Nov. 14, 1933. R. LORANT 1,934,934

CARD PUNCHING MACHINE

Filed Aug. 12, 1929 4 Sheets-Sheet 1

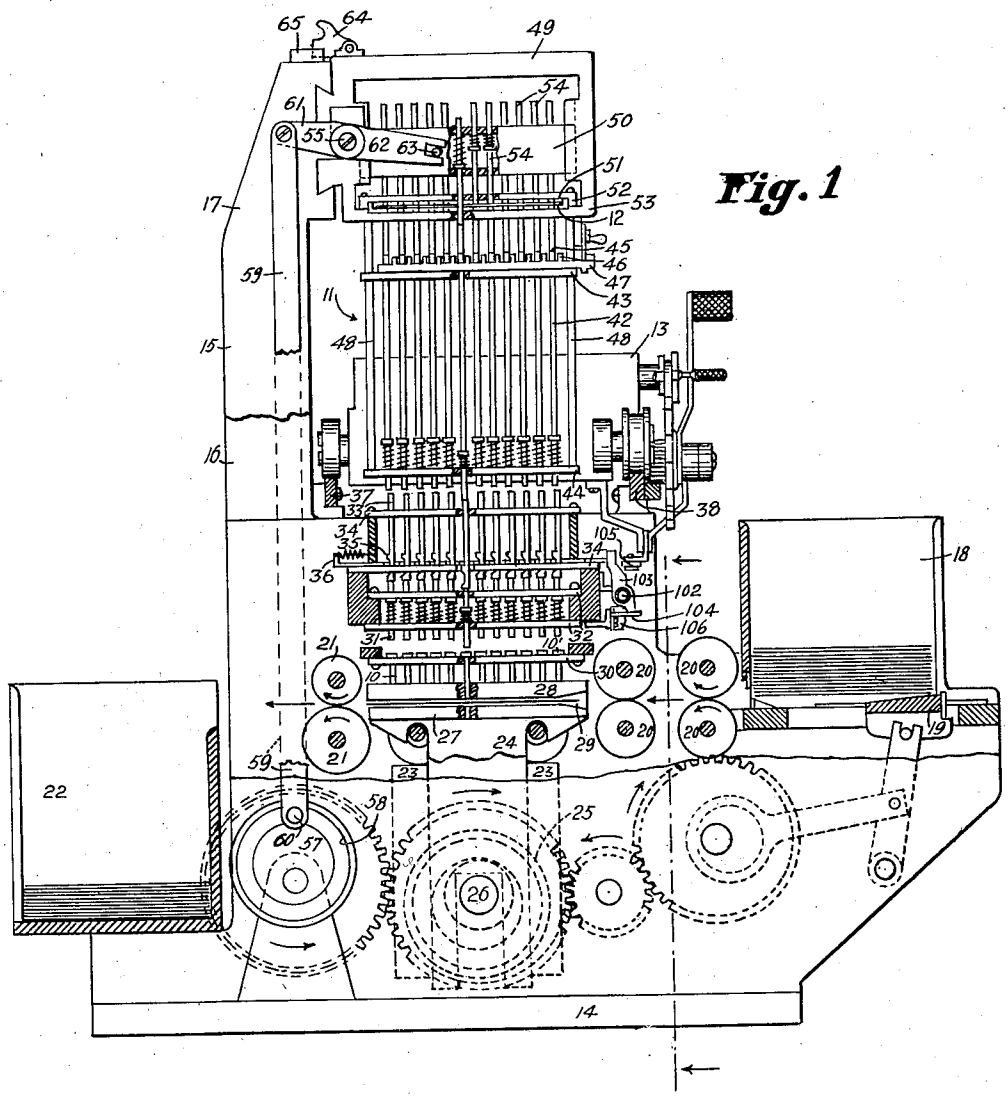


Fig. 1

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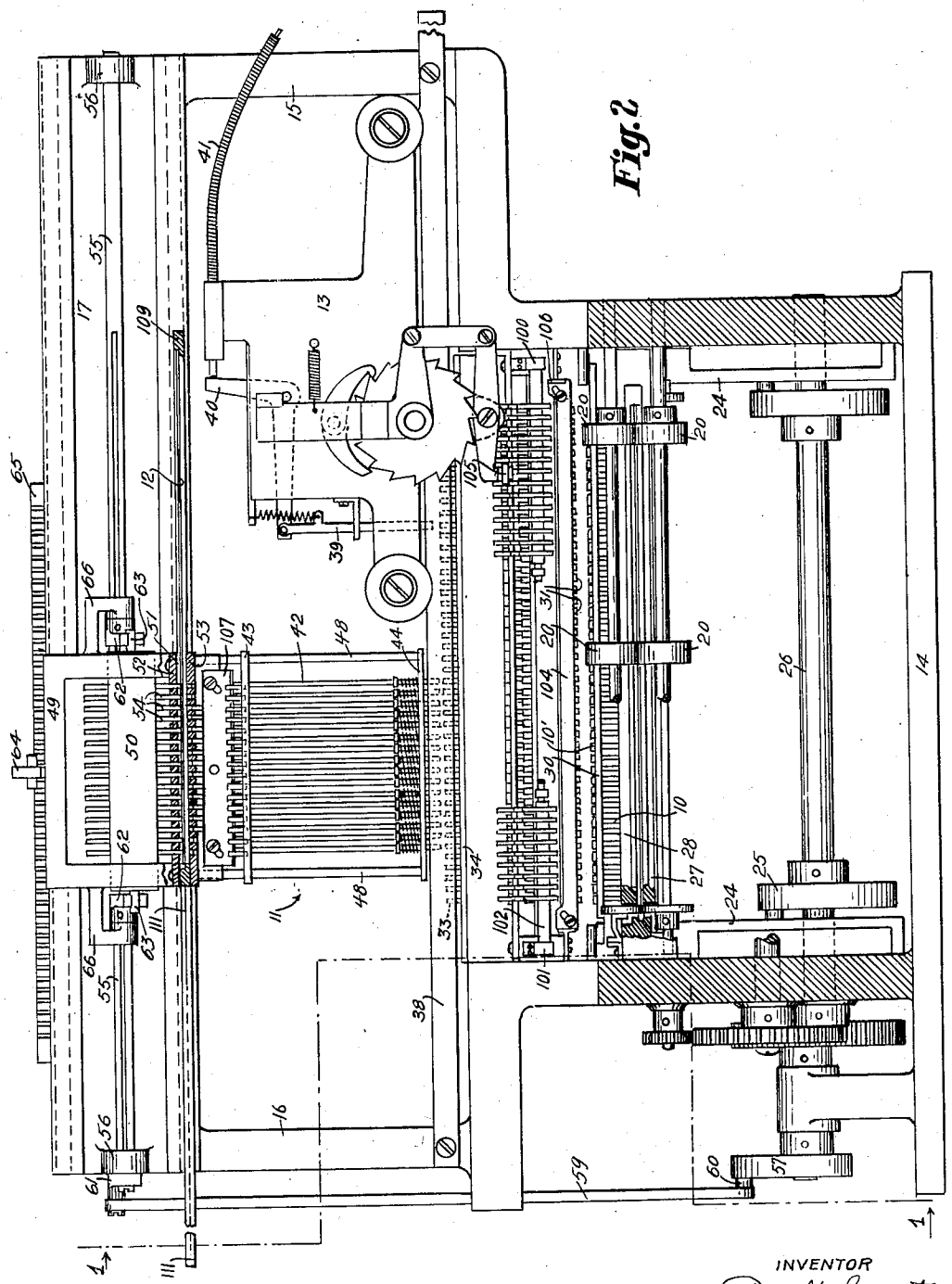


Fig. 2

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Fig. 3

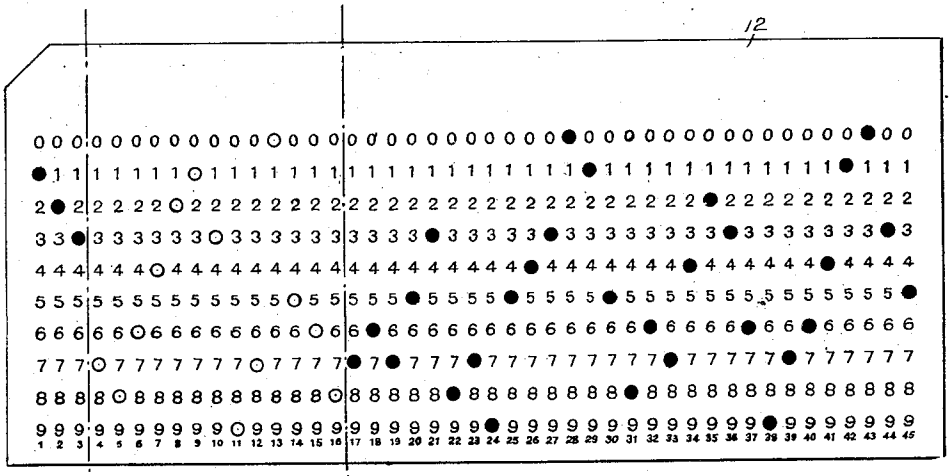
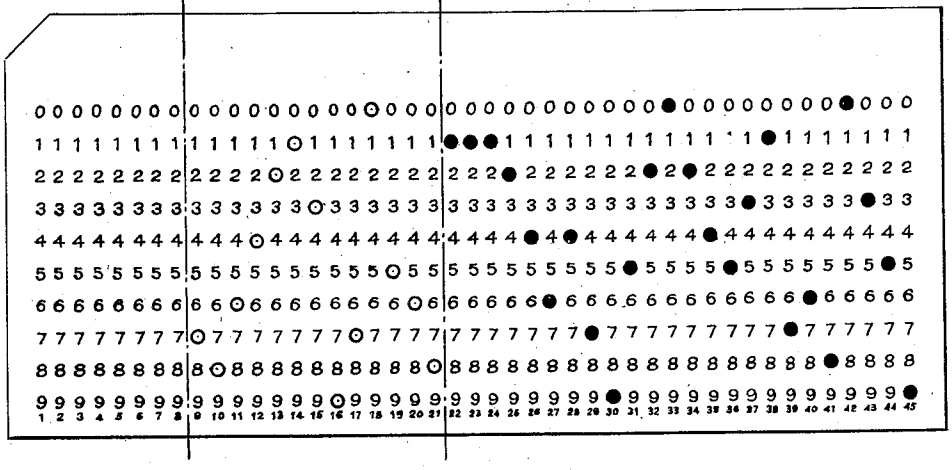


Fig. 4



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Fig.5

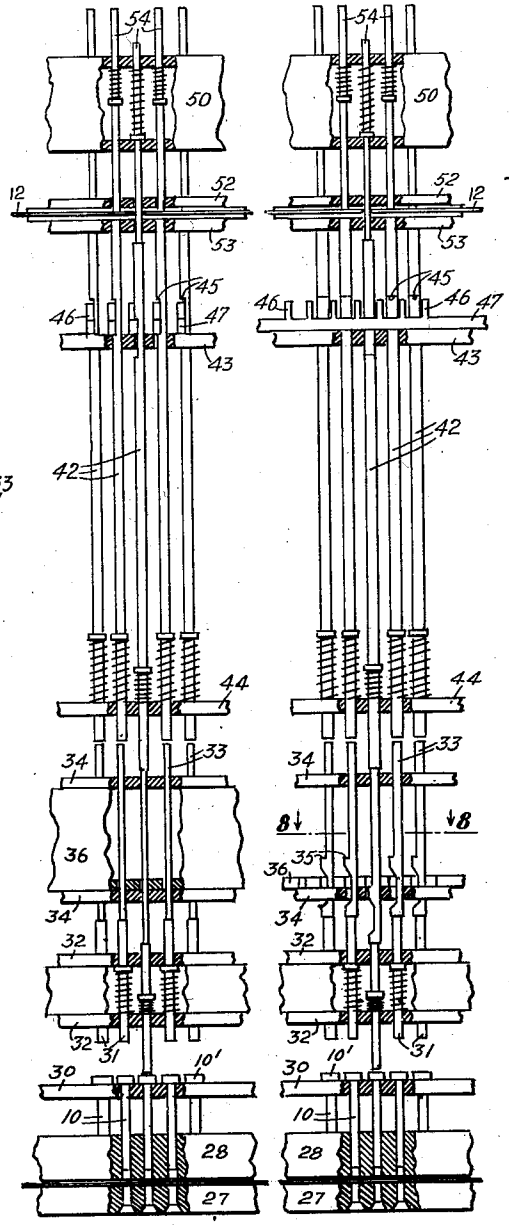


Fig.6

Fig.8

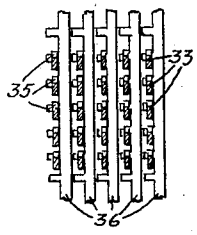


Fig.7

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Patented Nov. 14, 1933 1,934,934

UNITED STATES PATENT OFFICE

1,934,934

CARD PUNCHING MACHINE

Rudolf Lorant, Vienna, Austria, assignor to Remington Rand Incorporated, New York, N. Y., a corporation of Delaware

Application August 12, 1929, Serial No. 385,235, and in Germany September 1, 1928

11 Claims. (Cl. 164—114)

This invention relates to a card punching machine for the production of perforated statistical cards under control of sample cards, the records of which are to be transferred wholly or partly to the cards to be punched and, in the given case, to be complemented by additional manually selected perforations.

Punching machines are known which are adapted for this method of operation, that is for duplicating sample cards and at the same time allowing the punching of new records, but these punching machines have various defects: They do not permit of simultaneous transfer of a plurality of columnar records of the sample cards; on the contrary, they are only adapted to sense a single column of the sample card at a time and to cause a corresponding columnar perforating of the new card, from column to column, which requires considerable time, and consequently do not offer the full advantage of the saving of time to be gained by the duplicating process over the manually effected set-up. In addition, these machines do not make it possible to retain a set-up of the machine, effected either by the sample card or manually, for any desired number of cycles of operation to automatically punch the selected records uniformly in any desired number of cards. In addition, perforated columns of the sample card which are not to be duplicated must first be pasted over.

It is the object of the present invention to obviate these defects. This result is obtained in connection with a known punching machine provided with a manually controllable punching unit which effects the predetermined punching only after the control has been made and the card to be punched has been delivered. This is accomplished by providing it with an additional mechanism which is controlled by devices which sense any portion of the sample card, and which is adapted to control any desired portion of the punching field to transfer thereon records of the sample card. The effected set-up of any desired section of the punching field can be retained for any desired length of time to provide any desired number of cards with a uniform partial perforation.

The invention therefore solves the problem of transferring the records of any desired field of the sample card and, in addition, of complementing the same by additional manually selected perforations. The importance of this is obvious from the fact that it is frequently necessary to replace existing perforated cards by new cards which differ from the old ones only as to very few items. As an example, it may be mentioned here, that in the case of the cards of an insurance company, the agency and sometimes the amount to be paid vary while the other items remain the same. It also frequently happens that while the new cards to be made are not to replace the old cards they nevertheless differ from the old ones only in some of the items, for example, in the case of a workshop in which for the work on a certain order a card is made daily or weekly for each operator participating in the work, until the respective order is completed. The new card differs from the preceding card only in the perforation of the date and the working time. These cards are otherwise practically identical.

Heretofore the punching machine generally used for the production of these perforated cards was exclusively controllable by hand, so that it was necessary to read the records to be repeated, from the documents. The invention now permits an automatic transfer to new cards of the records contained in existing cards. This not only materially speeds up the production of new perforated cards but also prevents mistakes made in reading the old records so that the heretofore customary subsequent checking of these perforations becomes unnecessary.

A preferred embodiment of the invention is illustrated by way of example in the accompanying drawings.

In the drawings:

Fig. 1 is a cross-section of the machine on the line 1—1 of Fig. 2,

Fig. 2 is a front elevation of the machine, the card receptacle being omitted,

Fig. 3 shows a sample card with the field to be duplicated, indicated,

Fig. 4 shows a card which is to be perforated, with the field to receive the perforations, indicated,

Fig. 5 shows a plurality of sensing devices, punch set-bars and punches in front elevation,

Fig. 6 shows a plurality of sensing devices, punch set-bars and punches in side elevation,

Fig. 7 shows the punch die raised during a punching operation, and

Fig. 8 shows a horizontal section through the punch set-bars.

Punches 10 and the two punch set-bar actuating mechanisms of which one, 11, is controlled by the sample card, 12, and the other 13, by hand, are guided by a frame 14 comprising standards 15 and 16 connected at their upper ends by a cross-beam 17. The front of the frame

supports a card receptacle 18 from which the cards to be punched are automatically delivered to the machine by a reciprocating card-picker 19 and conveying rolls 20, to be delivered after punching has been effected to a delivery receptacle 22 by conveying rolls 21. This mechanism is old and well known.

The usual vertically reciprocating card carrier is provided with supports 24 sliding in vertical guides 23 on the fame 14. These supports are driven by cams 25 on the main shaft 26. The upper portion of the card carrier is formed by two superposed die-plates 27 and 28 mounted on the supports 24 and forming a card passage or slot 29 to receive the card to be perforated. Directly above the plate 28, a similarly perforated plate 30 is rigidly mounted in the frame 14 in the holes of which the punches 10 with their enlarged heads 10' are suspended to extend into the perforations of plate 28. The field covered by the punches 10 and consequently by the holes in plates 27, 28 and 30 corresponds to the size and shape of the cards to be perforated.

Every time a card is delivered from the card receptacle 18 into the passage 29, the card-carrier formed by the die-plates 27 and 28 rises so that the card therein is pressed against the lower ends of the punches 10 suspended in the stationary guide plate 30. The punches which are to punch a hole are held by the corresponding adjusted punch setting devices arranged above them, while the other punches may freely move in an upward direction and therefore yield under the pressure of the card to be perforated.

The adjustable punch setting devices compise spring-pressed stop pins 31 vertically guided in perforated plates 32 on the frame 14 and adapted to be pressed into their lower position in which they form stops for punches 10, against the force exerted by their springs, by punch set-bars 33 arranged above them. The punch set-bars 33 are mounted for vertical displacement in rigid guide plates 34 on the frame 14 and each of them is provided with a nose 35 behind which a spring-drawn locking plate 36 is adapted to snap when the set-bar has been depressed. For each row of set-bars 33 corresponding to a card column, a locking plate 36 is provided. In Fig. 1 one of the punch set-bars 33 is shown in its lower position, locked by a locking plate 36.

The present invention provides in addition to the usual manually adjustable mechanism 13, for the adjustment of the punch set-bars 33 a card sensing device which will hereinafter be described in detail. Mechanism 13 comprises a frame slidable on slide bars 37 and 38, to control a number of vertical setting rods 39 adapted to be lowered by means of angle levers 40 and pressure cables 41 actuated by keys (not shown), and which is automatically fed step by step over the field of the punch set-bars 33, from row to row, to depress in each row one of the set-bars 33. The manually adjustable mechanism 13 is in itself not new so that a detail description hereof appears unnecessary.

The adjusting mechanism 11 serving as duplicating controlling mechanism is provided with vertically displaceable adjustment rods 42 which slide in an upper perforated plate 43 and a lower perforated plate 44 and, when depressed strike punch set-bars 33. The upper portion of each of the rods 42 is provided with a lateral recess 45 into which may enter an upstanding projection 46 of slidable bar 47. A bar 47 is provided for each row of rods 42. The bars are displaceable on the plate 43 and, when thrown into engagement, they lock the rods 42 in their upper position. The bar 47 shown in Fig. 1 is in non-functioning position. In the embodiment illustrated only sixteen rows of adjusting rods are provided. Each row of punches comprises twelve punches conforming to the number of index point locations on the cards which are to be perforated. In order to be able to punch any desired card field corresponding to the sample card, the adjusting mechanism 11 is displaceable horizontally. Accordingly, the two plates 43 and 44 are supported by columns 48 which in turn are mounted on a frame or holder 49 adapted to slide along the cross-beam 17. The frame 49 serves to receive and guide a vertically reciprocating pin case 50 to sense the sample card 12 which is inserted from the side into a card-receiving slot 51, open on both sides, to the extent that the field which is to be duplicated is in position to be sensed. The card-receiving slot is formed by two perforated plates 52 and 53 on the frame 49 in line with the apertures of which slide the spring-mounted sensing pins 54 in the pin case 50. The frame 49 is open on top so that the sensing pins may be depressed by hand prior to the insertion of the sample card to effect certain adjustments.

As a convenient means of inserting the cards correctly, Figs. 1 and 2 of the drawings show within the card-receiving slot 51 a slide 109, 111 of rectangular outline with its middle part open and its walls or side and end bars flanged as shown in Figs. 1 and 2. This skeleton slide is of such dimensions that a card 12 can be laid on the flanges, and then the slide slid toward the left until the proper field of the card is brought under the sensing pins 54 all as shown in Fig. 2. This slide may, therefore, be set in such a position that said sensing pins 54 will cooperate with any desired field of the card 12. Obviously, any desired changeable stop device for the slide 109, 111 may be provided to facilitate the setting of the slide and card to the desired position.

The up and down motion of pin case 50 is produced by a grooved reciprocating shaft 55 mounted in the upper part of frame 14 at 56 and driven by a cam 57 provided with a cam slot 58, through the intermediary of a connecting rod 59 which is provided with a roll 60 and is hinged to an arm 61 of the reciprocating shaft 55. On the shaft 55, slide levers 62 which, while longitudinally displaceable on the shaft, are secured against relative rotation with respect to the shaft by a spline, are mounted in lateral extensions 66 of the frame 49, and engage with their forked ends lateral pins 63 on the pin case 50.

Frame 49 with the pin case 50 together with the adjusting mechanism 11 controlled thereby may therefore be moved to be made to act on any desired sections of the pins 33 and set pins 31. The frame is fixed in position by a latch 64 movably arranged thereon and adapted to engage notches of a correspondingly toothed rack 65 on the cross-beam 17.

The bars 47 may be locked in either of their positions by a locking plate 107 of known construction.

The operation of the punching machine is as follows: Let us suppose that the problem is to transfer from a sample card perforated in all 45 columns (Fig. 3), the record in columns 4 to 16 bordered by the dotted lines, and that this record is to be transferred into columns 9 to 21 of the cards to be perforated shown in Fig. 4. Columns 1 to 8 are to be left unperforated while

columns 22 to 45 are to be provided with new perforations.

First of all, all locking plates 36 are released, unless that has been done before, so that all punch set-bars 33 enter their upper normal position under the influence of the springs of pins 31. Frame 49 is then moved on the cross-beam 17 into a position in which row one of adjusting rods 42 is above row six of the set-bars 33, and the frame is held there by means of the latch 64. The sample card 12 is now inserted in card slot 51, in such a manner that its first column of index point locations registers with the first row of sensing pins 54. To prevent duplication of columns 1–3 of the sample card, the first 3 bars 47 are moved from the position shown in Fig. 1 towards the left into their locking position in which they lock their respective adjusting rods 42.

The set-bars 33 of rows 17 to 45 are then set by means of the adjusting mechanism 13 controlled row after row, from a key-board and the machine is then started, after previous insertion of an unpunched card in the slot 29.

Cam 57 lifts the push rod 59 so that the reciprocating shaft 55 moves the levers 62 connected therewith in a downward direction and presses the pin case 50 on to the sample card. Those pins 54 which pass through perforations strike the adjusting rods 42 below and move them, unless they are locked by their bars 47, down on to the set-bars 33 causing them to move from their upper, normal position into their lower position in which they are held by the locking plates 36 which snap into position behind lugs 35.

The corresponding stop pins 31 are at the same time moved into their stop position, as illustrated in Fig. 1 at the sixth pin from the left.

When the cam 57 has moved the pin case 50 into the position shown in Fig. 1, in which the sensing of the sample cards has been completed and the respective stop pins 31 have been set, the supports 24 with the die-plates 27 and 28 are moved upwardly by the drive cams 25. The card is thereby perforated in the above described manner. After return of the plates 27 and 28 to the normal position illustrated in Fig. 1, the perforated card is conveyed into the receptacle 22 by means of the rolls 21 and is replaced by a fresh card from the receptacle 16 which card is moved into the card slot 29 by the rolls 20.

If it is desired to punch more cards in the same manner, the machine is, without change of adjustment, maintained in operation with the result that by means of the automatic card conveying means, card after card passes through slot 29 and is there punched in accordance with the set-up of the stop pins 31.

In the above-described example of construction it has been supposed that the punching of the cards is to be set up partly by hand and partly by means of the sample card, but the punching machine is likewise adapted for ordinary duplicating of perforated cards, in which it is not necessary to complement the sample perforation by other records to be set up manually. In such case, however, the pin case 50 would have to be provided with the same number of rows of pins as that of the punches. Any desired number of cards may be punched from a sample card and certain fields may be left open for later complementation by manually controlled punching.

Vice-versa, the machine is likewise adapted for purely manual control without the use of sample cards. To this end, frame 49 must merely be moved in the extreme left position of Fig. 2, in which it releases the entire punching field for control by the manual means.

In the illustrated example of construction the exchange of sample card 12 is effected by hand. Release of locking plates 36 must likewise be effected by hand, before the previously set-up punching can be changed. This offers the possibility of retaining the adjustment of certain fields without change, even if the sample card is changed or the adjustment to be made by mechanism 13 is to be varied.

The set-bars set up by the manual means may be released automatically upon return of the carriage by cooperation of the erasing roller 105 with the releasing lever 106 as is well known. A plate 104 cooperates with the releasing levers to lock them in either their functioning or non-functioning position. These features are old and well known and provide for gang punching certain of the information set up manually.

It may be desired in some field of the cards controlled by the duplicating mechanism to punch in all of the cards, or in a number of them, matter not contained in the master card. For example, in Figs. 3 and 4 it is contemplated that the columns 1, 2 and 3 of the master card, which would control columns 6, 7 and 8 of the card to be punched, are to be blocked out by the bars 47 so that the holes in the master card in those columns will not be duplicated. It might be desired in these three columns to punch other matter such, for example, as a new date which would be common to all of the cards to be punched or to a considerable number of them. In this event before inserting the master card the suitable pins 54 may be depressed by hand thus depressing the corresponding set bars 33 which would be locked down automatically by their bars 36. In this case it would be desirable to turn down to inoperative position the three devices 103 in columns 6, 7 and 8 so that when the other set bars were released these would be left in locked position. The result of this arrangement would be that the desired matter, for example, the new date, would be punched in all cards irrespective of what was in the master card as long as the set bars were left locked in operative position.

What I claim as new and desire to secure by Letters Patent, is:

1. In a machine of the class described, the combination with a field of punches and a corresponding field of set-bars adapted when set to cause the individual corresponding punches to perforate a card, of a duplicating mechanism including a card holder for the card to be duplicated, a sensing mechanism for the card and means for transmitting movement from the sensing mechanism to the punch set-bars, said duplicating mechanism having a range less than the whole field of punches and means for shiftably supporting said duplicating mechanism to cover different portions of said field of punches.

2. In a machine of the class described, the combination with a field of punches and a corresponding field of set-bars adapted when set to cause the individual corresponding punches to perforate a card, of a duplicating mechanism including a holder provided with a card slot open at its ends so that a card to be duplicated may be inserted in said slot in different desired positions lengthwise of the card, a field of sensing pins carried by said holder, and transmitting elements adapted to set said set-bars when actuated by sensing elements passing through the card in

the card holder, and means shiftably supporting said holder to permit said duplicating mechanism to be shifted over any desired portion of the field of set-bars.

3. In a machine of the class described, the combination with a field of punches and a corresponding field of set-bars adapted when set to cause the individual corresponding punches to perforate a card, of a duplicating mechanism including a holder provided with a card slot open at its ends so that a card to be duplicated may be inserted in said slot in different desired positions lengthwise of the card, a field of sensing pins carried by said holder and transmitting elements adapted to set said set-bars when actuated by sensing elements passing through the card in the holder, means shiftably supporting said card holder to permit said duplicating mechanism to be shifted over any desired portion of the field of set-bars, and means for locking said holder in adjusted position.

4. In a machine of the class described, the combination with a field of punches and a corresponding field of set-bars adapted when set to cause the individual corresponding punches to perforate a card, of a duplicating mechanism including a holder provided with a card slot open at its ends so that a card to be duplicated may be inserted in said slot in different desired positions lengthwise of the card, a field of sensing pins carried by said holder and transmitting elements adapted to set said set-bars when actuated by sensing elements passing through the card in the holder, means operable automatically during an operation of the machine for moving said sensing pins to perform a sensing operation, and means shiftably supporting said holder to permit said duplicating mechanism to be shifted over any desired portion of the field of set-bars.

5. In a machine of the class described, the combination with a field of punches and a corresponding field of set-bars adapted when set to cause the individual corresponding punches to perforate a card, of a duplicating mechanism including a holder provided with a card slot open at its ends so that a card to be duplicated may be inserted in said slot in different desired positions lengthwise of the card, a field of sensing pins carried by said holder and transmitting elements adapted to set said set-bars when actuated by sensing elements passing through the card in the holder, means operable automatically during an operation of the machine for moving said sensing pins to perform a sensing operation, means shiftably supporting said holder to permit said duplicating mechanism to be shifted over any desired portion of the field of set-bars, and means for locking said holder in adjusted position.

6. In a machine of the class described, the combination with a field of punches and a corresponding field of set-bars adapted when set to cause the individual corresponding punches to perforate a card, of a duplicating mechanism including a holder, a sensing mechanism for the card to be duplicated and means for transmitting movement from the sensing mechanism to the punch set-bars, means for movably supporting said duplicating mechanism to permit the same to be moved out of cooperative relation to said field of set-bars to a set position of disuse, and manual means for setting up any one of the set-bars.

7. In a machine of the class described, the combination with a field of punches and a corresponding field of set-bars adapted when set to cause the individual corresponding punches to perforate a card, of a duplicating mechanism including a holder provided with a card slot open at its ends so that a card to be duplicated may be inserted in said slot in different desired positions lengthwise of the card, a field of sensing pins carried by said holder and transmitting elements adapted to set said set-bars when actuated by sensing elements passing through the card in the holder, means operable automatically during an operation of the machine for moving said sensing pins to perform a sensing operation, and means individual to the rows of the transmitting elements for preventing said elements from being actuated by their corresponding sensing elements.

8. In a machine of the class described, the combination with the usual field of punch set-bars and punches and a traveling carriage for setting up said set-bars column by column for subsequent control of said punches for perforating the whole field of a card at one operation, of a duplicating mechanism including means for sensing a portion of the field of a perforated card, said duplicating mechanism including a holder having a card slot, a sensing mechanism and means for setting up set-bars under control of said sensing mechanism, and means for shiftably supporting said duplicating mechanism to permit it to be shifted over any portion of the field of set-bars whereby a portion of the field of set-bars may be controlled by the duplicating mechanism and another portion by the traveling carriage.

9. In a machine of the class described, the combination with the usual field of punch set-bars and punches and a traveling carriage for setting up said set-bars column by column for subsequent control of said punches for perforating the whole field of card at one operation, of a duplicating mechanism including means for sensing a portion of the field of a perforated card, said duplicating mechanism including a holder having a card slot, a sensing mechanism mounted for reciprocation toward and away from the card to be sensed and means for setting up set-bars under control of said sensing mechanism, means operable automatically to reciprocate said sensing mechanism, and means for shiftably supporting said duplicating mechanism to permit it to be shifted over any portion of the field of set-bars whereby a portion of the field of set-bars may be controlled by the duplicating mechanism and another portion by the traveling carriage.

10. In a machine of the class described, the combination with the usual field of punch set-bars and punches and a traveling carriage for setting up said set-bars column by column for subsequent control of said punches for perforating the whole field of a card at one operation, of a duplicating mechanism including means for sensing a portion of the field of a perforated card, said duplicating mechanism including a holder having a card slot, a sensing mechanism mounted for reciprocation toward and away from the card to be sensed and means for setting up set-bars under control of said sensing mechanism, means operable automatically to reciprocate said sensing mechanism, and means for shiftably supporting said duplicating mechanism to permit it to be shifted over any portion of the field of set-bars whereby a portion of the field of set-bars may be controlled by the duplicating mechanism and another portion by the traveling carriage, said supporting means extending beyond the field of set-bars to permit said duplicating mechanism to be shifted to one side of the field of set-bars to

permit all of the set-bars to be set up by the traveling carriage.

11. The combination with punches, of manually operable selecting means for controlling operation thereof, a card slide adapted to receive a master card, a holder supporting said slide for movement with relation to said holder, means supported by said holder for sensing from the master card in said slide according to the position of said slide with relation to said holder, and means whereby said holder and punches may be brought into various relative positions for causing said sensing means to control various fields of said punches.

RUDOLF LORANT.