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Sather et al.

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[54] SELECTIVE INSERTION MACHINE HAVING SELECTIVE DOCUMENT MARKING

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[52] **U.S. Cl.** .....**235/61.11 E**, 209/111.7, 235/61.6 J, 235/61.9 A

[51] **Int. Cl.** **G06k 7/10**

[58] **Field of Search**.....101/93 C; 209/110, 110.5, 111.7; 270/58; 235/61.6 J, 61.11 E, 61.6 J

[56] **References Cited**

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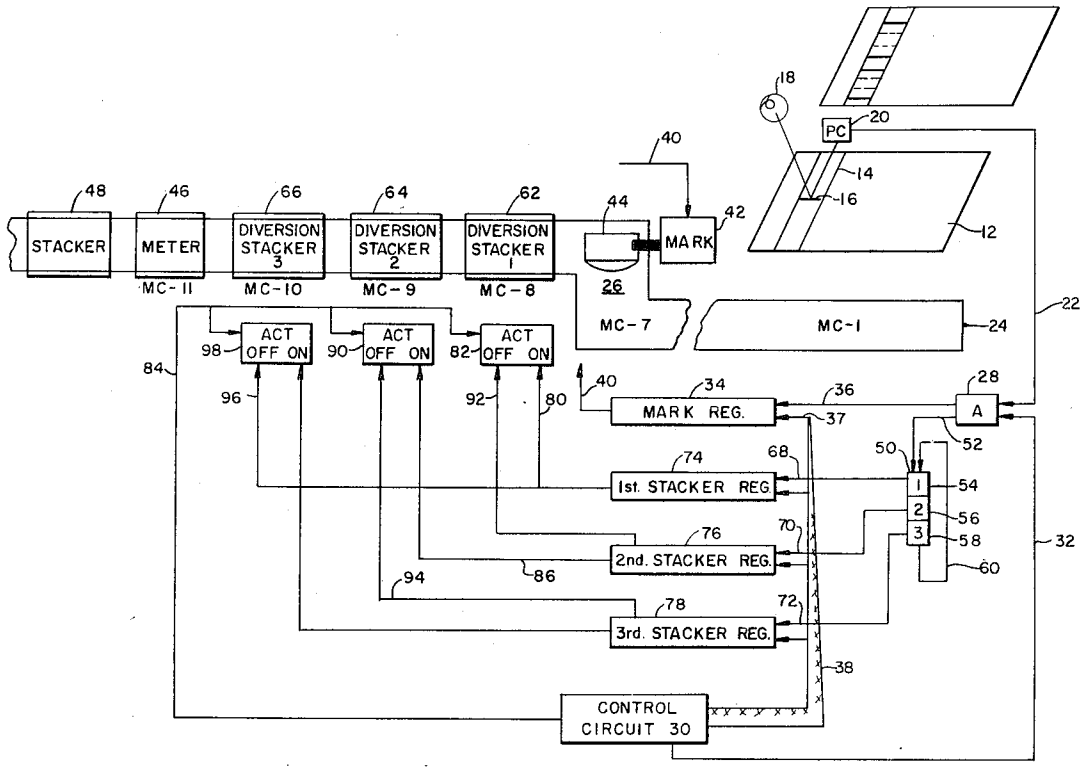
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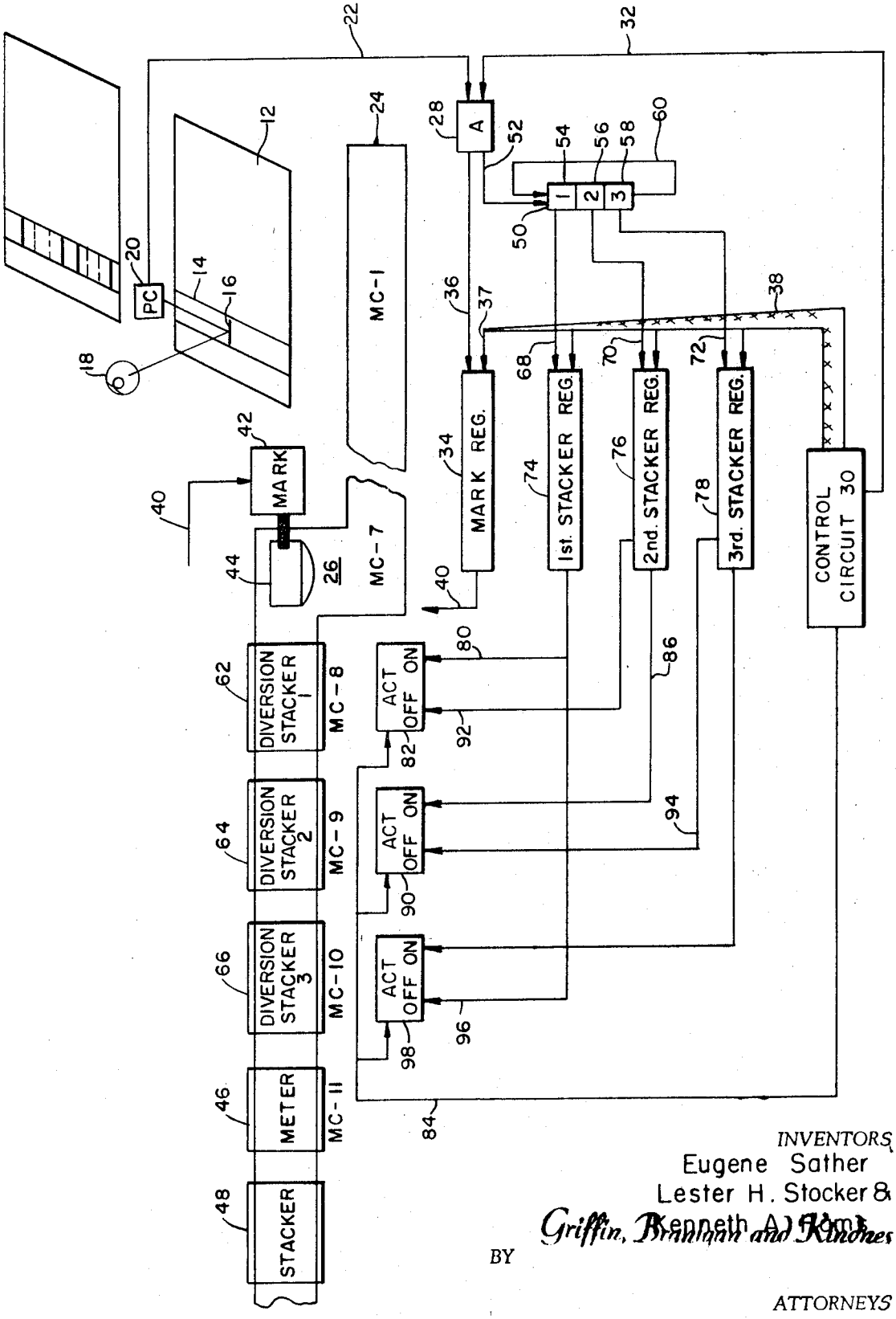
[57] **ABSTRACT**

A control document for an insertion machine has a mark placed on a predetermined portion thereof to indicate that the insertion material associated with that particular control document is to be mailed to an addressee having a different ZIP Code from the immediately preceding packet of documents on the insert track. This mark is sensed and a signal representative thereof is delivered to a shift register which controls a marking device for marking the envelope into which the related packet of documents is stuffed.

In an alternative embodiment, ZIP Code change signals are also delivered sequentially to stacking shift registers which control integral stackers for diverting the various document packets from the insert track. In this respect, only one such diversion stacker is operative at any given time because a means is provided for sequentially activating the diversion stackers in response to sequential ZIP Code change signals.

13 Claims, 1 Drawing Figure





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SELECTIVE INSERTION MACHINE HAVING SELECTIVE DOCUMENT MARKING

BACKGROUND OF THE INVENTION

This is a continuation in part of commonly assigned U.S. application Ser. No. 859,603, now U.S. Pat. No. 3,570,840 filed on July 17, 1969 which, in turn, is a divisional application of commonly assigned application Ser. No. 657,721, now U.S. Pat. 3,484,100 filed on July 14, 1967 and entitled "Selective Insertion Machine Having Variable Capacity Insertion Stations and Matching." In accordance with a notice in Volume 859 of the Official Gazette dated Feb. 11, 1969, the subject matter of application Ser. No. 657,721, now U.S. Pat. No. 3,484,100 is incorporated herein by reference.

The referenced application relates to an insertion machine of the type in which an insertion track moves groups of documents past a different one of a plurality of insertion, diversion, and other feeding stations during each machine cycle. After each group of documents has received all of its desired insertions, it is stuffed into an envelope and passed through a postage meter. After the postage meter, the various envelopes are conventionally removed from the insertion machine and sorted in accordance with their ZIP Codes so as to be suitably prepared for mailing. Frequently, however, the addresses of sequentially metered envelopes have the same ZIP Codes. Hence, it is an object of this invention to provide a structure for providing an indication of divisions between groups of envelopes to be mailed to different ZIP areas.

In accordance with principles of the invention, a control document may be either a separate document as described in the referenced application or a document that is actually fed onto the insertion track to have other material inserted therewith. In either event the control document is marked or otherwise coded in a predetermined location to indicate that the addressee associated with that particular document has a different ZIP Code than that of the preceding addressee. This mark is sensed and a signal representing the mark's existence is delivered to a shift register which controls a marking device for subsequently marking the envelope into which the control document or its related documents are subsequently stuffed. This mark is then used as a visual indication that the particular envelope is the first (or last) of a set of envelopes to be mailed to a common ZIP area.

In accordance with another aspect of the invention, the signal derived from the ZIP change mark on the control document is also delivered to a sequencing device for sequentially actuating diversion stackers. These stackers are then operative to sequentially gather each new set of commonly ZIP Coded envelopes so that each new set is stacked in a different stacker than the preceding set.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features, and advantages of this invention will be apparent from the following more particular description of preferred embodiments thereof as illustrated in the accompanying drawing. The drawing is not intended to be to scale, nor are the various elements intended to be illustrated in proportion. Instead, the drawing is intended to illustrate the principles of the invention in clear form. In this respect, the drawing is a schematic illustration of an insertion machine and its related control structure embodying the various aspects of the invention.

DETAILED DESCRIPTION

Although the referenced application discusses the use of diversion stackers and postage meters in an insertion machine, its drawings only illustrate the stations past which the document packets of a typical such machine pass during the first six machine cycles. The drawing of the instant application deletes the structure associated with the second through sixth machine cycles of the referenced application and adds certain structure associated with succeeding cycles.

With specific reference now to the accompanying drawing, a main or control document 12 has an indicia field 14 thereon for receiving coded indicia such as a ZIP Code change mark 16 located at a predetermined portion of the field 14. As the main document is fed by a feeder not shown it passes under a sensing mechanism comprising a lamp 18 and a photocell 20. Light rays from the lamp 18 are directed toward the field 14 and reflected upwardly toward the photocell 20. As the mark 16 passes thereunder, however, the output level of the photocell changes to provide a signal on line 22 representative of the presence of the ZIP Code change mark 16. The feeding of the main document 12 then continues until it is placed on the insert track 24 during the first machine cycle (MC–1).

The main document and perhaps a plurality of subordinate documents (as in the referenced case) are next moved past a plurality of feeding and insertion stations where various documents are selectively placed therewith. The number of machine cycles which occur during such passage depends upon the number of feeding and insertion stations that are employed. In any event, after the various insertions have been made, if any, the document packets (or the document if no insertions are made) are passed to a stuffing station such as 26 which, in the illustrated embodiment, occurs during the insertion machine's seventh machine cycle (MC–7).

Returning now to the passage of the main document under the photocell 20: the ZIP Code change signal is derived from the coded indicia and delivered on line 22 to an AND gate 28 which is operative in response to a gating signal from timing control circuit 30 on line 32 to gate the ZIP change signal to a marking shift register 34 on line 36. The ZIP change signal is passed through the various stages of the mark shift register in response to shift pulses on line 37 of cable 38 from the timing control circuit 30. In this manner, the mark shift register 34 provides an output signal on line 40 to an envelope marking device 42 at the time when the particular document packet corresponding to the particular main document is about to be stuffed into an envelope such as 44 at the stuffing station 26.

After the envelope 44 is marked, it is passed along the insert track during successive machine cycles, past a plurality of diversion stackers which are not pertinent to the embodiment of the invention now being described. The envelope 44 then passes through a postage meter 46 from which envelopes are delivered to a conventional stacker 48.

As succeeding main documents are placed on the insert track 24 and the various insertion documents placed therewith, no signals are generated by the photocell 20 nor is the marking device 42 operated until such time as the photocell 20 receives a suitable signal from another mark such as 16 located on a subsequent main document which is the first of a set of documents to be mailed to addressees having a different ZIP Code. When such a subsequent ZIP change mark is sensed, however, the envelope associated therewith is marked by the marking device 42 in the same manner as described above. Hence, as this process is repeated, it will be apparent that the resulting stack of documents in the postmeter stacker 48 will have marks on selected envelopes thereof representing divisions between sets of envelopes that are to be mailed to different ZIP Codes.

In an alternative embodiment of the invention, the ZIP change signal from AND gate 28 is also delivered to a circulating shift register 50 on line 52. In this regard, the circulating shift register has three stages 54, 56, and 58 and functions as a sequencing device. Upon receipt of a pulse on line 52, the first stage 54 is turned on. Upon receipt of the next pulse on line 52, stage 54 is turned off and stage 56 is turned on. Upon receipt of a third pulse on line 52, stage 54 remains off, stage 56 turns off, and stage 58 turns on. Upon receipt of a fourth signal on line 52, stage 58 turns off and feeds a signal back to stage 54 on line 60 to begin a repetition of the cycle just described Hence, the term circulating shift register.

As is about to be described, the signals in the various circulating shift register stages are used to control diversion stackers 62, 64, and 66 which are operative to remove

selected document packets from the insert track prior to the time the envelopes are passed through the meter 46. This is particularly helpful where the various ZIP areas are in the different postage zones so that diversion of the envelopes prior to the meter permits them to have their postage separately affixed. It will be apparent to those skilled in the art, however, that the diversion stackers can be just as conveniently placed along the insert track after the meter 46 if such is desirable. In fact each such diversion stacker may have a separate meter associated therewith.

The various stages of the circulating shift register 60 are connected by lines 68, 70, and 72 to diversion stacker shift registers 74, 76, and 78, respectively. Hence, when stage 54 of the circulating shift register is ON, the first stage of the diversion stacker shift register 74 is also turned on. This signal in the first stage of the stacker shift register is moved on through the register by means of shift pulses on an input line of cable 38 from the timing control circuit 30. In the illustrated embodiment, therefore during the particular document packet's eighth machine cycle, stacker shift register 74 provides an output signal on line 80 to activate a diversion stacker actuator control 82 which is operative upon receipt of a timing signal on line 84 from the timing control circuit 30 to actuate the diversion stacker 62 and remove the related envelope from the insert track. In this respect, it should be noted that the thusly removed envelope has also been marked by the marking device 42 in the manner described above.

As also described above, stage 54 of the circulating shift register 50 remains on until the shift register 50 receives a subsequent ZIP change signal on line 52. Hence, in the illustrated embodiment, until a ZIP change mark is passed under the photocell 20, all succeeding envelopes are removed from the insert track by the diversion stacker 62. That is, the diversion stacker shift register 74 continues to shift output pulses onto line 80 so that the diversion stacker actuator remains on and is actuated in response to actuation signals on line 84 from the control circuit 30 during each machine cycle. If preferred, however, selected packets or groups of packets can be passed on to the conventional stacker 48 by merely disenabling selected outputs from either the stacker shift registers or the actuation signals on line 84.

As soon as another ZIP Code change mark passes under the photocell 20, the first stage of the circulating shift register 50 is turned off and the second stage turned on. Hence, because the first stage of the second diversion stacker shift register 76 is connected by line 70 to the ON stage 56 of the circulating shift register 50, the first stage of the diversion stacker shift register 76 is turned on. As subsequent shift pulses are delivered to shift register 76 from the timing control circuit 30, therefore, its various stages are sequentially turned on until such time as it produces an output pulse on line 86 which turns on stacker 90. During the previous machine cycle, however, a pulse was delivered on line 92 from the next-to-last stage of the second stacker shift register 76 to turn off the first diversion stacker's actuator 82 and prevent premature diversion of the second diversion stacker's first envelope by stacker 62. In this manner, when the next diversion stacker actuator pulse is generated by the timing control circuit on line 84, the stacker 64 is permitted to remove the related envelope from the insert track.

Diversion stacker 66 is operated in a similar manner upon receipt of the next ZIP change pulse on line 52; and also similarly, actuator 90 is turned off during the previous machine cycle by a pulse on line 94 from the next-to-last stage of the third stacker shift register 78. The process is then repeated for the third diversion stacker 66 in a similar manner; and, upon receipt of the fourth ZIP change signal on line 52 turns off the third stage 58 of the circulating shift register 50 and turns on stage 54 which, in turn, turns on the first stage of the first shift register 74. After the required number of shift pulses, therefore, the first stacker shift register 74 produces an output on both line 80 to turn on actuator 32 as described above, and on line 96 to turn off the third diversion stacker actuator 98. Consequently, the various shift registers operate in the manner described above to function as a sequencing device for sequentially actuating the diversion stackers so that each new set of envelopes is stacked in a different stacker than the preceding set.

It will be appreciated by those skilled in the art that although the invention has been described in specific terms, various other modifications are equally within the scope of the invention. For example, in the preferred embodiment, the first document of each set is marked, but the last document of a set could be marked equally as well; and, for a given document packet, if no additional material is placed with the control document, the group or packet will be comprised of only that single document. It will also be apparent to men skilled in the art that certain of the various signals can be delayed somewhat in order to provide suitable timing. Also, more shift registers can be used to control other stacking stations; and rather than having the ZIP change marks 16 prerecorded on the various control documents 12, structure can be provided for scanning suitable ZIP Code indicia so as to make an independent determination of whether there is a ZIP Code change between one document and the next. In fact, given sufficient stacking stations, it would also be apparent that the invention can be used to effect a ZIP sort if such is desired.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of operating a document processing machine of the type in which a track moves sets of document packets in seriatim past a plurality of stations during successive machine cycles; and wherein each document packet includes a control document adapted to receive diversion control code indicia thereon; and wherein selected stations are adapted to remove document packets from said track, said method comprising the steps of:

sensing the presence of first such diversion control indicia on a first such control document representing a first set of document packets, and generating a first diversion control signal in response to said first diversion control indicia;

delivering said first diversion control signal to a first of said stations for removing the set of document packets associated with said control document from said track, each said packet in said first set being removed in seriatim by said first station during successive machine cycles;

sensing the presence of second such diversion control indicia on a second such control document representing a second set of documents and generating a second diversion control signal in response to said second diversion control indicia;

delivering said second diversion control signal to both said first station to prevent further removal of document packets by said first station and to a second such station; and,

removing the set of document packets associated with said second control document from said track, each such packet in said second set being removed in seriatim by said second station so that said first and second sets of document packets are sequentially diverted at different stations in response to the presence of sequential diversion control signals on sequential diversion-coded control documents representing correspondingly sequential sets of document packets.

2. The method according to claim 1 including the step of marking a document in each packet having diversion-coded control document associated therewith.

3. In a document processing machine of the type in which a track moves sets of documents past a different one of a plurality of stations during each machine cycle, and wherein each packet of documents has a control document adapted to receive coded diversion control indicia thereon, there being one thusly coded control document associated with each such set, said machine including apparatus comprising:

means for delivering said control documents to the document track;

means for sensing the presence of diversion control indicia on said control documents and generating diversion control signals in response thereto;

a plurality of diversion means each being selectively operable to remove said document packets from said track;

sequencing means; and

means for delivering said diversion control signals to said sequencing means for sequentially delivering said diversion control signals to said diversion means in accordance with a predetermined sequence, each of said diversion means being operative in response to receipt of a diversion control signal to sequentially remove from said track the document packets in the set associated with the control document from which a given document control signal is derived.

4. Apparatus according to claim 3 including:

timing means;

and, storage means associated with each diversion means for sequentially receiving said sequential diversion control signals from said sequencing means and operative in response to receipt of timing signals from said timing means to deliver said diversion control signals to the associated diversion means.

5. Apparatus according to claim 4 wherein said storage means are shift registers operative in response to timing signals from said timing means to shift said diversion control signals once during each machine cycle and adapted to deliver a given diversion control signal to the associated diversion means when the document packet from which the given diversion control signal is derived is adjacent the associated diversion means.

6. Apparatus according to claim 3 wherein said sequencing means comprises a plurality of bistable stages and including:

means connecting each of said stages to a different one of said diversion means, said stages being adapted so that only one such stage provides a diversion control signal to its related diversion means at any given time.

7. Apparatus according to claim 6 wherein said plurality of bistable stages comprises a circulating shift register wherein an output from the last stage thereof is fed back to the first stage thereof.

8. Apparatus according to claim 3 including marking means; and

means for also delivering said diversion control signals to said marking means which is operative in response to receipt thereof to mark a document of the associated document packet.

9. Apparatus according to claim 8 including timing means; and

storage means associated with each diversion means for sequentially receiving said sequential diversion control signals from said sequencing means and operative in response to receipt of timing signals from said timing means to deliver said diversion control signals to the associated diversion means.

10. Apparatus according to claim 9 wherein said storage means are shift registers operative in response to timing signals from said timing means to shift said diversion control signals once during each machine cycle and adapted to deliver a given diversion control signal to the associated diversion means when the document packet from which the given diversion control signal is derived is adjacent the associated diversion means.

11. Apparatus according to claim 8 wherein said sequencing means comprises a plurality of bistable stages and including:

means connecting each of said stages to a different one of said diversion means, said stages being adapted so that only one such stage provides a diversion control signal to its related diversion means at any given time.

12. Apparatus according to claim 11 wherein said plurality of bistable stages comprises a circulating shift register wherein an output from the last stage thereof is fed back to the first stage thereof.

13. Apparatus according to claim 8 wherein said means for delivering said diversion control signals to said sequencing means includes:

gating means; and

means for generating timing signals, said diversion control signals being delivered to said gating means which is operative in response to receipt of a timing signal from said control means to gate said diversion control signals to said sequencing means and said marking means.

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