

March 12, 1946.

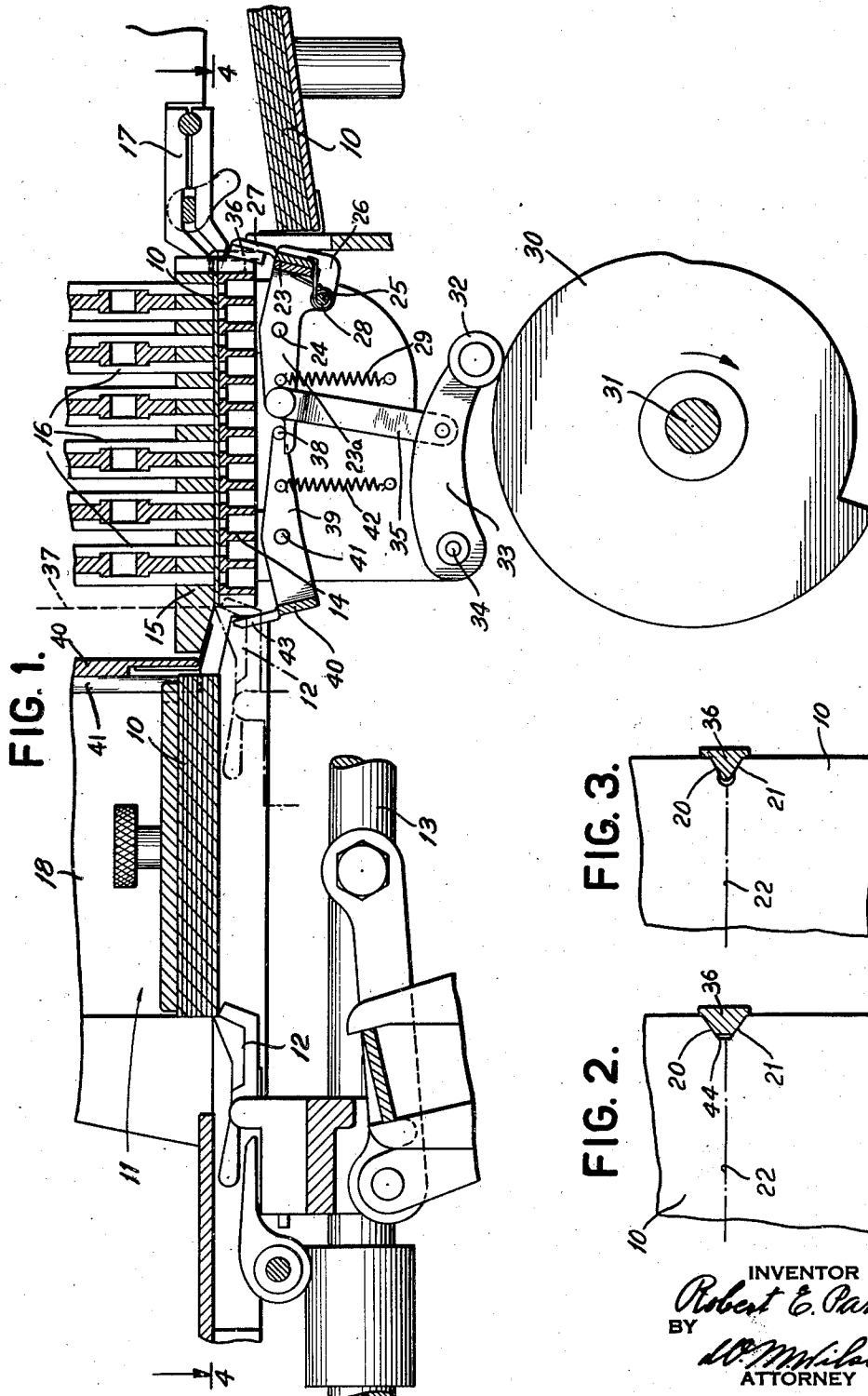
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2,396,384

RECORD PERFORATING MACHINE

Filed Aug. 24, 1944

2 Sheets-Sheet 1



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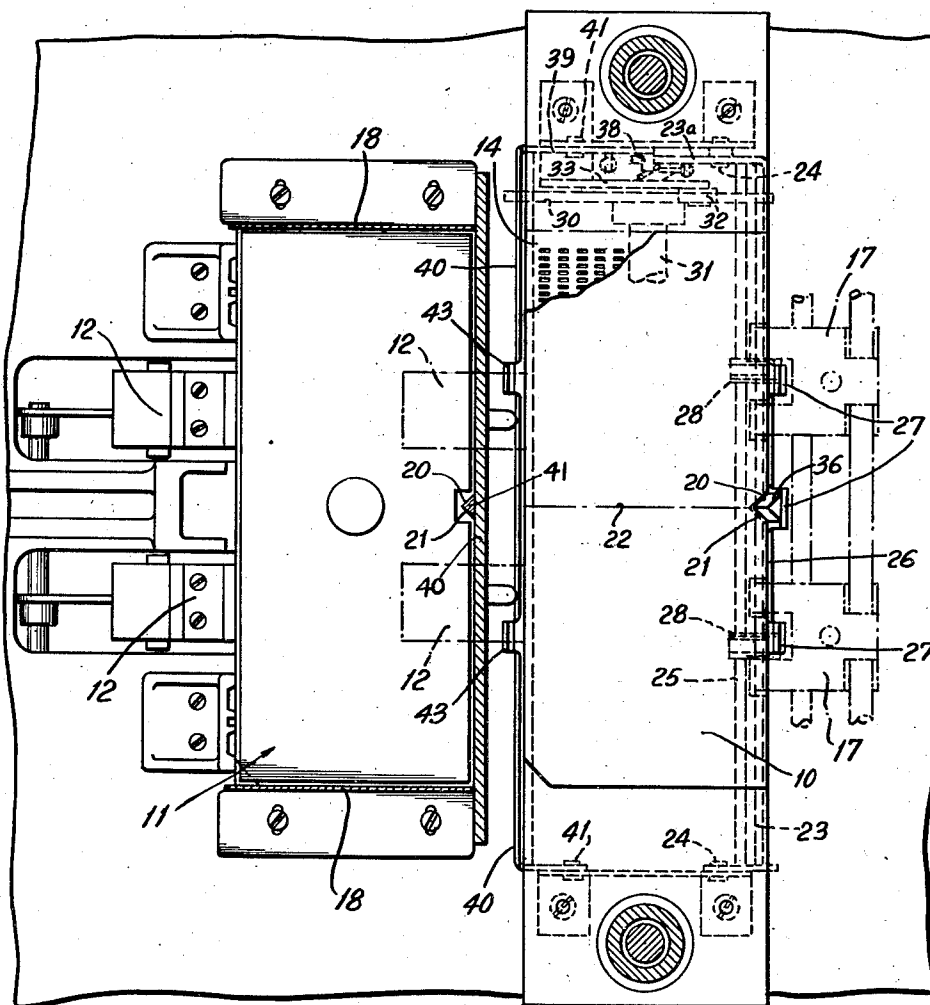
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FIG. 4.



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2,396,384

RECORD PERFORATING MACHINE

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Application August 24, 1944, Serial No. 550,939

5 Claims. (Cl. 164—111)

This invention relates to record-controlled machines and more specifically to machines for perforating the record cards used in the well known Hollerith system.

The record cards used in the well known Hollerith system are manufactured of specially processed paper which is manufactured according to very rigid specifications to insure consistency of physical characteristics and high electrical insulation with a minimum of such defects as carbon spots and embedded particles of metal which conduct electric current, since it is necessary in electrically controlled machines to avoid this characteristic above all. Notwithstanding all of the care exercised in the control of the physical characteristics of the paper and cards, it has been found that there is a considerable seasonal variation in the dimensions of the cards. It has been found that in very dry weather the cards dry out and shrink, whereas in damp weather they tend to absorb moisture and swell. It is necessary, in the use of these cards, that they be fed very precisely and that the registration of the card columns with the usual sensing brushes or punches must be maintained very accurately on account of the close spacing of the columns and small amount of material separating the holes having the same value in adjacent columns.

The dimensions of the card are $3\frac{1}{4}$ inches by $7\frac{3}{8}$ inches, and it is made with the fibers extending lengthwise so that, it will be appreciated, greater variation occurs lengthwise than across the shorter dimension. The so-called index positions on the card are arranged in transverse columns and rows and, since the columnar spacing (lengthwise) is quite close as compared to the spacing of the rows (crosswise), the former is more critical, and for all practical purposes the variation crosswise is negligible.

It has been the custom, at the beginning of the drier periods of the year, which in the northern hemisphere is usually the winter season, to adjust the side guides in the card magazines or hoppers so that they are closer together than during wetter or more humid seasons. On account of the very large number of machines in use, it is difficult for the servicemen in any one area to get around to all of the machines in use in time to readjust the magazine side guides to accommodate for the shrinkage or swelling of the cards. Another difficulty is that the transition from the wet to the dry seasons and vice versa is not sharp but apt to be slow which aggravates the difficulties experienced with cards.

It is the object of the present invention, there-

fore, to provide mechanism which actually moves each card transversely of its line of feed, if necessary, to bring it into alignment with an imaginary reference line which will insure that each card will be more nearly accurately aligned with respect to the punching devices before they operate on the card, thereby making it unnecessary for the servicemen to make periodic readjustments in the magazine side guides. This will enable such guides to be adjusted loosely enough to accommodate the cards during any season of the year or at any time when unusual atmospheric conditions may temporarily cause a major change in the card dimension.

In carrying out the object of the invention, it is proposed to provide the leading edge of the card with a V notch which, as the card arrives in punching position, will engage or be engaged by a wedge and, if the card is out of line with respect to the imaginary reference line, one side of the V notch will be cammed by the wedge to effect a lateral shift of the card into proper position. This will effect a nearly exact centering of punches with spaces to be punched, if the temperature around the punching machine is nearly uniform and the cards have uniform absorbing characteristics to moisture.

The notch is cut into one edge of the card during its manufacture and is accurately located so that a line through its apex will bisect the card. Such line may be called an imaginary reference line, and it will be appreciated that with the notch centrally located and serving as a camming element integral with the card itself any slight expansion or contraction of the card will be equally distributed on both sides of the imaginary reference line.

It is therefore a further object of the invention to provide an improved record card in which the card itself is configured in such a manner that by virtue of its configuration it will effect a self alignment when passed through a machine provided with a complementally configured stop or guide.

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

In the drawings:

Fig. 1 is a sectional view of a punching mechanism showing the present invention applied thereto.

Figs. 2 and 3 are fragments of record cards

showing modified forms of aligning indentations in the edge of the card.

Fig. 4 is a plan section looking in the direction of lines 4-4 of Fig. 1.

In the drawings, the invention is shown as applied to the well known "International" gang punch disclosed in Patent No. 1,817,631 granted August 4, 1931. It will be understood, however, that this particular machine has been selected purely for the purpose of illustrating and describing the invention, and that the invention may be applied to other machines in which perforated cards are employed with such minor changes in the design or arrangement of the parts as may be necessary to adapt the invention to such other machines.

In Figs. 1 and 4 there is shown the essential elements of the record card feeding mechanism of the well known international gang punch. Record cards generally designated 10 are placed in a hopper 11, from where they are advanced singly from the bottom of the stack by a pair of pickers 12 slidable on rods 13. Picker 12 pushes the cards between die 14 and stripper 15, where punches 16 operate to punch out selected positions. Thereafter, grippers 17 grip the leading edge of the card and pull it out from the punching position. This briefly is the sequence of operations and reference may be had to Patent No. 1,817,631 for more detailed explanation.

The present invention is concerned with the manner in which the card 10 is accurately aligned in the punching position between die 14 and stripper 15. First, it may be mentioned that magazine 11 has side plates 18 extending along the short edges of the cards, and these plates are adjustable in the direction of the length of the card, loosely, to the maximum length the card might have, taking into consideration extreme weather conditions involving excessive humidity such as might cause the card to swell to maximum length.

With this adjustment of the card guides, the cards will necessarily fit rather loosely, between the plates 18, during dry periods and the clearance space between the edge of a card and a plate 18 may vary as much as .035 inch. The plates 18 will be adjusted so that properly centered cards clear by .010 inch when the card has the greatest possible dimension arising from extreme swelling. Thus, besides the foregoing clearance there may be an additional clearance of .020 inch when the card has shrunk through extreme dryness to the minimum length.

Under these conditions, when the cards are placed in the hopper 11, the ends of the cards and their imaginary center lines may not line up but may be offset to some extent, and the pickers 12 will advance the cards in such offset relationship to the punching station where, if no alignment were effected, punching would occur in slightly varying positions in the several cards. In Patent 1,817,631 there is provided a pair of fixed side guides identified at 235 in Fig. 6 of the patent, but these unlike the hopper side plates are not adjustable and must be spaced for the maximum possible length, with the result that "short" cards have considerable play in the direction of their length.

In accordance with the present invention, each record card is provided with a V-shaped notch whose inclined edges 20 and 21 (Fig. 4) lie on opposite sides of the imaginary center line 22 of the card. By so configuring the leading edge of the card, camming surfaces are provided on

the card itself which will cause automatic centralization of the card in the following manner.

In Fig. 1, 23 represents a bail pivoted at 24 and having a tie rod 25 upon which is pivoted a member 26 from which three fingers 27 extend upwardly (see Fig. 4). Coil springs 28 hold member 26 against bail 23 and, when bail 23 rocks counterclockwise, member 26 moves integrally therewith to the dotted line position indicated in Fig. 1. This rocking is effected by a spring 29 attached to an arm 23a of bail 23, and its action is controlled by a cam 30 on main shaft 31 (shaft 70 of Patent 1,817,631) which co-operates with a roller 32 of follower arm 33 pivoted at 34 and having link connections 35 with arm 23a.

The central finger 27 has a cam 36 of triangular cross-section secured thereto which, when bail 23 is rocked, takes a vertical position in the path of the leading edge of the card 10 as pickers 12 advance the card from hopper 11. The stroke of pickers is so adjusted that the trailing edge of the card is advanced to a line designated 37 coextensive with the left edge of die 14, and the distance from line 37 to the left sides of fingers 27 is slightly less than the smallest card width, so that fingers 27 will rock about pivot 25 with spring 28 yielding to permit such action, and the card will be located with line 37 as a reference line. As the card engages fingers 27, the V notch in its leading edge will engage cam 36 and automatically centralize itself. That is, for example, if the card is out of line in a downward direction as viewed in Fig. 4, the edge 20 of the notch will slide along the upper plane of cam 36 to slide the card upwardly as pickers 12 continue to push it to the right.

The edges of the pickers 12 are in a common line and, as the card shifts vertically, it slides across the ends of the pickers to its central position, where the imaginary reference line 22 runs through the apex of cam 36.

When arm 23a of bail 23 rocks counterclockwise, its free end moves away from a pin 38 in an arm 39 of a bail 40 pivoted at 41. As a result, spring 42 rocks bail 40 clockwise to swing fingers 43 against the trailing edge of the card to hold it on reference line 37 while pickers 12 return to the left. The card is thus held by fingers 43 and 27 with its trailing edge along a fixed line 37 and its center line extending through the center of cam 36. This condition will be the same for all cards, and it will be apparent that the total amount of linear shrinkage or expansion will be equally divided on both sides of line 22.

With the parts in such positions, punching of the card takes place in the usual manner as set forth in the patent referred to, and thereafter cam 30 rocks bails 23 and 40 back to their full line positions of Fig. 2 and grippers 17 seize the leading edge of the card and remove it from the punching station.

Figs. 2 and 3 show two different forms in which the card notch may be formed. In Fig. 2 the sides 20, 21 do not meet in a point as in Fig. 4 but have a base portion 44, thus spacing edges 20 and 21 at a greater distance to one side of line 22. In Fig. 3 the angle α is made more acute and the bottom of the notch is rounded for better manufacture and is more resistant to accidental tearing at the notch.

It is seen, therefore, that the provision of a self locating notch made in the leading edge of a record card provides a simple, inexpensive and

accurate means of obtaining registration of the card in a machine where instrumentalities must register accurately on the card surface.

As a further aid in centralizing the cards, the right hand guide plate 40 of hopper 11 may have secured thereto a wedge 41 for engagement with the leading edges of the cards 10 so that, when they are placed in the hopper, they will be initially centralized by engagement of their notches with the wedge 41. This wedge may be slightly smaller than the notch for ease of placing the cards in the hopper and will thus serve simply as an initial approximate aligner, and more accurate alignment will be effected by wedge 36 when the card reaches the actual punching station.

While there have 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. In a record controlled perforating or like machine, means to feed a record card linearly along a normal line of feed, said card having a notch in its leading edge whose sides form an angle bisected by a line parallel with the direction of feed of the card, a camming element located in the path of movement of the card and engageable by the sides of said notch, said engagement causing lateral shifting of the card to centralize the notch with respect to said camming element, said feeding means maintaining the trailing edge of the card in a line transverse to the direction of feeding.

2. In a record controlled perforating or like machine, means to feed a record card linearly along a normal line of feed, said card having a notch in its leading edge whose sides form an angle bisected by a line parallel with the direction of feed of the card, said line also bisecting the card, a camming element located in the path of movement of the card and engageable by the sides of said notch, said engagement causing lateral shifting of the card to centralize the notch and card with respect to said camming element.

3. In a machine of the class described, means to feed a record along a straight path to mechanism with which said record is to be registered, a member movable into engagement with one edge of the record to locate said edge along a fixed reference line, said record having a notch in the opposite edge, a camming element engageable with said notch to shift the record in the direction of said reference line to locate the record with respect thereto.

4. In a machine of the class described, means for feeding a record card in a straight line, said card having its leading edge configured to form a pair of oppositely inclined camming surfaces, a camming element positioned in the path of said card and engageable with said surfaces to effect a shift of the card in a direction transverse to its initial direction of movement, said feeding means maintaining the trailing edge of the card in a line transverse to the direction of feeding.

5. In a machine of the class described having a punching station, means for feeding a card to said station, one edge of said card having a camming notch therein, means movable toward the card for concurrently engaging said edge and the edge opposite thereto to locate the card in one direction, operating means for said movable means, and a cam for engaging the card notch for locating the card in the transverse direction.

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