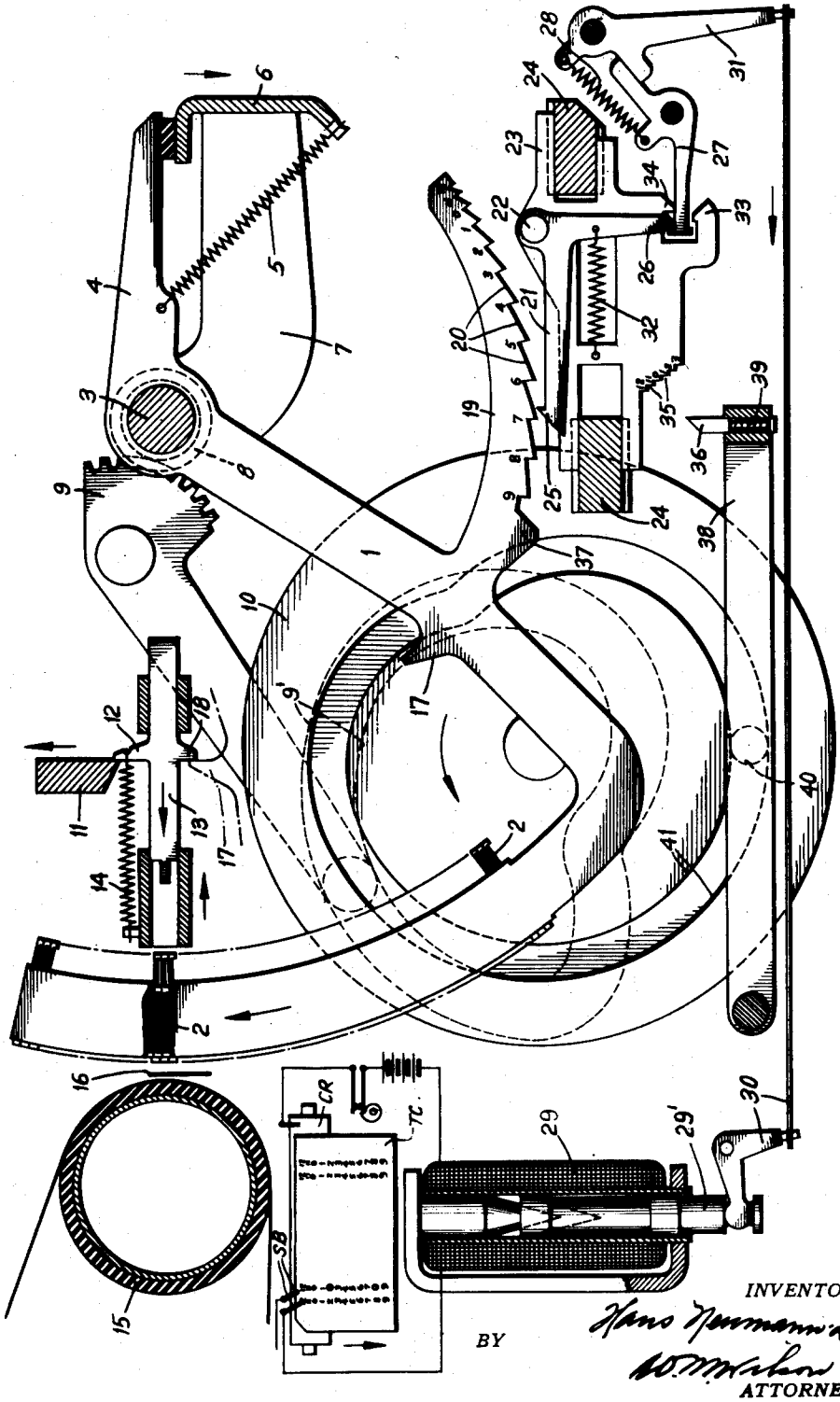
Aug. 4, 1942. H. NEUMANN-LEZIUS 2,291,970

PRINTING MECHANISM

Filed Sept. 24, 1940



Patented Aug. 4, 1942 2,291,970

UNITED STATES PATENT OFFICE

2,291,970

PRINTING MECHANISM

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Application September 24, 1940, Serial No. 358,077
In Germany September 27, 1939

12 Claims. (Cl. 101—93)

This invention relates to printing means adapted particularly, though not limited, to use in accounting machines to print indications represented by marked index positions of columns of a record card.

In machines wherein the printing means includes a type carrier moved in synchronism with the sensing of successive index positions of a record card, it has been the practice to control the selection of a type for printing by a combination of markings in index positions divided into groups or zones. Thus, where the card has index positions 9, 8, 7, . . . 1, 0, 11, and 12, the index positions 9 to 0 may be considered as in one zone and the index positions 11 and 12 as in a different zone. The different indications may then be represented by a mark in one of the zones of index positions in combination with one or more marks in the other zone of index positions, requiring corresponding zoning of the operation of the printing means, including a change in operation of the machine to place the printing means under successive control of the zones of the index positions.

The object of the present invention is to provide, in a machine such as described above, means for selecting a type which is not dependent on the zoning of operations of the machine or on corresponding zoning or subdivision of the index positions to bear the combinations of markings of the indications. Thus, a combination of two marks in any index positions may represent an indication and be effective to control the selection of the type for printing the indication. This has the advantage of enlarging the scope of a given number of index positions in representing indications and correspondingly enlarging the number of types which may be selected to print the indications.

More specifically, the object is to provide a plurality of successively acting stop means for stopping successive advances of a printing unit carrying indication-printing devices, with each stop means comprising interengaging stop parts moved relatively to each other in synchronism with the means for advancing the printing unit or in synchronism with the successive sensing of a plurality of indication-representing marks on a record body.

It is to be understood that some of the principles of the invention are applicable to the setting of differentially movable units regardless of whether or not they are controlled by codal indications on record cards.

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

In the drawing the figure shows diagrammatically a printing unit and related control parts.

The form of the invention shown in the drawing is adapted for application to an automatic accounting machine in which the cards are sensed electrically while in motion for indication markings and in which the printing unit is advanced in synchronism with the movement of the record card through the sensing means. It is to be understood, however, that the illustrated form is merely exemplary and that the invention may be used in connection with machines provided with indication sensing means other than electrical means and that the form of the printing unit and related control or setting parts may be varied.

Referring to the drawing, the printing unit is one of a plurality of parallel units, each of which includes a type carrier 1 slidably carrying successive types 2 for printing numerical, alphabetical and other desired indications. Each type carrier is rockably mounted on a shaft 3 and provided with a rear arm 4 urged by a spring 5 against a bail 6 carried by arms 7 which are also rockably mounted on shaft 3. Rigid with one of the arms 7 is a gear 8 meshed with a sector 9 following a cam groove 9' in a cam wheel 10. The cam wheel makes one revolution each machine or card cycle and during the greater part of this cycle, the cam groove 9' rocks sector 9 counterclockwise while during the remainder of the cycle, the sector 9 is restored in a clockwise direction. During the counterclockwise or forward stroke of sector 9, it rocks bail 6–7 clockwise which, through spring 5, advances the type sector impositively in the same direction throughout its type-selecting range. The advance of the type carrier is selectively arrested at a differential point of the type-selecting range under control of an indication on the record card, in a manner which will be explained later. When arrested at the selected point of its range, the carrier is positioned with the type corresponding to the indication at a printing position in which the back of the type is opposite the nose of a hammer 13. The hammer has a lug 12 engaged by a bar 11 which is rocked out of the way of the lug during the portion of the cycle in which cam groove 9' permits sector 9 to idle before starting its return stroke. As the bar 11 releases

lug 12, a spring 14 drives the hammer against the selected type to cause the type to print, through an ink ribbon 16, on a sheet carried and fed by the platen roll 15 in a known manner. As also known in the art, hammers 13 of those type carriers which have not been set for a type selection during the cycle are prevented from needlessly operating by engagement of lugs 17 of the type carriers with projections 18 of the hammers. Restoration of the hammers is effected in a suitable known manner.

Associated with each type segment 1 is an arm 19 having twelve teeth 20 marked 9 to 0, 11, and 12. The record card TC has twelve index positions 9 to 0, 11, and 12 which pass the sensing means in synchronism with the travel of the correspondingly designated teeth 20 past the nose 25 of a pawl 21. For convenience, the pawl 21 and the teeth 20 may be considered as the primary stop contrivance for the type carrier of which the coacting parts move with respect to each other in synchronism with the passage of successive index positions of the card through the sensing means. The sensing means comprises conductive brushes SB, one for each card column, and a common contact roll CR. The index positions 9, 8, 7, . . . 1, 0, 11, and 12, pass in order, through the sensing means and when the brush encounters a perforation in an index position, it engages the contact roll to close a circuit momentarily through a solenoid 29. One card is acted on each cycle and its index positions 9, 8, 7, . . . 1, 0, 11, and 12 pass in order through the sensing means in synchronism with the travel of the corresponding teeth 20 past the nose 25 of pawl 21. The actuating means for the type carrier idles after the last or "12" index position passes the sensing brush SB and during this idling period, the printing operation occurs, following which the type carrier is restored. A single perforation in an index position of a card column may be employed, as is customary, to designate a number while combinations of perforations in a column may be used to represent alphabetic characters, punctuation marks, and other desired symbols. The present invention permits the use of a pair of perforations in any two index positions of a card column to represent a character or sign. Thus, a "9" perforation may be combined with any other perforation in the column to represent, in codal form, a desired indication. Merely by way of example, it is preferred in the present instance to represent the various indications by pairing a perforation in one of the index positions 9 to 4 of a column with a perforation in one of the positions 3, 2, 1, 0, 11, and 12 of the column. It is to be understood, however, that where a greater number of indications are to be designated, the index positions may be paired in all possible combinations. As the card passes the sensing means, one or more perforations in a column are sensed to cause energization of solenoid 29. The single or repeat energization of the solenoid during a cycle causes the advance of the type carrier to be arrested, with the type corresponding to the sensed indication at printing position. The first energization of the solenoid results in the parts 20 and 21 of the primary stop contrivance engaging each other to effect a primary interruption in the advance of the type carrier, at which point the type which may be designated by the first perforation will be in printing position. The second or repeat energization of the solenoid acts through a secondary stop contrivance, comprising parts 35 and 36, to stop a supplementary advance of the type carrier, at the end of which the type for printing the indication represented by a pair of perforations in a column is at the printing position.

The manner in which the stop contrivances are operated will now be explained in detail. Pawl 21 is in the form of a bell crank lever pivoted on a stud 22 carried by a slide 23. There is one slide 23 for each of the parallel printing units and a guide block 24 with suitable ways is provided for slidably mounting the slides. The lower arm of each pawl 21 is formed as an inclined nose 26, the abrupt side of which is initially engaged by the upper leg of the T-shaped nose of a latch lever 27. The latch lever is maintained by a spring 28 in engagement with a projection of a lever 31 which is connected by a linkage 30 to the plunger 29' of solenoid 29. Upon the sensing brush SB encountering the first perforation in a card column, solenoid 29 is energized for the first time during the card cycle to cause lever 31 to rock clockwise. This, in turn, causes counterclockwise movement of the latch lever 27, withdrawing the upper leg of its T-shaped nose from the nose 26 of pawl 21 and placing the lower leg of the T-shaped nose in front of a projection 33. The release of pawl 21 permits a spring 32 to rock the nose 25 upwardly to engage that one of the teeth 20 which corresponds to the perforated, sensed index position and which is then immediately to the right of the nose 25. The engagement of this tooth with the pawl nose 25 couples the pawl and its carrying slide 23 to the type carrier for common advance therewith. However, as the lower leg of the T-shaped nose of lever 27 now is in front of the projection 33 of the slide, it stops the slide and, thereby, the coupled type carrier, after the slide has moved just far enough to bring the lower nose 26 of pawl 21 ahead of the T-shaped nose of lever 27. When sensing of the perforation is completed, solenoid 29 is deenergized, causing latch lever 27 to return clockwise and bring the upper leg of its T-shaped nose in front of a second projection 34 of the slide 23, thereby stopping advance of the slide and the coupled type carrier in a primary position corresponding to the first sensed perforation of the card column. Such perforation may be the only one in the column and may designate a desired indication, in which event, the type carrier will have been arrested with the type for printing this indication located at the printing position.

Assuming that a second perforation occurs in the card column, the sensing of this perforation causes a repeat energization of solenoid 29, which results in the lowering and withdrawal of the upper leg of the T-shaped nose of lever 27 from projection 34 of slide 23. This frees the slide and type carrier for common movement during which the type carrier performs a supplementary advance. The extent of this supplementary advance is determined by the coaction of the parts 35 and 36 of the secondary contrivance. The second perforation in a card column cannot occur in the "9" index position which is the first one encountering the sensing means. Thus, theoretically, there may be one step 35 for each of the index positions 8, 7, . . . 0, 11, and 12. However, for the present example, it has been assumed that the second perforation is to occur only at one of the index positions 3, 2, 1, 0, 11,

and 12; hence, one step 35 is shown for each of these index positions. The steps are progressively distant from the nose of stop 36, and the stop is moved progressively upward into the path of the successive steps 3, 2, 1, 0, 11, and 12 in synchronism with the passage of the corresponding index positions 3, 2, 1, 0, 11 and 12 through the sensing means. Thus, if the second perforation is sensed in one of the latter index positions, the repeat operation of latch lever 27 releases the slide 23 for advance at the time the nose of stop 36 is in front of the corresponding step 35. The stop is engaged by this selected step to interrupt advance of the slide and, thereby, to arrest the supplementary advance of the coupled type carrier at a point of its type selecting range at which the type, corresponding to the indication denoted by the pair of sensed perforations in the card column, is located at the printing position. Thus, different combinations of primary and secondary advances of the type carrier are provided to effect selection of types for printing.

The stop 36 is slidably mounted in a socket in the free end of the pivoted arm 38 and surrounded by a spring 39 which urges the stop to maintain normal upper position on the arm until arrested by the bottom of a step 35, after which the arm 38 may continue to move while the stop remains stationary. Arm 38 has a follower roller 40 riding in a cam groove 41 of the cam wheel 10. In the present example, the cam groove is shaped to allow arm 38 to remain idle while the index positions 9 to 4 are passing the analyzing means. The cam groove then progressively raises arm 38 in front of the successive steps 35 in synchronism with the passage of index positions 3, 2, 1, 0, 11, and 12 through the sensing means. The sensing of the second perforation in one of these index positions releases the slide for advance with the type carrier until arrested by engagement of stop 36 with the step 35 then in front of the stop and corresponding to the second perforation position. The stop then remains at rest while cam groove 41 continues to raise arm 38 until the "12" index position of the card passes the sensing means. The arm 38 then idles while the printing operation occurs, after which the arm is restored, together with the stop 36, by the cam groove 41.

After the printing operation, sector 9 is restored by cam groove 9', causing restoration of the printing unit. As the unit returns, teeth 20 ratchet past nose 25 of pawl 21 and, finally, a lug 37 of the arm 19 engages the front, inclined edge of the nose 25 and cams the pawl 21 counterclockwise into normal release position until the front face of the lug and the confronting edge of the pawl nose are in flush engagement. Thereafter, the return travel of the type sector is communicated, through lug 37 and pawl nose 25, to slide 23. As the slide completes its return travel, noses 34 and 33 thereof and nose 26 of pawl 21 successively cam past the nose of latch lever 27 which, at the end of the return stroke of the printing unit is in normal engaged position with respect to the nose 26 of the pawl 21, thereby holding slide 23 in initial position.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, 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. A cyclically operating machine controlled by record bodies on which characters are represented by different combinations of pairs of markings, comprising printing apparatus including a printing unit provided with character types, means for advancing the printing unit, during a cycle, through a type-selecting range, means to sense the pair of markings representing a character on a record body, means controlled by the sensing means according to the sensing of one of the pair of markings for arresting the advance of the printing unit at a differential point of the type-selecting range and controlled by the sensing means upon sensing of the other of the pair of markings for causing release of the printing unit for a further advance, and means, including a cyclically differentially positioned stop, for terminating the further advance of the printing unit with the type for the character represented by the sensed pair of markings located at a printing position.

2. A machine controllable by designations having a plurality of characteristics, comprising a selectively settable unit, means adapted to advance the unit through a given range, means to sense the characteristics of a designation in succession, means controlled by the sensing means upon sensing of one of the characteristics for effecting a primary selective setting of the unit, means controlled by the sensing means upon subsequent sensing of another characteristic of the designation for causing a supplementary advance of the unit from its primary setting, and means, including a stop progressively positioned in synchronism with the successive sensing of characteristics, for arresting the supplementary advance of the unit to effect a secondary selective setting thereof along said given range.

3. A machine controllable by codal indications having combinations of characteristics, comprising a differentially settable unit, means to advance the settable unit, means to sense the characteristics of an indication, a movable contrivance adapted to be coupled to the unit for advancing therewith, a device initially acting on the contrivance to hold it uncoupled from the unit and to prevent movement of the contrivance, means controlled by the sensing means according to the sensing of the characteristics of an indication for repeatedly operating said device, the first such operation causing the contrivance to be coupled to the unit and arresting the contrivance and, thereby, the unit by interengagement of parts of the device and contrivance and a repeat operation of the device releasing the contrivance for advance with the unit, and a stop for engaging the contrivance to limit the latter advance so as to differentially set the unit according to the sensed indication.

4. A machine controllable by codal indications having combinations of characteristics comprising a differentially settable unit, actuating means to advance the unit releasably, means to sense the characteristics of an indication, a movable contrivance having a part adapted to be coupled to the unit, a device coacting with the aforesaid part to hold it uncoupled from the unit, means controlled by the sensing means according to the sensed indication characteristics for effecting repeat operations of said device, the first such operation of the device causing the aforesaid part to be coupled to the unit and after such cou-

pling allowing the unit to advance the now-coupled contrivance until arrested by engagement of a part of the device with a stop portion of the contrivance and a repeat operation of the device releasing it from said stop portion to allow the unit to advance together with the now-coupled contrivance, and means for governing the extent of the latter advance so as to set the unit differentially according to the sensed indication.

5. A cyclically operating machine through which record cards are fed during successive cycles, each card having successive index positions adapted to be marked in combinations to represent different indications; comprising printing-means including a type carrier with successive indication-printing types, means to advance the type carrier releasably through a given range during a cycle, means to sense the index positions of a card in succession, a movable stop contrivance having means engageable with the carrier to arrest advance thereof, a device acting on the contrivance to hold it disengaged from the type carrier, means controlled by the successive sensing of markings representing an indication for effecting successive operations of the device, the first such operation of the device causing the stop contrivance to engage the type carrier and bringing the device into engagement with a stop portion of the contrivance to arrest the advance of the type carrier, a successive operation of the device releasing it from the stop portion to enable the contrivance to advance together with the now-engaged type carrier, a second stop contrivance for differentially arresting the latter advance of the first-mentioned contrivance and the carrier with a type thereof in position to print the indication denoted by the sensed markings, and means for moving the second stop contrivance in synchronism with the sensing of the index positions into differential arresting relation with the first contrivance.

6. A cyclically operating machine comprising a type carrier having successive character types, actuating means to advance the carrier releasably during a cycle, a movably mounted device, coupling means between the device and carrier, latching means latching the coupling means in ineffective position and releasable therefrom to cause it to couple the device and carrier together, a stop surface on the device engaged by the latching means to arrest the device when coupled to the carrier and thereby to arrest the carrier after a certain advance thereof, said latching means being subsequently releasable from the stop surface to release the device and thereby enable the carrier to continue its advance while advancing the device therewith, a stop for arresting the continued advance of the carrier, character selecting means, and means controlled thereby for effecting the successive release operations of the latching means in timed relation to the cycle of the machine so as to cause the total advance of the carrier to position a selected character type in a printing position.

7. A cyclically operating machine comprising a type carrier with successive character types, means to advance the carrier releasably during a cycle, a movably mounted device, coupling means between the device and carrier, latching means latching the coupling means in ineffective position and releasable therefrom to cause it to couple the carrier and device together, a stop surface on the device engaged by the latching means when coupled to the carrier for arresting the device and thereby the carrier after a certain advance thereof, said latching means being subsequently releasable from the stop surface of the device to release the device and thereby the carrier so as to enable the carrier to continue its advance during which continued advance the carrier advances the device therewith, stop means engageable with the device to arrest it and thereby the carrier after the continued advance of the carrier, and character selecting means for timing the successive releases of the latching means from the coupling means and stop surface in relation to the cycle so as to cause a selected character type to be presented in printing position at the completion of the said continued advance of the carrier.

8. A cyclically operating machine comprising a type carrier with successive character types, means for releasably advancing the carrier during a cycle, a movably mounted device, a coupling member carried by the device and adapted to engage the carrier to couple the device thereto for advance thereby, a latch for latching the member in uncoupling position and releasable therefrom to enable it to engage the carrier and couple the device thereto for advance thereby, a stop surface on the device engaged with the latch, after releasing the member, to prevent advance of the device and thereby to arrest the carrier coupled thereto after a certain advance of the carrier, said latch being releasable thereafter from the stop surface to release the device and thereby release the carrier for supplementary advance, a cyclically progressively positioned stop for stopping the supplementary advance of the device and carrier with a selected character at printing position, character selecting means, and means controlled thereby for effecting the first and second releasing operations of the latch.

9. A cyclically operating machine comprising a type carrier with successive character types, means to advance the carrier releasably during a cycle, a movably mounted device, coupling means between the device and carrier, latching means engaging the coupling means to hold it ineffective and releasable therefrom to cause it to couple the device and carrier together, a stop surface on the device engaged by the latching means, when the device and carrier are coupled together, to prevent advance of the device and thereby arrest the carrier after a certain advance thereof, said latching means being subsequently releasable from the stop surface to enable the carrier to continue its advance and during such continued advance to move the device therewith, a cyclically operating stop cyclically placed in progressive stop positions with respect to the device so as to be effective in one of these positions, depending upon the time within the cycle at which the carrier is released for its continued advance, to engage the device and thereby arrest the continued advance of the carrier, and character selecting means for timing the successive release operations of the latching means with respect to the cycle so as to cause a selected character type to be presented in printing position at the completion of the continued advance of the carrier.

10. A cyclically operating machine for operating on a record having character designating characteristics, comprising a type carrier with successive character types, cyclical actuating means for releasably advancing the carrier during a cycle, a movably mounted device, coupling means between the device and carrier, latching means engaging the coupling means to hold it in-

effective and releasable therefrom to cause it to couple the device and carrier together, a stop surface on the device engaged by the latching means, when the device and carrier are coupled together, to thereby arrest the carrier after a certain advance thereof, said latching means being subsequently releasable from the stop surface to enable the carrier to continue its advance and during such continued advance to move the device therewith, a cyclically operating stop cyclically placed in proressive stop positions with respect to the device so as to be effective in one of these positions, depending upon the time within the cycle at which the carrier is released for its continued advance, to engage the device and thereby arrest the continued advance of the carrier, means for sensing the character designating characteristics on the record and means controlled thereby for timing the successive release operations of the latching means with respect to the cycle, so as to cause a selected character type to be placed in printing position at the completion of the continued advance of the carrier.

11. A cyclically operating machine comprising a type carrier with successive character types, means for releasably advancing the carrier, a movably mounted device, a coupling member carried thereby and adapted to engage the carrier to couple the device to the carrier for advance thereby, a latch for latching the member in non-coupling position, means for releasing the latch from the member to enable the member to engage the carrier and couple the device to the carrier for advance thereby, a stop surface on the device engaged by the latch after releasing the coupling member to limit the advance of the device and thereby to arrest the type carrier with a selected character in printing position, and character selecting means for timing the operation of the means which releases the latch from the member in relation to the advance of the carrier so as to cause the carrier to be arrested when the selected character is in printing position.

12. A cyclically operating machine acting on a record during a cycle, such record having any of several character representations, comprising a type carrier having successive character types, means to advance the carrier releasably during a cycle, a movably mounted device, a coupling member carried thereby, a latch engaging the coupling member to hold it disengaged from the carrier and coincidentally to prevent movement of the device, sensing means for the character representations, means controlled by the sensing means upon sensing a character representation for releasing the latch from the coupling member to enable the member to engage the carrier and couple the device thereto for advance therewith, and a stop surface on the device engaged by the latch for limiting the advance of the device and thereby arresting the type carrier with the character type corresponding to the sensed character representation in printing position.

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