May 10, 1932. A. THOMAS 1,858,174

CARD PERFORATING MACHINE OR THE LIKE

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Fig. 1.

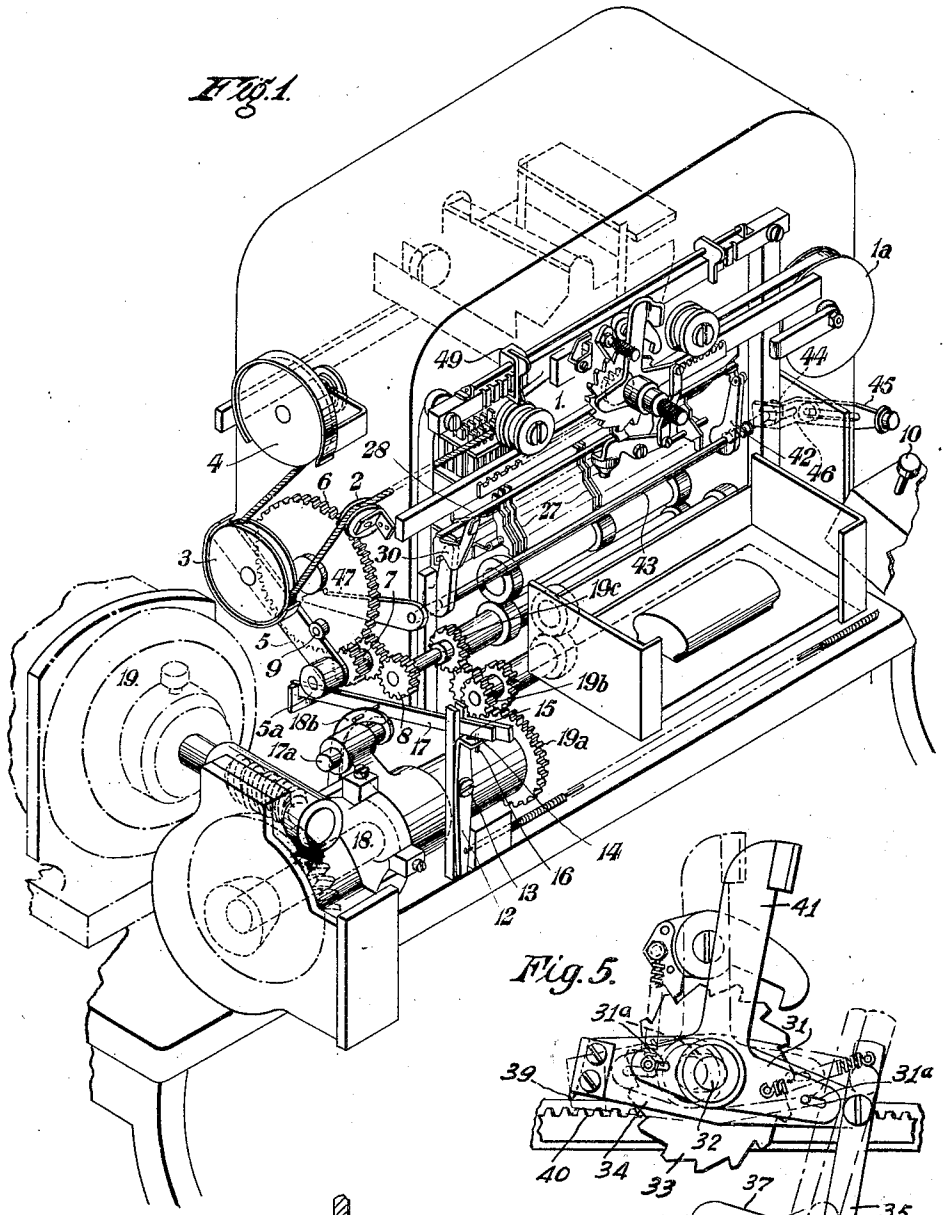
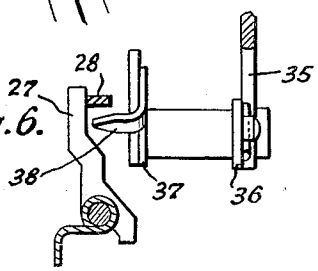


Fig. 5.

Fig. 6.



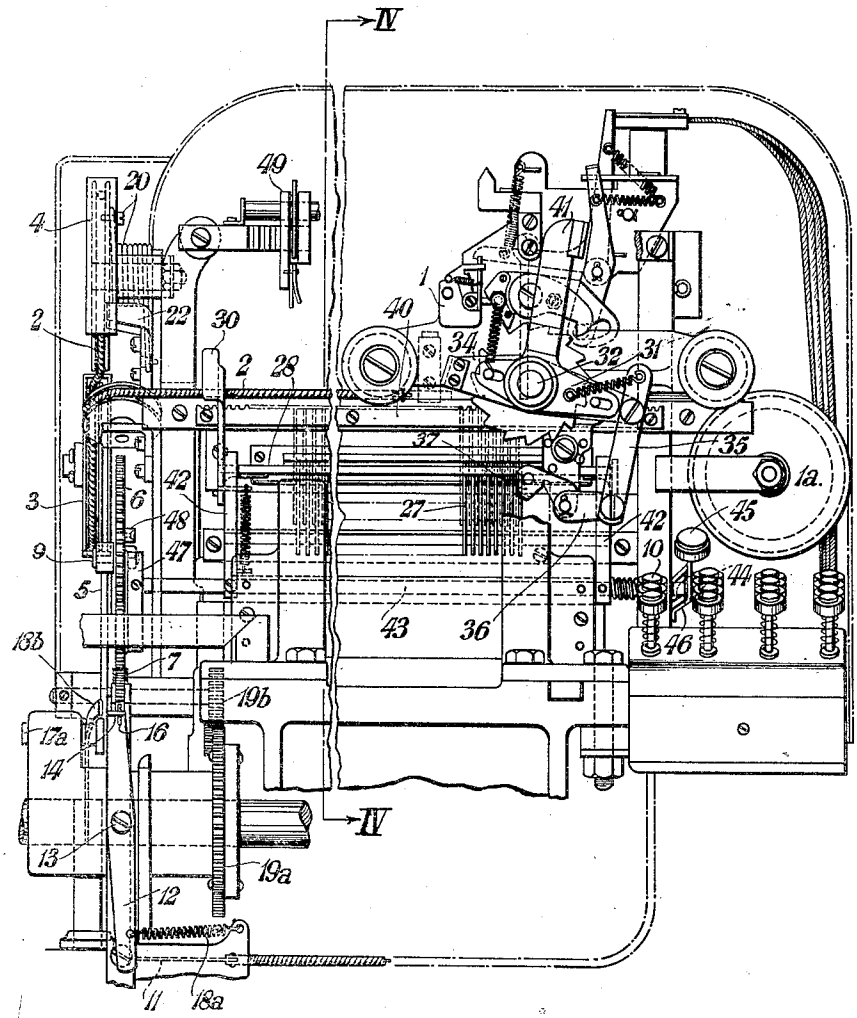
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CARD PERFORATING MACHINE OR THE LIKE

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Fig. 2.



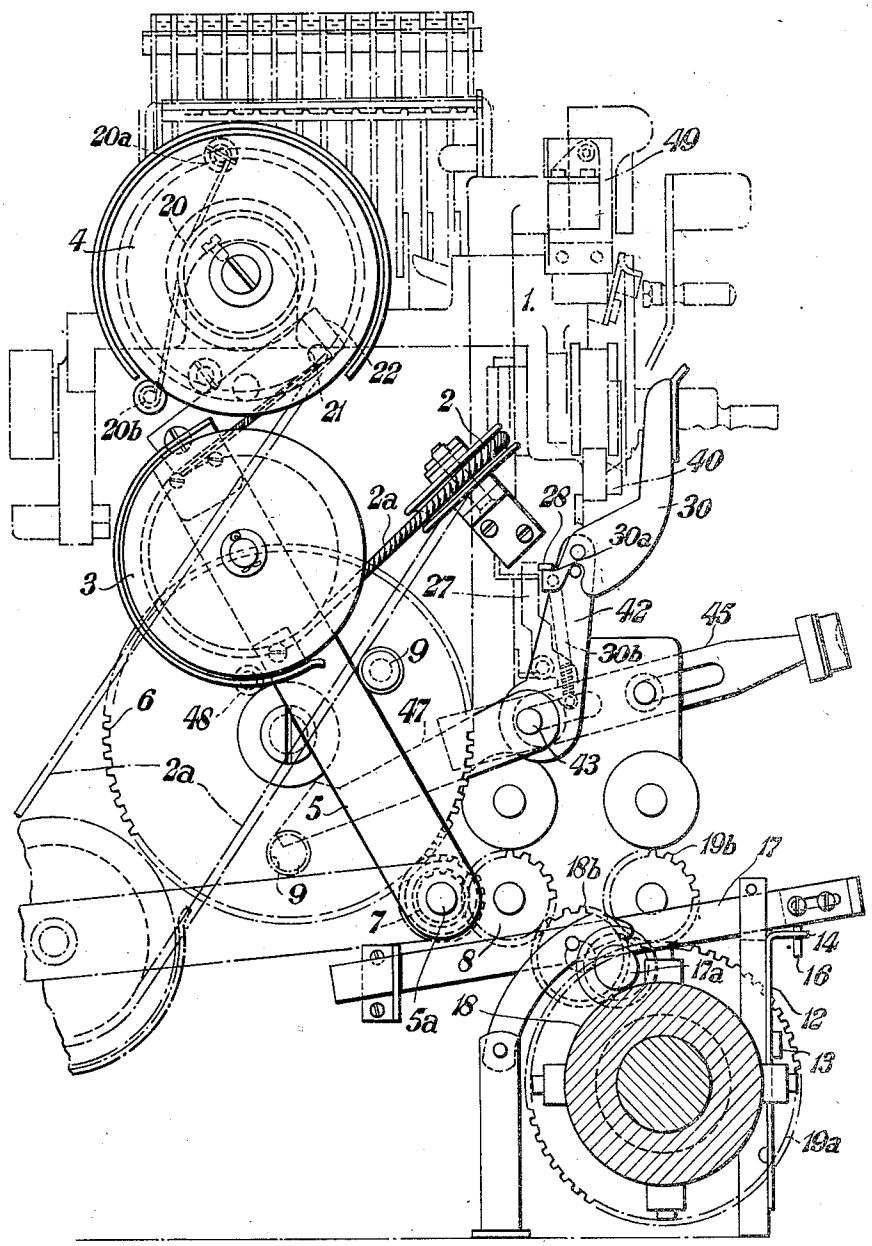
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CARD PERFORATING MACHINE OR THE LIKE

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Fig. 3.



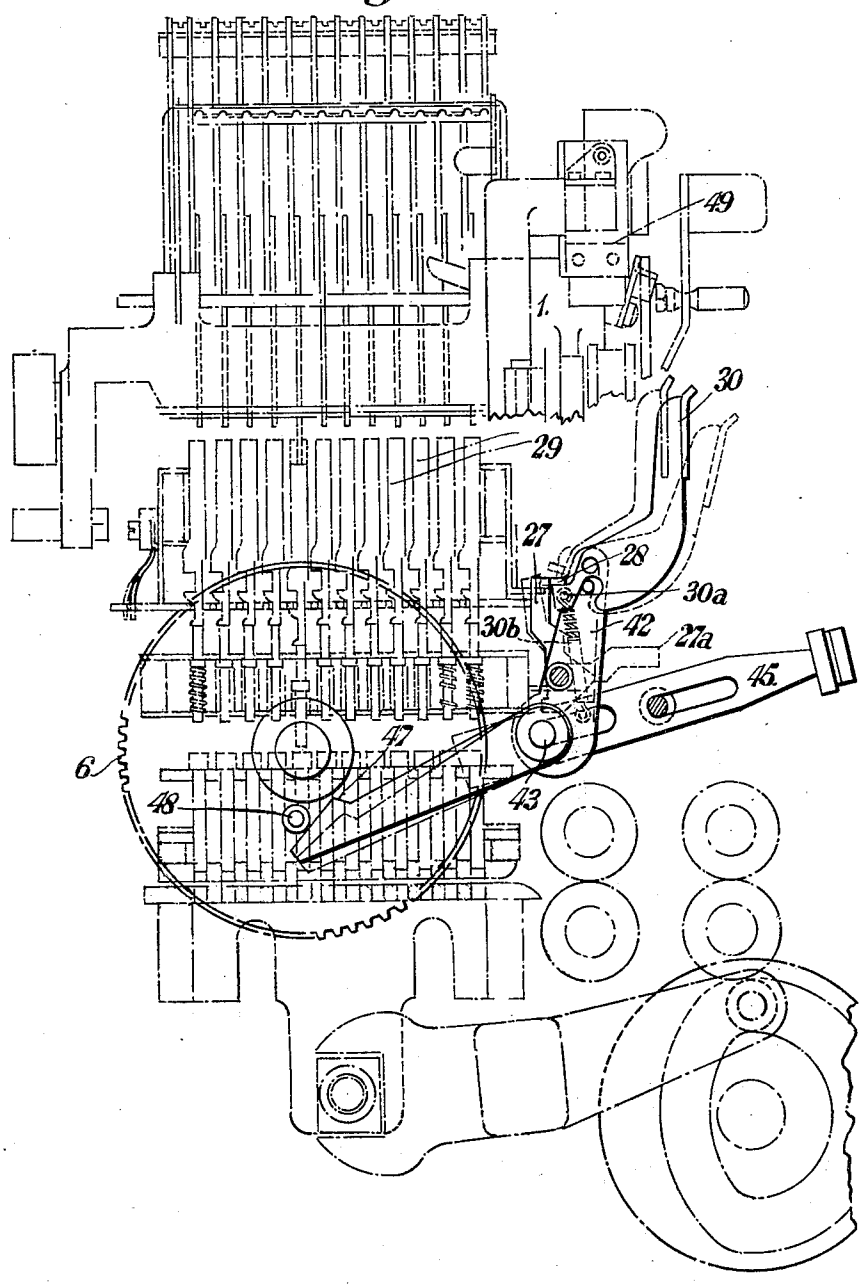
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Fig. 4.



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UNITED STATES PATENT OFFICE

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CARD PERFORATING MACHINE OR THE LIKE

Application filed January 10, 1930, Serial No. 419,974, and in Great Britain January 21, 1929.

This invention relates to card perforating machines or the like and has for one of its objects to provide means for automatically returning the carriage after each setting operation with the minimum of shock and vibration.

Another object of the invention is to provide means for bringing the carriage return mechanism back to its initial position each time the carriage is returned.

The movement of the carriage is effected by the agency of a tension spring, the power of which is released through escapement mechanism including an escapement wheel and escapement pawls carried by the carriage.

In the type of machine to which the invention relates the carriage carries a plurality of setting members in the form of plungers which are arranged in one column from front to rear of the machine, the setting members corresponding to and being controlled by the keys e. g. through the agency of Bowden mechanism and bell crank levers, so that on depression of the respective key the setting member is depressed.

The column of setting members so carried by the carriage is traversed step by step over a field of set bars of which there are a plurality of columns producing lines of bars at right angles to each column, the number of columns being at least as great as the number of columns formed on statistical cards, sheets, or the like, to be perforated in the machine, each column comprising a set of bars one corresponding to each setting member.

As the carriage is traversed over the field the columns of setting members are brought successively over each column in the field of bars. Upon the depression of one of the setting members the respective bar in the column of the bars under the setting members at the particular position of the carriage, is depressed, and is held depressed by a spring pressed latch bar which engages with a shoulder on the depressed bar.

In moving down, the bar depresses a spring pin. There is one such pin for every bar and the springs on these pins tend to keep the pins in upward position, which is their normal position, the springs also serving to reset the respective bars when the latch aforesaid has released them.

Each of the latch bars has its front end arranged in juxtaposition with a pivoted releasing pawl formed with an oblique face hereafter referred to.

Beneath the spring pins the punches are arranged one punch for each pin in a stripper plate, and the lower ends of the punches extend into a movable frame comprising a die and die plate between which is a space, for the introduction of the cards to be perforated.

This frame is reciprocated vertically under power and when a card is in the space between the die and die plate, the card is moved up with the frame and encounters all the punches, lifting them with it.

If a spring pin is depressed it attempts to stop the upward movement of the respective punch, but as the respective bar is held by the latch aforesaid the spring pin acts as an abutment for the punch and causes a corresponding perforation of the card.

In the operation of such a machine the key board is operated to actuate one or more of the setting members at each position of the carriage and at the end of the carriage traverse of the field of bars the punch key is operated, thereby connecting the frame to power which effects the perforation of the card according to the setting action.

A perforating machine according to the present invention comprises a carriage, a cable in the form of a loop having one end anchored and the other end attached to the carriage, a device engaging with the loop and adapted to move in a circular path and means for moving said device whereby the loop is extended and the carriage caused to return to its initial position with a simple harmonic motion. Thus the initial movement of the carriage is of gradual nature, the speed of which is accelerated up to the middle of the movement and then decelerated to the end of the movement, so that the carriage does not start up suddenly and is also brought to rest gently thereby avoiding shock.

Preferably the actuating key for the punch

operating mechanism serves not only to actuate the punching mechanism, but also the carriage return mechanism.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings which show by way of example some preferred embodiments of the present invention.

In the drawings Fig. 1 is a perspective view of a punch perforating machine embodying the invention.

Fig. 2 is a front elevation of the machine;

Fig. 3 is an end elevation looking from the left of Fig. 2;

Fig. 4 is a section on the line IV—IV of Fig. 2 but with the release bar actuating mechanism in elevation;

Fig. 5 illustrates on an enlarged scale the back-spacing mechanism and the means for resetting one individual column of set bars, and

Fig. 6 shows a detail of the arrangement shown in Fig. 5.

In the construction illustrated the carriage 1 has attached thereto a cable 2 passing over a jockey pulley 3, the other end of the cable being anchored to a wheel 4, the construction of which will be described later. The jockey pulley 3 lies in a loop 2*a* of the cable and is carried on an arm 5 pivoted at 5*a* to the frame of the machine the weight of the pulley tending to cause the arm to assume a substantially horizontal position when the carriage is in its initial position as stated above. The carriage is advanced step by step when the keys are pressed, by means of a spring within a housing 1*a*.

Mounted on the machine frame is a toothed wheel 6 geared to a pinion 7 connected to one of the pinions 8 of the feed mechanism for the cards, sheets or the like, the toothed wheel 6 constituting the rotatable member serving to operate the carriage return mechanism, and on one face of the toothed wheel 6 is an abutment in the form of a roll 9 which acts against the pivoted lever 5 which is coaxial with the pinion 7 aforesaid so as to displace the lever 5 an amount corresponding to the position of the roll 9 in its circular path.

On the depression of the punch key 10 at the end of a setting operation a Bowden cable 11 moves a lever 12 about its pivot 13. The upper end of this lever is turned over at 14 and provided with an oblique slot 15 engaging with a pin 16 carried on a bar 17. Owing to the obliquity of the slot 15 movement of the lever 12 causes an axial movement of the bar 17 which allows a spring pressed plunger 17*a* to engage with a member 18 provided with dog teeth so as to connect an electric motor 19 through a gear train 19*a*, 19*b*, 19*c* to the pinion and the toothed wheel 6 causing the roll to press down the lever 5 during its rotation to the substantially horizontal position, when the carriage is returned. The plunger 17*a* is automatically disengaged from the teeth of the member 18 by means of a cam member 18*b* over the surface of which the plunger rides and is then withdrawn from engagement with the dog teeth after one revolution of the member 18. The bar 17 is returned to its initial position by a spring 18*a*.

The arrangement is such that the roll 9 starts its operation on the pivoted lever 5 with a minimum speed so that the initial movement of the carriage 1 is of gradual nature, the speed of which is accelerated up to the middle of the movement and then decelerated until the end of the movement, that is to say, there is what may be termed a simple harmonic motion in operation with the lever 5.

The wheel 4 to which the cable 2 is attached is provided with a spring 20 having one end secured to the wheel at 20*a* and the other to the machine frame at 20*b* (see Fig. 3). The wheel 4 carries a stop 21 adapted to engage with a fixed abutment 22 when the carriage is in its initial position. In Fig. 3 the carriage has moved from this position so that the arm 5 is not horizontal. In the event of the punch key being depressed whilst the carriage for some reason or other is prevented from moving with the cable, the wheel 4 is rotated and the spring 20 becomes stressed, the stop 21 on the wheel being retracted from the abutment 22 on the frame to the desired extent, and then automatically returned under the spring action.

The spring on the wheel aforesaid also acts as a guard for the operator, and is especially useful when the carriage is returned over a part only of its traverse as in gang punching, as the arrest of the carriage does not interfere with the working of the pivoted lever.

Referring now to the pivoted release pawls arranged at the front end of each of the latch bars as hereinbefore referred to as comprised in a perforating machine for cards, sheets or the like, there is pivotally mounted on the escapement wheel shaft of the carriage carrying the setting members, a rocking member adapted to be operated by hand provided with an arm connected by a link to a rocking lever usually disposed just above the latches and mounted on the carriage frame and carrying at its free end a bevelled roller.

When the rocking member is operated by hand it is rocked so as to move the roller downwardly on to the oblique or cam faces of the latches through the agency of the link and second rocking lever hereinbefore referred to. If then the carriage is returned towards the left of the machine the roller passes over the oblique or cam faces of all the latches and causes them to move their respective latch bars longitudinally thereby releasing all the

bars previously set and which were previously locked by the latching bar.

In such form of machine after a setting operation the punch key is operated and then the carriage returned to the left hand or starting position with the result that all the release pawls are operated and the latch bars caused to release the set bars.

In operable relation with all of the release pawls or latches 27 there is provided a release bar 28 arranged transversely of them, and operable laterally to simultaneously return all latch pawls to normal position, whereby they cause the movement of the latch bars to release any set bars 29.

The operation of this release bar 28 may be automatic or by hand, and in the hand operation there is provided a lever 30 at one side of the machine which can be moved manually into the chain line position in which a nose 30*a* on the lever causes a lateral displacement of the bar 28. For the purpose of releasing individual latches there is provided as in the known constructions a rocking member 31 pivotally mounted on the shaft 32 of the escapement wheel 33. Mounted to slide axially on the rocking member 31 is a plate 34 provided at one end with an arm 35 connected by a link 36 to a rocking lever 37 which carries instead of a pivoted roller a finger 38 so that on the operation of the rock member 31 the finger operates on particular latch which is determined by the back spacing mechanism now about to be described. This back spacing mechanism is conveniently combined with the escapement mechanism and may be employed whether or not the modified arrangement for operating the release pawls is employed. The back spacing mechanism includes a back spacing pawl 39 formed on the sliding plate 34 and adapted to engage with the carriage rack 40 when the member 31 is rocked. The member 31 is provided with a hand lever 41 and when this lever is brought into the position shown in chain lines in Fig. 8 the pawl 39 engages with the rack 40 and the carriage is moved back one tooth of the rack as permitted by the slots 31*a* in the member 31. Simultaneously the finger 38 is operated to reset the column of bars corresponding to the new position of the carriage.

By such an arrangement if an error has been made in punching a hole in a particular column, the carriage can be returned to the column and the latch bar released by one movement of the back spacer lever and the bars reset by operating the correct key.

Referring now to the operation of the latches 27 by a power operated release bar 28 arranged transversely of them, as employed in a machine having means for automatically returning the carriage 1 to initial position as hereinbefore described, the movement of the bar 28 may be effected on the return of the carriage 1 by carrying the bar on arms 42 mounted on a rock shaft 43 operable from the source of power, conveniently the tooth wheel 6 operating the pivoted lever 5 of the return mechanism for the carriage 1, the arrangement being synchronized so that when the carriage has returned, the setting latches have all been released and the machine is immediately ready for the next punching operation.

One of the pivoted arms 42 mounted on the rock shaft 43 heretofore mentioned for operating the release bar 28 conveniently forms the bearing for the hand lever 30 for operating the bar independently of the rock shaft and the rock shaft is also mounted for axial adjustment so as to disengage it from the source of power when it is required to operate it by hand. To this end one end of the rock shaft 43 is provided with a head 44 under which passes a push rod 45 having a cam surface 46 which engages the head and on being pushed causes the axial displacement by a camming action.

At the other end of the rock shaft is fixed an arm 47 which on the displacement of the rock shaft is carried out of the path of an actuating member 48 carried by the tooth wheel 6 aforesaid of the carriage return mechanism.

On such operation the release bar 28 can be operated by hand.

On the retraction of the push member 45 effecting a cam action on the rock shaft 43, the latter is preferably spring returned to bring its arm 47 into the path of the actuating member or roll 48 on the tooth wheel 6, so that the latch bar 28 is power operated synchronously with the return of the carriage as hereinbefore explained.

Should it be desired to put any of the latches 27 out of operation for the time being the bar 28 may be raised by means of the lever 30 having its nose 30*a* engaging with the bar 28 (Figs. 3 and 4). The lever 30 is normally held in the full line position by a spring 30*b* but is depressed into the dotted position to raise the bar 28 clear of the latches. Any latch may then be pulled out into the position shown at 27*a* where it is out of action. The bar 28 may then be lowered to prevent the remaining latches from coming out.

It may here also be mentioned that in a machine provided with a back spacing device the carriage travel is increased to the extent of one column so that in the end position of the carriage the operation of the back spacing mechanism will bring the carriage setting levers over the end column of bars for the correction of that column as may be desired.

An advantage arising out of this construction is that the operation of the keys in the end position of the carriage cannot produce an incorrect setting of the bars in the end

column as does occur in an ordinary machine when the carriage at the end of its traverse is over the end column. In that case if the operator, believing there is one more column to go, operates another key, this causes the resetting of the bars in the end column, consequently the setting of the wrong bar in the end column.

By constructions according to the present invention such errors are eliminated.

Although the carriage return mechanism herein referred to has been described in its application to a perforating machine for cards, sheets or the like, the description is by way of example only, as the invention is applicable to any form of record making devices in which a carriage is traversed during a series of setting operations and the record effected by a separate key or actuator.

What I claim is:

1. In a punch perforating machine, the combination of a carriage, a cable in the form of a loop having one end anchored and the other end attached to the carriage, a device engaging with the loop and adapted to move in a circular path and means for moving said device, whereby the loop is extended and the carriage caused to return to its initial position with a simple harmonic motion.

2. In a punch perforating machine, the combination of a carriage, a control cable therefor attached at one end to the carriage and anchored at the other end and a portion of said cable being formed into a loop, a device engaging said loop and an abutment movable through a circular path and adapted to displace said cable engaging device according to its position in the circular path, so as to extend the cable correspondingly, whereby a simple harmonic motion is imparted to the device and the carriage is returned to its initial position with a corresponding motion.

3. In a punch perforating machine, the combination of a carriage and a control cable therefor attached at one end to the carriage and anchored at its other end and a portion of said cable being formed into a loop, a jockey pulley engaging said loop, a pivotal arm carrying said pulley at its free end, an abutment member movable through a circular path and adapted to abut against said pivotal arm so as to displace said pulley an amount depending upon the position of said abutment member in its circular path, whereby a corresponding movement is imparted to the cable and the carriage is returned to its initial position with a simple harmonic movement.

In testimony whereof I affix my signature.

ARTHUR THOMAS.