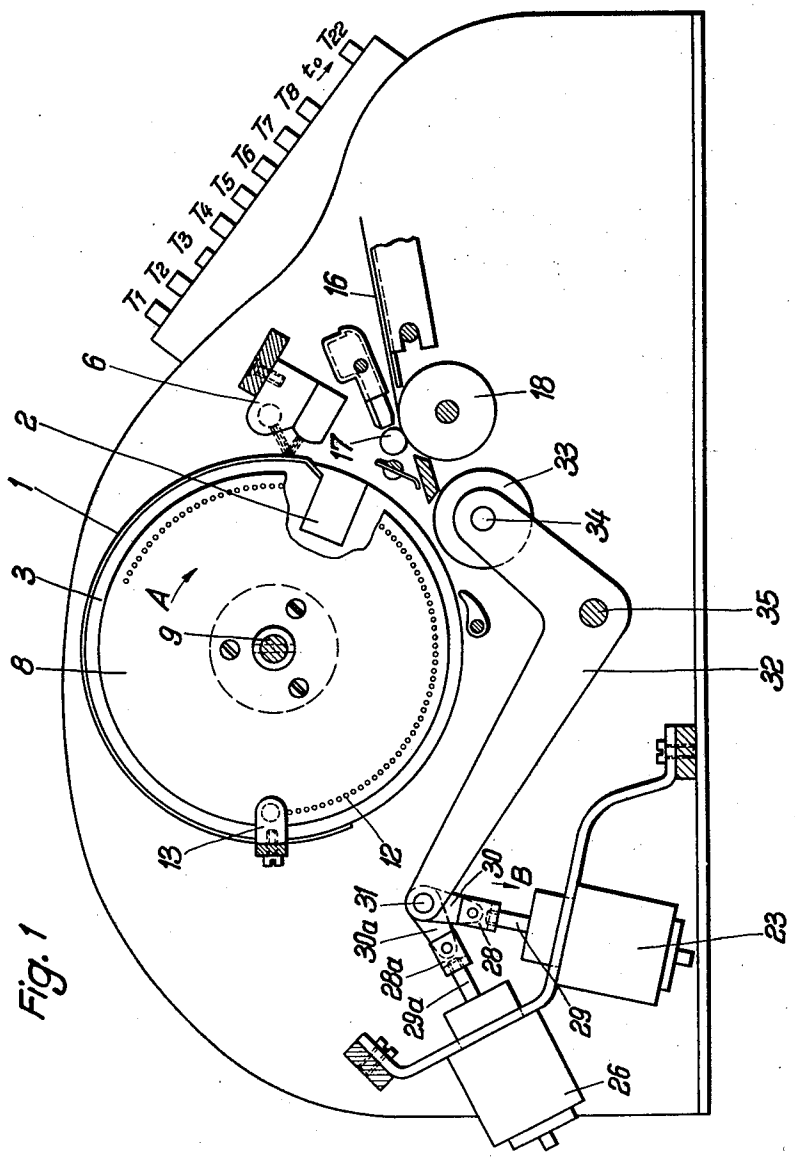


Fig. 1

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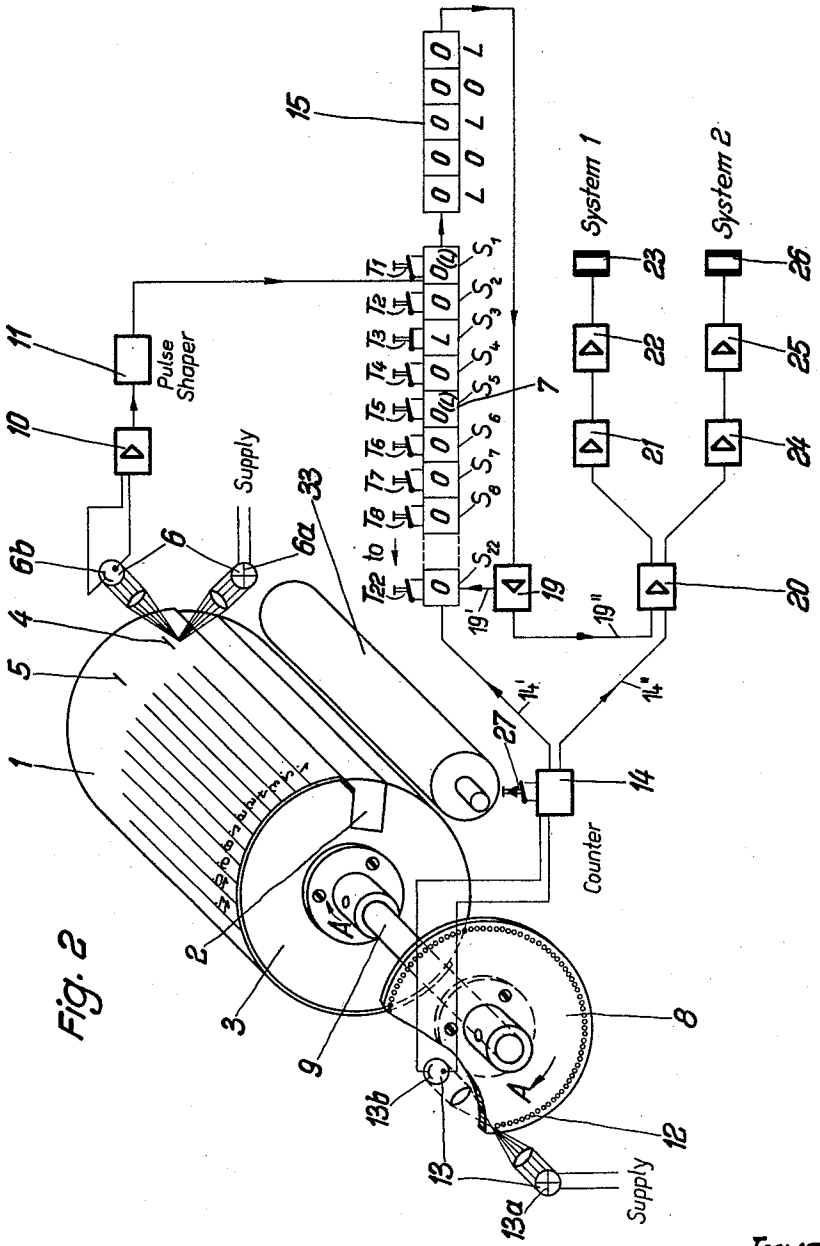


Fig. 2

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ROTARY SELECTIVELY PRINTING DUPLICATOR

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23 Claims. (Cl. 101—91)

The present invention concerns a rotary duplicator, and more particularly a duplicator which reproduces selectively one or more lines out of a plurality of printing lines existing on a printing form, the spacing between the reproduced lines being the same or preferably a smaller one than the spacing between the selected printing line of the form. In duplicators of this kind the printing is effected by intermittingly moving one of two cooperating printing members into printing position relative to the other, this movement being produced by means of electro-magnets which are energized by the output of sensing means, preferably photoelectric pick-up means, which are arranged to sense index marks arranged on or next to the printing form for indicating those printing lines thereof which are desired to be selectively reproduced.

It has been found that arrangements of the above mentioned kind are unsatisfactory in various respects. For carrying out the desired operations a great number of relays of great sensitivity were needed, and great numbers of contacts, partly incorporated in the relays and partly provided as sliding contacts cooperating with slip rings, were required whereby the danger of failure was introduced on account of the unavoidable wear of the contacts and due to the likelihood that the contacts would become contaminated.

It is therefore a main object of this invention to provide for a duplicator of the general type set forth but being free of the above mentioned disadvantages.

It is a further object of this invention to provide for a duplicator as mentioned which is composed of a comparatively small number of entirely reliable components.

It is still another object of this invention to provide for a duplicator of the kind mentioned above which may be operated in a very simple and highly efficient manner and at comparatively high speed.

With the above objects in view a preferred embodiment of the invention comprises in a rotary selectively printing duplicator, in combination, a rotary printing roller comprising holding means for holding in a predetermined position on said printing roller a printing form having a plurality of printing lines thereon and at least one index means in predetermined relation to a selected one of said printing lines; pressure means cooperating with said printing roller and mounted movably to and from a printing position opposite said printing roller; electromagnetic means for moving, when energized, said pressure means to said printing position; pickup means arranged for deriving a signal from said index means whenever the latter passes, during rotation of said printing roller, through the pickup area of said pickup means; impulse generator means operatively connected with said printing roller for delivering at least one control pulse every time when during rotation of said printing roller one of said printing lines passes through a predetermined location; shift register means having a plurality of bistable storage elements respectively associated with said printing lines, each of said storage elements being changeable between a signal storing condition and a non-storing condition by application of pulses of predetermined characteristic, one of said storage elements being connected with said pickup means for receiving therefrom said signal as a signal-storing pulse, said shift register means having an input terminal connected with said impulse generator means for receiving therefrom said control pulses as shift pulses in synchronism with the rotation of said printing roller, and having an output terminal for furnishing an output pulse whenever a signal stored in the storage element next to said output terminal is shifted to the latter under the action of a shift pulse applied to said register means; and means for transmitting said control pulses, under control of said output pulse, to said electromagnetic means for energizing the latter, whereby said selected one of said printing lines is printed by the movement of the pressure roller into printing position in response to said shift impulse coinciding with the passing of said selected printing line through a predetermined location, and to one of said output pulses corresponding to a signal derived from the pickup of the index means corresponding to said selected printing line.

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 diagrammatic lateral elevation of a duplicator according to the invention; and

FIG. 2 is a diagrammatic illustration composed of a diagram of the electrical circuits involved and further comprising a perspective partial view of the essential operating parts of the device.

Before describing the details of the illustrated embodiment, we wish it to be understood that our invention is not concerned with details of the various electrical components described further below, but rather with the particular combination and arrangement of well known electrical and electronic components in relation to the operation of a rotary duplicator adapted for selectively and intermittently printing selected lines from a multiline printing form. Therefore the individual electrical or electronic components known per se are only mentioned and shown in block form and without showing details within the individual component, particularly because these details are entirely known in the art using digital components. It is the mutual cooperation between these components and with the operating members of the duplicator which, according to the invention, results in a duplicator which is entirely reliable in operation, not subject to substantial wear and capable of rapid operation whereby this duplicator according to the invention is greatly superior to those known to the art.

As can be seen from FIG. 1 and partly from FIG. 2, the duplicator comprises a printing roller 3 mounted for rotation on a shaft 9 and provided with a holding member 2 for holding a printing form 1 in a predetermined position along its circumference. The printing form 1 carries a plurality of equally spaced printing lines as shown in FIG. 2. In a well known manner a pressure roller 33 cooperates with the printing roller 3 by being movable to and from a printing position with respect to the printing roller 3. The pressure roller 33 is supported on a shaft 34 which, in turn, is carried by a bell crank lever arrangement 32 pivoting about pivots 35. For moving the pressure roller 33 to its printing position, i.e. for moving the opposite end of the lever arrangement 32 in the direction of the arrow B, at least one electromagnet 23 is provided which, when energized, moves its armature 29 in the direction of arrow B which movement is transmitted through links 28, 30 to a pivot point 31 at

the remote end of the lever arrangement 32. Preferably, however, for permitting a more rapid operation, a second electro-magnet 26 is provided which operates in the same manner by means of the members 29*a*, 28*a* and 30*a*. In the conventional manner a set of feed rollers 17, 18 is provided for feeding a sheet of paper 16 which is to receive the imprint into the area between the circumference of the pressure roller 33 and, when the printing roller is rotated, the surface of the printing form 1.

As can be seen from FIG. 2, the printing form is provided with index markings, e.g. index marks 4 and 5 which are shown to be in register with the first and fifth printing line on the form 1. In this case the index marks 4 and 5 would have the effect of causing selected reproduction of only the first and fifth printing line on form 1. Evidently, the index marks need not be in axial register with the corresponding lines on the printing form 1 but must be located in a predetermined and fixed circumferential relation to the respective printing line. Also, the index marks should be preferably located within one annular surface area around the roller 3. Likewise, the index marks need not be located on a portion of the printing form 1 although this is most practical, they could also be located on a separate strip of material placed around the printing roller 3 adjacent to the printing form 1. Finally, the index marks could even be arranged directly on the surface of the printing roller 3 adjacent to the lateral edge of the printing form 1.

Photoelectric pick-up means are arranged opposite to the above-mentioned annular area in which the index marks, e.g. marks 4 and 5, may be arranged on or next to the printing form 1. As indicated in FIG. 2, the pick-up means 6 comprise in a conventional manner a light source 6*a* connected with a supply of electric energy, and a photosensitive cell 6*b* exposed to the reflection of light rays projected from the source 6*a* onto the above-mentioned annular area and therefore capable of sensing marks like the index mark 4 or 5 during the rotation of the printing roller 3.

The arrangement further comprises an impulse generator which consists of a disk 8 mounted for rotation together with the printing roller 3 on the shaft 9, and of a second photoelectric pick-up device 13 cooperating with the disk 8. The disk 8 is provided along a circle concentric with the axis of the shaft 9 with a series of holes 12. The angular spacing between consecutive holes 12 should be at least equal to the angular spacing of consecutive printing lines on form 1 with respect to the axis of shaft 9. The pick-up arrangement 13 comprises a light source 13*a* connected to a supply of electric energy and arranged to project a beam of light through the holes 12 while the disk 8 is rotating, and a photo-sensitive cell 13*b* arranged to be impinged upon by light passing from the source 13*a* through any one of the holes 12. The relation of the location of the holes 12 on the disc 8 with respect to the location of the printing lines on the form 1 when the latter is held on the roller 3 in a predetermined and uniform position, is such that the light passing through the holes 12 produces in the cell 13*b* an electric pulse every time one of the printing lines passes through a predetermined location. However, for reasons set forth further below, it is preferred that the number of holes 12 is increased in such a manner that three consecutive holes correspond to each printing line on the form 1, which means that three consecutive pulses are produced in and furnished by the cell 13*b* for the passage of each printing line through the predetermined location mentioned above. Of course, the number of three pulses per printing line is only given as an example for the purpose of explanation.

The circuit arrangement connecting the pick-up arrangements 6 and 13 with the above-described electromagnets 23 and 26 is illustrated in FIG. 2. A shift register 7 is provided and composed of 22 bistable storage elements S_1 to S_{22}, respectively associated with the printing lines on the form 1, assuming that 22 is the number of printing lines that can be accommodated on the printing form 1. The elements and the entire shift register are of conventional design and capable of storing and shifting information in response to the application of pulses of predetermined characteristic, and also capable of being reset from storing condition to non-storing condition by the application of a reset pulse of corresponding characteristic. Each of the elements S_1 to S_{22} is connected with a manual setting device e.g. a key-operated switch T_1 to T_{22} for selectively and manually causing the application of a pulse or voltage to the particular storing element by which the latter is changed from non-storing condition to storing condition. Preferably, the keys T_1 to T_{22} are arranged on a key board on the outside of the duplicator as indicated by FIG. 1. The output of the pick-up arrangement 6 is taken to an amplifier 10 and from there through a pulse shaper 11 to the shift register element S_1 which has an output terminal constituting the output of the entire shift register 7. Consequently, every signal produced by the pick-up arrangement 6 due to sensing one of the index marks e.g. the marks 4 and 5, is applied as a signal-storing pulse to the shift register element S_1. The shift register elements being in non-storing condition are marked with "O" while those elements which are in signal storing condition are marked with "L." In the present example it is assumed that in addition to the pre-selected index marks 4 and 5 corresponding to the first and fifth line of the printing form 1, the shift register element S_3 has been changed to signal-storing condition by operation of the key switch T_3. This manual signal-storing operation makes it possible during an extended duplicator run to cause any desired additional printing line to be reproduced in addition to the lines selected previously and represented by the index markings on or next to the printing form 1.

The control pulses produced by the pulse generator arrangements 8, 13 are supplied as shift impulses to the input of the shift register 7 as shown as in input of the register element S_{22}. If, as mentioned above, the disc 8 is provided only with one hole 12 for every single printing line on the form 1, then the control pulses may be applied, with or without amplification, directly to the input of the shift register 7. However, in this case the angular location of the individual holes 12 on the disc 8 must be slightly offset with respect to the corresponding angular position of the corresponding printing line so that each control pulse arriving as a shift pulse at the input of the shift register 7 will shift any information "L" stored anywhere in the register 7 one step forward only after a signal-storing pulse from the pick-up arrangement 6 and corresponding to the same printing line to which the hole 12 producing the particular shift pulse corresponds, has reached the shift register element S_1. It can be seen that whenever information "L" is stored in the element S_1 the arriving shift pulse will shift this information into the output termnal so as to be available for the operation of the remaining components of the circuit described further below, for instance for the energization of at least one of the electro-magnets 23, 26 mentioned above.

If, on the other hand, for reasons explained further below, the disc 8 is provided with a plurality of holes 12, for instance with 3 holes 12, for every printing line on the printing form 1, then a counter device 14 is interposed between the pick-up arrangement 13 and the input terminal of the shift register 7 and connected therewith by the line 14'. The counter 14 is of conventional design, preferably containing also an amplification stage, and delivers through line 14' only the last one, e.g. the third one, of the pulses of each group of pulses corresponding to one printing line. Either by means of a delay device in the counter 14 or by corresponding location of the third hole of each group of three holes in the disc 8 care is taken for causing again the shift pulse to take effect on

the element S_1 only after information has been stored therein. However, the counter 14 has a second output which delivers, with or without amplification, each of the incoming control pulses into a line 15' connected to a control device 20.

The device 20 has a second input connected by a line 19'' and, if desired through the devices 15 and 19 described further below, with the output terminal of the shift register 7. The device 20 is also of conventional design and is operative for passing a sequence of control pulses arriving through line 15' only upon the arrival of an output pulse from the shift register 7 through line 19''. The device 20, in the preferred embodiment of the invention illustrated in FIGS. 1 and 2, has two outputs, one of which is connected by line 20' with control devices 21 and 22 adapted to control the energization of the electro-magnet 23, while the other output is connected by line 20'' with the control devices 24 and 25 controlling the energization of the electro-magnet 26. In this case the control device 20 has the further function of switching, every time when it is rendered operative, the groups of control pulses, e.g. of three control pulses, alternatingly to the line 20' and to the line 20''. Consequently, if two consecutive printing lines of the form 1 are to be reproduced so that two consecutive output pulses from the register would follow each other very closely, the first of these pulses would be caused to energize the system 1 comprising the devices 21, 22 and the electro-magnet 23, while the immediately following pulse would cause energization of the system 2 comprising the devices 24, 25 and the electro-magnet 26. This changing between two electro-magnets 23 and 26 eliminates difficulties which would otherwise arise in the case of using only one electro-magnet due to the unavoidable time factor involved in energizing comparatively large electro-magnets as needed in a duplicator of this kind.

The control device 20 is essentially a combination of a gate and a pulse-controlled selective switch and may be composed of a well known AND-circuit and an impulse relay connecting in response to a first pulse the line 15' with the line 20' and connecting in response to the second pulse the line 15' with the line 20''.

The control devices 21 and 24 are identical and have the characteristics of a counter, preferably combined with an amplification stage, functioning in such a manner that of every group of pulses e.g. three pulses only the first and the last one thereof is passed on to an amplifier 22, 25, respectively. These amplifiers of conventional type would have to contain a device, e.g. a flip-flop or an impulse relay, whereby of each group of pulses the above-mentioned first pulse is amplified and transmitted to the electro-magnets 23, 26, respectively, while the last pulse e.g. the third pulse cuts off the amplifier output so as to deenergize the respective electro-magnet.

In ordinary cases where the pressure roller 33 has the same length as the printing roller 3 and where the index marks e.g. 4 and 5, are placed in register with the respectively associated printing line on the form 1, it will not be possible to arrange the pick-up arrangement 6 in such a position that it picks up a signal from an index mark at the moment when the respectively associated printing line is subtantially in printing position opposite the pressure roller 33. In order to overcome this difficulty the invention provides the following arrangement. In the starting position as shown in FIG. 2, the first printing line is angularly spaced from its printing position opposite the pressure roller 33 an amount equal to e.g. 5 line spacings. Consequently, when the printing roller 3 is rotated, the first printing line will reach its printing position only after five control pulses have been delivered as shift pulses to the shift register 7. Accordingly, an auxiliary shift register 15 is connected in series with the shift register 7. This auxiliary register 15 contains five storage elements and operates in the same manner as the main shift register 7. Consequently, any information stored in any one of the elements of the register 7 will be passed by the shift pulses applied to the main register 7 stepwise in unchanged sequence through the register 15 before reaching the above-mentioned control device 20. Thus, a signal produced by sensing the first index mark 4 will reach the device 20 when the first line associated with mark 4 is in its printing position. The same applies to all other index marks and printing lines.

Between the output of the auxiliary shift register 15 and the control device 20 an amplifier 19 is provided. In a preferred embodiment of the invention this amplifier 19 has a second output connected by a line 19' with a second input of the shift register element S_{22}. Consequently, in continued operation of the duplicator any information stored in the register 7 either by the application of signals from the pick-up device 6 or introduced by manual operation of any one of the keys T_1 to T_{22} will be circulated and reintroduced into the fifth register 7 after every cycle of operations. In this manner repeated actuation of any one of the keys T_1 to T_{22} is avoided.

Finally, a reset key 27 is provided e.g. at the counter 14 which serves to introduce into the registers 7 and 15 a reset pulse or voltage which acts to reset all the elements of the registers to non-storing condition.

It is to be understood that all the devices 10, 11, 14, 19—22 and 24—25 are preferably electronic devices or circuits so that the difficulties arising frequently in the operation of electro-magnet relays are avoided.

The operation of the arrangement according to the invention is as follows. It may be assumed that, as illustrated by FIG. 2, markings 4 and 5 associated with the first and fifth printing line of the form 1 are provided, and that for printing additionally the third printing line the key T_3 has been actuated. Consequently, before the start of operations the information "L" has been stored in the element S_3 of the shift register 7. After the start of the rotation of the printing roller 3 first the index mark 4 is sensed whereby information "L" is stored in the element S_1. During the rotation of the printing roller 3 the rotation of the disc 8 causes the production of a sequence of control pulses in consecutive groups of three pulses, each group corresponding to the movement of the print form 1 a distance corresponding to one spacing between the printing lines. Since every third pulse so produced is applied as a shift pulse to the shift register 7 the information "L" stored in the element S_1 is shifted stepwise with every shift pulse into the auxiliary register 15 and will have arrived in the foremost element thereof after the fifth shift pulse has been applied. After the eighth shift pulse the information "L" that was originally stored in the element S_3 will have reached the third element of the auxiliary register 15. Immediately before the tenth shift pulse is applied the information "L" is stored in the element S_1 on account of the sensing of the index mark 5 registering with the fifth printing line on the form 1. Consequently after said tenth shift pulse this information is shifted into the last element of the register 15 so that now the information "LOLOL" is stored in the register 15. The next following shift pulse applied to the register 7 moves any information further introduced from the pick-up arrangement 6 or already stored manually in the rest of the register 7 one step forward, but by all means it moves the information stored in the auxiliary register 15 one step forward so that now an output pulse from the foremost element of the register 15 is delivered through the amplifier 19 to the control device 20. Hereby the latter is rendered operative for a period of time sufficient to permit the passage of three consecutive control pulses either to system 1 or to system 2. In view of the fact that at the time when the above-mentioned output pulse is delivered from the register 15 to the control device 20 the first printing line has reached its printing position opposite the pressure roller 33, and since now through the energi-

zation of the electro-magnet 23 or 26 the pressure roller is moved into printing position, the first printing line which was selected by placing the index mark 4 on the form 1, is now printed. It will be understood readily that in the same manner the third and fifth printing lines will be reproduced or printed in the same manner and in the corresponding sequence.

Whatever information passes through the auxiliary shift register 15 is reintroduced from the amplifier 19 into the element S_{22} of the main register so that after a corresponding number of pulses again the information "LOLOL" will be stored in the elements S_1 to S_5 ready for being used in the next operational cycle.

If for a subsequent printing operation either a different printing form 1 is attached to the printing roller 3, or a different set of index marks is to be applied, or a previous storage of information effected by operation of one or more of the keys T_1 to T_{22} is no longer desired, then all the stored information in the register 7 and 15 can be cancelled by manual operation of the reset key 27.

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 rotary selectively printing duplicator differing from the types described above.

While the invention has been illustrated and described as embodied in rotary selectively printing duplicator comprising pick-up means, impulse generator means and shift register means, 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 appyling 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 rotary selectively printing duplicator, in combination, a rotary printing roller comprising holding means for holding in a predetermined position on said printing roller a printing form having a plurality of printing lines thereon and at least one index means in predetermined relation to a selected one of said printing lines; pressure means cooperating with said printing roller and mounted movably to and from a printing position opposite said printing roller; electromagnetic means for moving, when energized, said pressure means to said printing position; pickup means arranged for deriving a signal from said index means whenever the latter passes, during rotation of said printing roller, through the pickup area of said pickup means; impulse generator means operatively connected with said printing roller for delivering at least one control pulse every time when during rotation of said printing roller one of said printing lines passes through a predetermined location; shift register means having a plurality of bistable storage elements respectively associated with said printing lines, each of said storage elements being changeable between a signal storing condition and a non-storing condition by application of pulses of predetermined characteristic, one of said storage elements being connected with said pickup means for receiving therefrom said signal as a signal-storing pulse, said shift register means having an input terminal connected with said impulse generator means for receiving therefrom said control pulses as shift pulses in synchronism with the rotation of said printing roller, and having an output terminal for furnishing an output pulse whenever a signal stored in the storage element next to said output terminal is shifted to the latter under the action of a shift pulse applied to said register means; and means for transmitting said control pulses, under control of said output pulse, to said electromagnetic means for energizing the latter, whereby said selected one of said printing lines is printed by the movement of the pressure roller into printing position in response to said shift impulse coinciding with the passing of said selected printing line through a predetermined location, and to one of said output pulses corresponding to a signal derived from the pickup of the index means corresponding to said selected printing line.

2. In a rotary selectively printing duplicator, in combination, a rotary printing roller comprising holding means for holding in a predetermined position on said printing roller a printing form having a plurality of printing lines thereon and at least one index means comprising a mark optically in contrast with its surrounding in predetermined relation to a selected one of said printing lines; pressure means cooperating with said printing roller and mounted movably to and from a printing position opposite said printing roller; electromagnetic means for moving, when energized, said pressure means to said printing position; photoelectric pickup means arranged for sensing said mark and for deriving a signal from sensing said mark whenever the latter passes, during rotation of said printing roller, through the pickup area of said pickup means; photoelectric impulse generator means operatively connected with said printing roller for delivering at least one control pulse every time when during rotation of said printing roller one of said printing lines passes through a predetermined location, said impulse generator means including a source of light producing a beam and a light barrier extending across said beam and movable rotarily with said printing roller relative to each other, said light barrier having a plurality of light-permeable portions including at least one such portion for every one of said printing lines, respectively, and photoelectric pickup means in the path of said beam passing through any one of said portions; shift register means having a plurality of bistable storage elements respectively associated with said printing lines, each of said storage elements being changeable between a signal storing condition and a non-storing condition by application of pulses of predetermined characteristic, one of said storage elements being connected with said pickup means for receiving therefrom said signal as a signal-storing pulse, said shift register means having an input terminal connected with said impulse generator means for receiving therefrom said control pulses as shift pulses in synchronism with the rotation of said printing roller, and having an output terminal for furnishing an output pulse whenever a signal stored in the storage element next to said output terminal is shifted to the latter under the action of a shift pulse applied to said register means; and means for transmitting said control pulses, under control of said output pulse, to said electromagnetic means for energizing the latter, whereby said selected one of said printing lines is printed by the movement of the pressure roller into printing position in response to said shift impulse coinciding with the passing of said selected printing line through a predetermined location, and to one of said output pulses corresponding to a signal derived from the pickup of the index means corresponding to said selected printing line.

3. In a rotary selectively printing duplicator, in combination, a rotary printing roller comprising holding means for holding in a predetermined position on said printing roller a printing form having a plurality of printing lines thereon and at least one index means comprising a mark optically in contrast with its surrounding in predetermined relation to a selected one of said printing lines; pressure means cooperating with said printing roller and mounted movably to and from a printing position opposite said printing roller; electromagnetic means for moving, when energized, said pressure means to said printing position; photoelectric pickup means arranged for sensing said mark and for deriving a signal from

sensing said mark whenever the latter passes, during rotation of said printing roller, through the pickup area of said pickup means; photoelectric impulse generator means operatively connected with said printing roller for delivering a group of a predetermined number of consecutive control pulses every time when during rotation of said printing roller one of said printing lines passes through a predetermined location, said impulse generator means including a source of light producing a beam and a light barrier extending across said beam and movable rotarily with said printing roller relative to each other, said light barrier having a plurality of light-permeable portions including a group of a predetermined number of such portions for every one of said printing lines, respectively, and photoelectric pickup means in the path of said beam passing through any one of said portions; shift register means having a plurality of bistable storage elements respectively associated with said printing lines each of said storage elements being changeable between a signal storing condition and a non-storing condition by application of pulses of predetermined characteristic, one of said storage elements being connected with said pickup means for receiving therefrom said signal as a signal-storing pulse, said shift register means having an input terminal connected with said impulse generator means for receiving therefrom said control pulses as shift pulses in synchronism with the rotation of said printing roller, and having an output terminal for furnishing an output pulse whenever a signal stored in the storage element next to said output terminal is shifted to the latter under the action of a shift pulse applied to said register means; and means for transmitting said control pulses, under control of said output pulse, to said electromagnetic means for energizing the latter, whereby said selected one of said printing lines is printed by the movement of the pressure roller into printing position in response to said shift impulse coinciding with the passing of said selected printing line through a predetermined location, and to one of said output pulses corresponding to a signal derived from the pickup of the index means corresponding to said selected printing line.

4. In a rotary selectively printing duplicator, in combination, a rotary printing roller comprising holding means for holding in a predetermined position on said printing roller a printing form having a plurality of printing lines thereon and at least one index means comprising a mark optically in contrast with its surrounding in predetermined relation to a selected one of said printing lines; pressure means cooperating with said printing roller and mounted movably to and from a printing position opposite said printing roller; electromagnetic means for moving, when energized, said pressure means to said printing position; photoelectric pickup means arranged for sensing said mark and for deriving a signal from sensing said mark whenever the latter passes, during rotation of said printing roller, through the pickup area of said pickup means; photoelectric impulse generator means operatively connected with said printing roller for delivering a group of a predetermined number of consecutive control pulses every time when during rotation of said printing roller one of said printing lines passes through a predetermined location, said impulse generator means including a source of light producing a beam and a light barrier extending across said beam and movable rotarily with said printing roller relative to each other, said light barrier having a plurality of light-permeable portions including a group of a predetermined number of such portions for every one of said printing lines, respectively, and photoelectric pickup means in the path of said beam passing through any one of said portions, each of said groups of light-permeable portions having an angular position with respect to the axis of rotation in predetermined relation to the angular position of a different one of said printing lines; shift register means having a plurality of bistable storage elements respectively associated with said printing lines, each of said storage elements being changeable between a signal storing condition and a non-storing condition by application of pulses of predetermined characteristic, one of said storage elements being connected with said pickup means for receiving therefrom said signal as a signal-storing pulse, said shift register means having an input terminal connected with said impulse generator means for receiving therefrom said control pulses as shift pulses in synchronism with the rotation of said printing roller, and having an output terminal for furnishing an output pulse whenever a signal stored in the storage element next to said output terminal is shifted to the latter under the action of a shift pulse applied to said register means; and means for transmitting said control pulses, under control of said output pulse, to said electro-magnetic means for energizing the latter, whereby said selected one of said printing lines is printed by the movement of the pressure roller into printing position in response to said shift impulse coinciding with the passing of said selected printing line through a predetermined location, and to one of said output pulses corresponding to a signal derived from the pickup of the index means corresponding to said selected printing line.

5. A duplicator as claimed in claim 4, wherein said impulse generator means include counting means for passing only every last control pulse out of each of said groups thereof as a shift pulse to said shift register.

6. A duplicator as claimed in claim 5, wherein said means for transmitting said control pulses to said electromagnetic means include control means connected with said impulse generator means for being supplied with all of said control pulses, and being additionally connected with said output terminal of said shift register means for being actuated by output pulses therefrom, said control means being normally inoperative and being rendered operative only by the application of each of said output pulses for a time period sufficient to pass one of said groups of control pulses to said electromagnetic means.

7. A duplicator as claimed in claim 6, wherein said means for transmitting said control pulses to said electromagnetic means include counting and impulse-responsive switch means connected between said control means and said electromagnetic means for starting the energization of the latter in response to the first one of a group of control pulses and for terminating said energization in response to the last one of such group of control pulses.

8. A duplicator as claimed in claim 7, wherein said electromagnetic means comprise two alternatively operable electromagnetc, and wherein first counting and impulse-responsive switch means are connected between said control means and one of said electromagnets, and second counting and impulse-responsive switch means connected between said control means and the other electromagnet, said control means including impulse-response change-over switch means for alternatingly passing said control pulses, in response to consecutive ones of said output pulses, to said first and second counting and impulse-responsive switch means so as to alternatingly energize said electromagnets.

9. A duplicator as claimed in claim 4, wherein in the starting position the first one of said printing lines is spaced from its printing position opposite said pressure means a distance which in circumferential direction of said printing roller is an integer multiple of the spacing between consecutive printing lines.

10. A duplicator as claimed in claim 9, wherein said shift register means are extended beyond said one storage element by the addition of a number of additional storage elements equal to said integer number determining said spacing of said first printing line from its printing position, so that said output pulse is delivered from the last

one of said additional elements when the respective printing line has reached its printing position.

11. A duplicator as claimed in claim 10, wherein means are provided between the output terminal of said last one of said additional elements and said control means for reintroducing each of said output pulses to the storage element at the end of said shift register means opposite to its output terminal.

12. In a rotary selectively printing duplicator, in combination, a rotary printing roller comprising holding means for holding in a predetermined position on said printing roller a printing form having a plurality of printing lines thereon and at least one index means comprising a mark optically in contrast with its surrounding in predetermined relation to a selected one of said printing lines; pressure means cooperating with said printing roller and mounted movably to and from a printing position opposite said printing roller; electromagnetic means for moving, when energized, said pressure means to said printing position; photoelectric pickup means arranged for sensing said mark and for deriving a signal from sensing said mark whenever the latter passes, during rotation of said printing roller, through the pickup area of said pickup means; photoelectric impulse generator means operatively connected with said printing roller for delivering a group of a predetermined number of consecutive control pulses every time when during rotation of said printing roller one of said printing lines passes through a predetermined location, said impulse generator means including a source of light producing a beam and a light barrier extending across said beam and movable rotarily with said printing roller relative to each other, said light barrier having a plurality of light-permeable portions including a group of a predetermined number of such portions for every one of said printing lines, respectively, and a photoelectric pickup means in the path of said beam passing through any one of said portions, each of said groups of light-permeable portions having an angular position with respect to the axis of rotation in predetermined relation to the angular position of a different one of said printing lines; shift register means having a plurality of bistable storage elements respectively associated with said printing lines, each of said storage elements being changeable between a signal storing condition and a non-storing condition by application of pulses of predetermined characteristic, one of said storage elements being connected with said pickup means for receiving therefrom said signal-storing pulse, said shift register means having an input terminal connected with said impulse generator means for receiving therefrom said control pulses as shift pulses in synchronism with the rotation of said printing roller, and having an output terminal for furnishing an output pulse whenever a signal stored in the storage element next to said output terminal is shifted to the latter under the action of a shift pulse applied to said register means, said shift register means including setting means for individually and selectively changing any of said storage elements from non-storing condition to storing condition independently of an application of a signal storing pulse; and means for transmitting said control pulses, under control of said output pulse, to said electromagnetic means for energizing the latter, whereby said selected one of said printing lines is printed by the movement of the pressure roller into printing position in response to said shift impulse coinciding with the passing of said selected printing line through a predetermined location, and to one of said output pulses corresponding to a signal derived from the pickup of the index means corresponding to said selected printing line.

13. A duplicator as claimed in claim 12, wherein said setting means include control keys mounted on the outside of the duplicator for manually controlling the setting of the respectively associated storage elements to storing condition.

14. A duplicator as claimed in claim 13, including reset means for returning, whenever desired, all of said storage elements to non-storing condition.

15. A duplicator as claimed in claim 12, wherein said impulse generator means include counting means for passing only every last control pulse out of each of said groups thereof as a shift pulse to said shift register.

16. A duplicator as claimed in claim 15 wherein said means for transmitting said control pulses to said electromagnetic means include control means connected with said impulse generator means for being supplied with all of said control pulses, and being additionally connected with said output terminal of said shift register means for being actuated by output pulses therefrom, said control means being normally inoperative and being rendered operative only by the application of each of said output pulses for a time period sufficient to pass one of said groups of control pulses to said electromagnetic means.

17. A duplicator as claimed in claim 16, wherein said means for transmitting said control pulses to said electromagnetic means include counting and impulse-responsive switch means connected between said control means and said electromagnetic means for starting the energization of the latter in response to the first one of a group of control pulses and for terminating said energization in response to the last one of such group of control pulses.

18. A duplicator as claimed in claim 17, wherein said electromagnetic means comprise two alternatively operable electromagnets, and wherein first counting and impulse-responsive switch means are connected between said control means and one of said electromagnets, and second counting and impulse-responsive switch means connected between said control means and the other electromagnet, said control means including impulse-responsive change-over switch means for alternatively passing said control pulses, in response to consecutive ones of said output pulses, to said first and second counting and impulse-responsive switch means so as to alternatively energize said electromagnets.

19. A duplicator as claimed in claim 18, wherein in the starting position the first one of said printing lines is spaced from its printing position opposite said pressure means a distance which in circumferential directions of said printing roller is an integer multiple of the spacing between consecutive printing lines.

20. A duplicator as claimed in claim 19, wherein said shift register means are extended beyond said one storage element by the addition of a number of additional storage elements equal to said integer number determining said spacing of said first printing line from its printing position, so that said output pulse is delivered from the last one of said additional elements when the respective printing line has reached its printing position.

21. A duplicator as claimed in claim 20, wherein means are provided between the output terminal of said last one of said additional elements and said control means for reintroducing each of said output pulses to the storage element at the end of said shift register means opposite to its output terminal.

22. A duplicator as claimed in claim 21, wherein said setting means include control keys mounted on the outside of the duplicator for manually controlling the setting of the respectively associated storage elements to storing condition.

23. A duplicator as claimed in claim 22, including reset means for returning, whenever desired, all of said storage elements to non-storing condition.

No references cited.