

Aug. 4, 1953

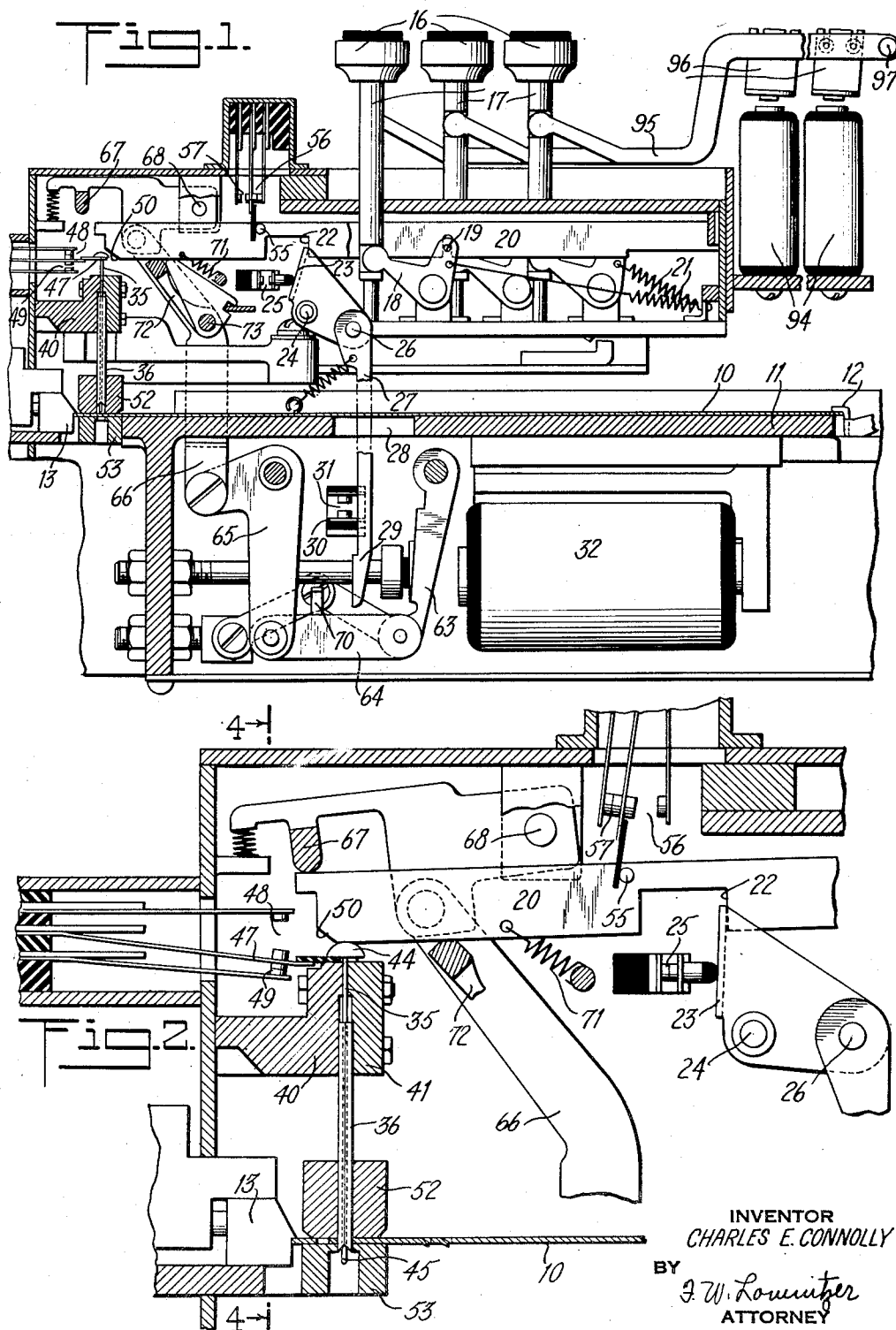
C. E. CONNOLLY

2,647,580

MACHINE FOR PUNCHING RECORDS

Filed May 13, 1948

4 Sheets-Sheet 1



Aug. 4, 1953

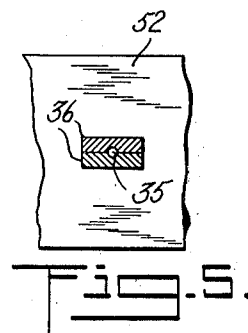
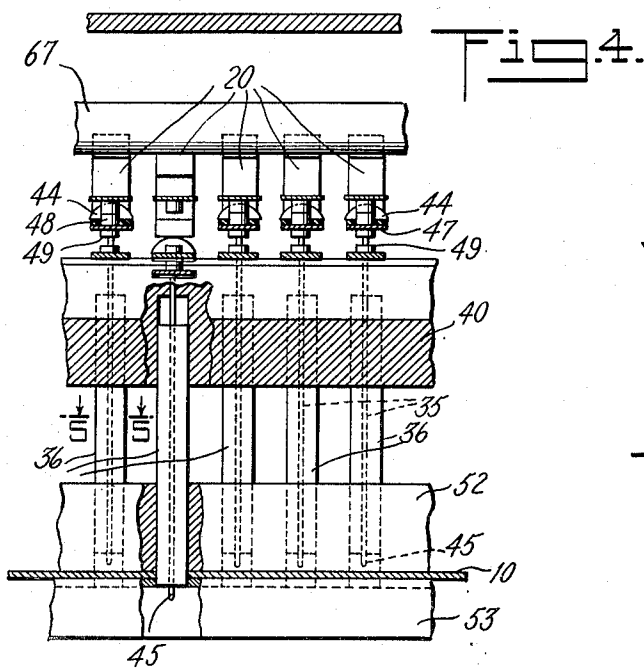
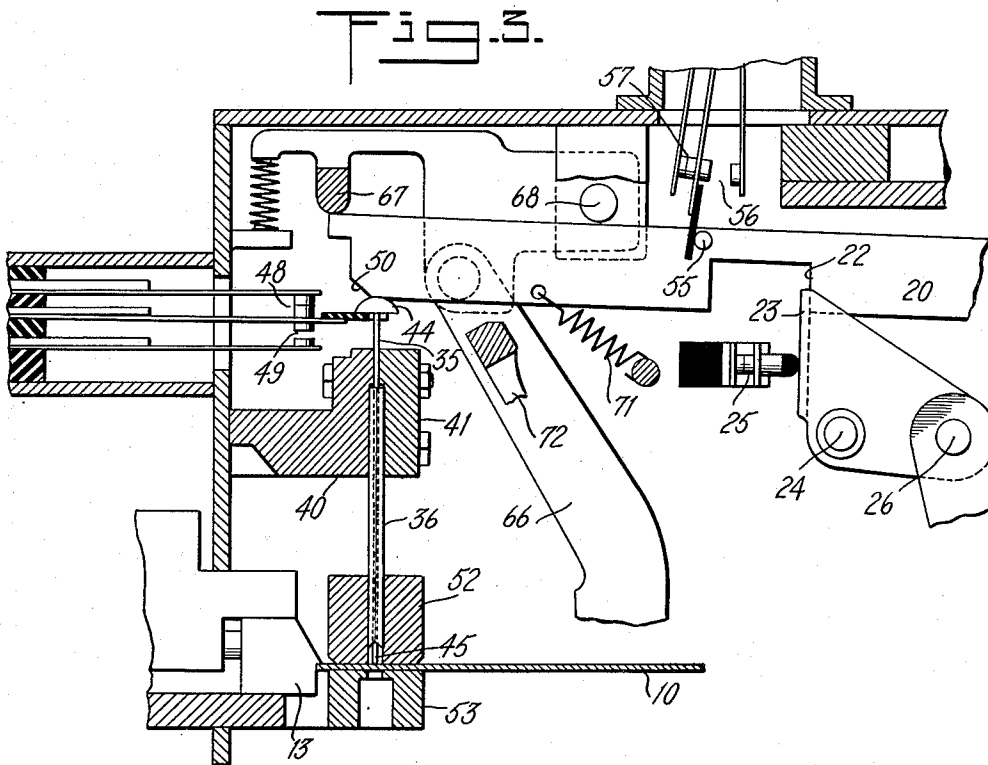
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

Fig. 6.

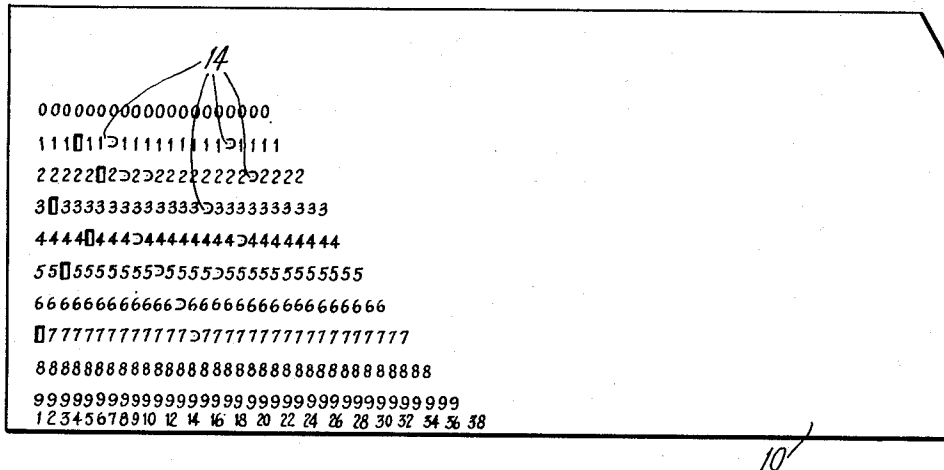
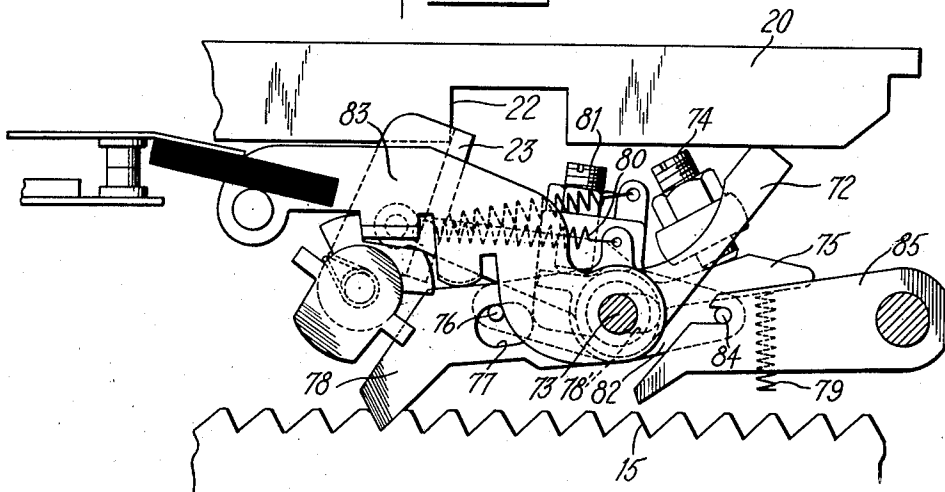


Fig. 7.



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4 Sheets-Sheet 4

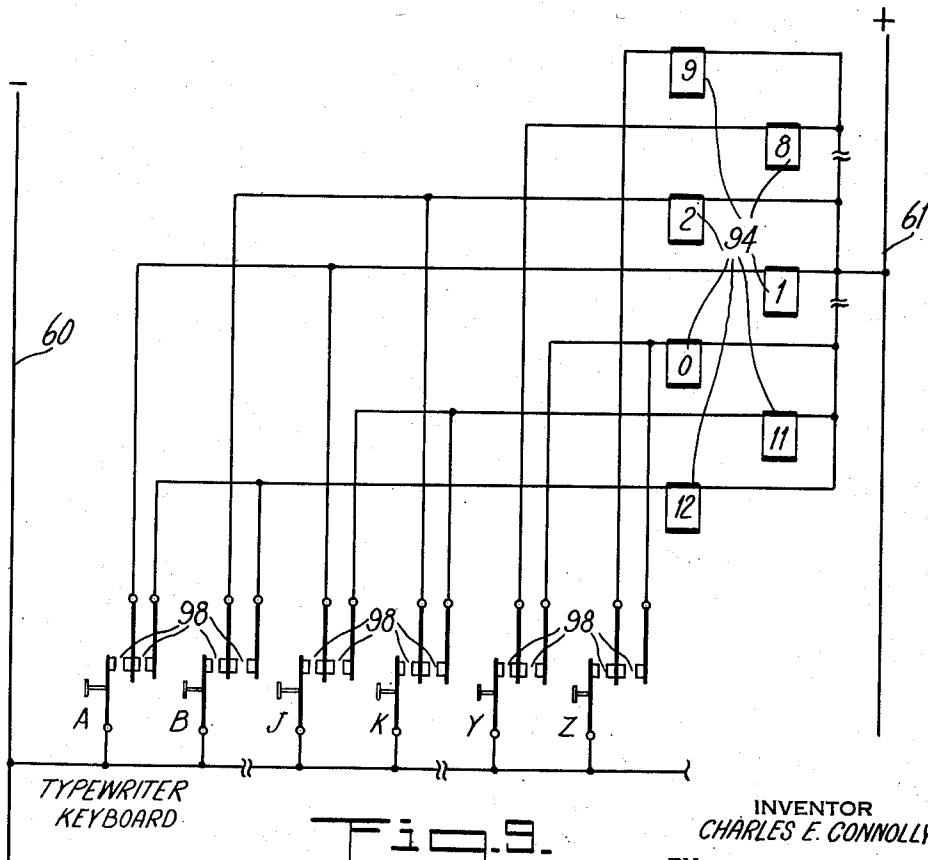
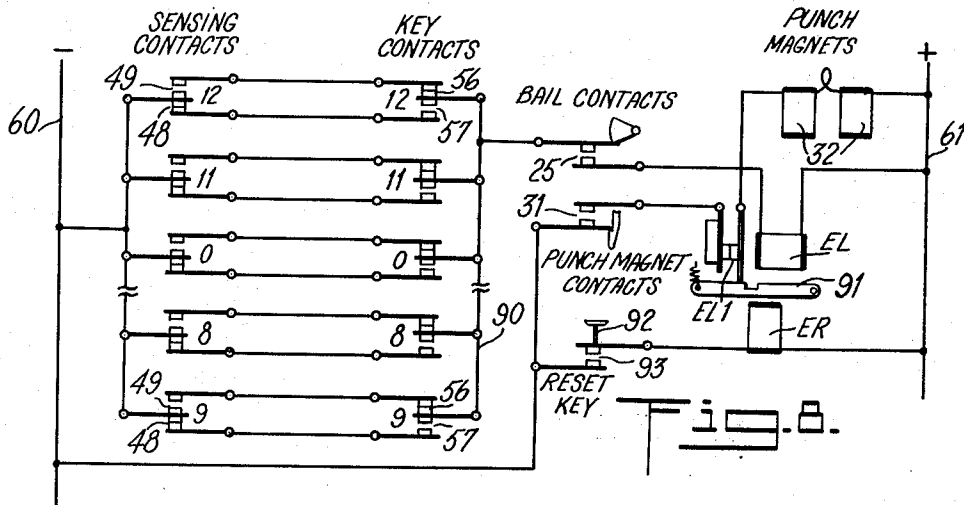


Fig. 9.

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MACHINE FOR PUNCHING RECORDS

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Application May 13, 1948, Serial No. 26,797

10 Claims. (Cl. 164—113)

1

The present invention pertains to punching mechanisms and more particularly to the type which punches records to represent statistical information.

The primary object of the present invention, in the broadest sense, is to effect the transformation of one form of statistical representing designation to another form and as an incident to such transformation verify the correctness of the original designation.

The invention resides in not only the provision of means constructed and arranged to effect the concomitant transforming-verifying function but also includes the process and method for carrying out these functions.

As explanatory of the purpose of the present invention it is well known that one form of statistical representing record contains designations made by a perforating machine which completely cuts out the perforations from the record stock and in so doing produces chads, or pieces of waste paper. These chads are of the same configuration as the hole and are rectangular as in on form of card, circular as in another form of card, etc. The holes are completely cut out so that sensing elements of another machine controlled by the record may penetrate the hole and effect a selective operation when the presence of a hole is sensed. These sensing elements may be pins, electrical contact brushes, etc., all of which go completely through the hole to have the proper sensing function.

Due to the fact that the production of thousands and thousands of such chads presents problems in their disposal and by their manufacture cause the possibility that these small pieces of card or paper stock may enter the working parts of the machine, it has been the subject and object of the patent to R. A. Lake, No. 2,255,794, dated September 16, 1941, to produce a semi-perforated or "chadless" form of record to solve the above problems. In this form the hole is semi-perforated so that the uncut part forms a hinge-connection between the chad and the record stock. Other advantages which need not be enumerated here but which are fully described in this patent also accrue from this type of record.

However, the semi-perforated or chadless form of record is not suitable to control existing forms of record controlled accounting, sorting and other forms of similar machines, and it is, therefore, the aim and object of the present invention to transform the type of record hav-

2

ing chadless holes or semi-perforated holes to the type of record having completely severed holes.

A feature of the present machine is the design of a checking or numeral or alphabet verifying punch which, in reality, is a punch because, upon verification of the designation of one form, a completely punched hole or holes are made.

A feature of the construction also pertains to the provision of a plurality of combination record sensing and punching pins, each combination of which is coordinated with the related index point position of a column of a record to be sensed, verified and punched. While a plurality of sets of such pins may be provided for simultaneous verification and punching of a plurality of columns of a record, it is preferable to provide only one set and coordinate it with a single record column at a time. To this end the coordination of a single set of such combined sensing-punching pins is preferably effected by movement of the record relative to the combined sensing-punching pins and is automatically effected by the operation of the keys of a keyboard.

The punching-verifying machine is provided with keys similar to those of a card punching machine or a typewriter keyboard and the operator operates the keys just as if a new card were being punched. If there is a chadless hole or a plurality of holes representing data corresponding to the numeral or alphabet key depressed the sensing pin or pins will pass through the perforation and then effect the operation of the punching mechanism to sever the chad from the record at each index position that the chadless hole was sensed and thereby make a complete hole at each of such index point positions. In this manner the mere operation of the key verifies the correctness of the chadless perforation or perforations and transforms each chadless hole to a completely cutout hole.

A suitable error indicating device may also be provided to indicate the lack of correspondence between the key depressed and the chadless hole or holes in the column sensed. In the present machine when there is a failure in correspondence between the key depressed and the chadless hole in the column sensed the depression of a key will not make a hole at an index position corresponding to the key punched and further, the card will not space to the next column.

Thus, under such circumstances the failure to space the carriage carrying the card to be veri-

3

field will be quickly recognized by the operator. Thus, an error in either the original punching of the card or the key operation is indicated.

In the preferred embodiment there is arranged at each index point position a punch pin which is adapted to punch a rectangular hole and carries a sensing pin protruding below the punch and adapted to pass through the chadless hole, if one is found when the related key is operated. The punch keys shift the interposers in the usual way and if the associated sensing pin is over a chadless hole the shifted interposer will cam it down through the hole to a position ready to punch the hole. As the sensing pin passes through the hole its related comparing contacts are transferred. There is a comparing circuit controlled by contacts closed by each key and the contacts transferred by the associated sensing pin.

A comparing circuit or a plurality of comparing circuits are preferably incomplete when there is conformity between the key depressed and the chadless hole or holes sensed and thus a circuit is normally completed to the punch magnet which punches the rectangular holes and column spaces the card carriage.

If there is a disconformity between the chadless hole in the column sensed and the key operated, a comparing circuit will be completed, the punch magnet will not energize, no hole is punched, and the card carriage does not space, thus indicating an error either in the key operated or the original chadless hole.

While the present machine, for the purposes of illustration shows the manner of transforming from one type of hole to another type of hole, whether it represents data by a single hole, or data combinational holes in its broader aspects the invention is not limited to this manner of transformation. For the holes there may be marks, graphical or the like, and a mark may be transformed to a hole, either in the same record, or another. Various other modifications are within the spirit of the invention, as defined by the appended claims.

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 transverse sectional view of a well known form of key-controlled record punching machine in which the present invention is preferably embodied. In this figure all parts are shown at normal.

Fig. 2 is a side elevational view showing the interrelation of parts when a sensing pin has sensed the presence of a chadless type of hole corresponding to the key depressed, and the position the punch pin occupies after it has been depressed to completely sever the chadless hole.

Fig. 3 is a side elevational view showing the position that interrelated parts occupy when there is a failure to sense a hole in an index point position corresponding to the key operated.

Fig. 4 is a sectional view taken on the line 4-4 of Fig. 2 showing the arrangement of a plurality of combined sensing-punching pins.

Fig. 5 is a detail sectional view taken on the line 5-5 of Fig. 4.

Fig. 6 is a view showing a statistical representing record punched with the chadless form of holes, as well as completely severed holes which have been verified as correct.

4

Fig. 7 is a detail view of an escapement mechanism for spacing the record column by column.

Fig. 8 is a wiring diagram of the electrical instrumentalities of the machine.

Fig. 9 is an additional wiring diagram showing the control of the instant verifying punch to permit the verification of alphabetical data.

For the purpose of illustration, one form of the present invention has been shown incorporated in the type of key controlled punching machine shown in the patent to F. L. Lee et al., No. 1,772,186, granted August 5, 1930, and the basic machine will be described in only so much detail as is necessary to understand the present invention.

At the outset the card 10 to be verified is shown in Fig. 6 perforated in columns 7-19 with unverified chadless holes. There is also shown in columns 1-6 the transformation of the chadless type of hole to completely severed rectangular holes, showing that the chadless holes in such positions have been verified and found to be correct.

As is well known, the card 10 to be verified is fed from a magazine and rests upon a flat bed surface 11 (Fig. 1) with its rear or trailing edge engaged by a pivoted pusher 12 and its leading edge engaged by an abutment 13. The cards are fed from the magazine at the right of the apparatus shown in Fig. 1 to the left and, therefore, to prevent interference or engagement by parts of the apparatus the hinges 14 of the chads are at the left so that whenever a chad strikes any portion of the machine it will be merely rocked. Otherwise if the chads are hinged in a reverse position the chads might encounter an obstruction so that the record could not pass freely through the machine. The verifying-punching station has, as will be described, a plurality of punching-sensing elements, one for each of the twelve index point positions where the holes are placed, and are spaced corresponding to the index point positions of a card column. By escapement means which is well known the card is stepped column by column past the punching-sensing elements and when completely verified the card may either be manually removed from the machine or automatically ejected.

Reverting now to the construction of the carriage which carries the card to be verified and punched, the pusher 12 is carried by a transversely extending bracket fixed to an escapement rack 15 (Fig. 7) and the abutment 13 is also carried by a similar bracket carried by the escapement rack 15. By means of the escapement mechanism which will be described and which is operated for each key depression the escapement rack 15 is moved by the power in a coiled-up spring so as to move step by step, thus bringing the successive card columns into coordination with the combined sensing-punching elements.

The keyboard consists of ten digit representing keys 16 and swiveled to the stem 17 of each key 16 is one arm of a bell crank 18, the other arm of which has a pin and open slot connection 19 to an interposer bar 20. Also connected to each bell crank 18 is a spring 21 which returns the interposer bar 20 and depressed key 16 to normal positions. When a key 16 is manually depressed it rocks the connected bell crank 18 against the resistance of spring 21 to shift the associated interposer bar 20 to the left. Each interposer bar 20 is notched intermediately to provide a vertical shoulder 22 engaged by a common bail 23 fixed to a shaft 24. Movement of any interposer bar 20 to

5

the left rocks the bail 23 to close contacts 25, in an obvious manner (see Fig. 3).

One side of bail 23 carries a horizontally extending pin 26 passing through a hole in the upper end of a vertical link 27. Link 27 extends 5 immediately through an elongated guide hole 28 cut in the frame 11; the width of the hole preventing any lateral movement of the link. The lower end of link 27 is formed with a hook 29 underlying a spring blade 30 which carries 10 one of the points of punch contacts 31.

When any interposer 20 is shifted its shoulder 22 rocks bail 23 to raise link 27, the hook 29 of which thereupon moves blade 30 upwardly to close punch contacts 31. The closure of the 15 contacts 31 energizes the magnet 32 to effect, as will be described, a punching operation but only if it has been ascertained that there is a chadless hole at a position corresponding to the depressed key.

Instead of the punching elements which are customarily provided in the basic machine of the form now being described, there is arranged at each index point position combined sensing-punching elements comprising a sensing pin 35, 25 and a punch pin 36, which is preferably made of two parts, as shown in Fig. 5. These two parts are of a form to punch a rectangular hole, and are brazed or pinned to the sensing pin 35.

Extending transversely of the machine is cross 30 bar 40 provided with holes to receive the punch and sensing pins 36, 35 and which are retained by a mounting plate 41. Thus, cross bar 40 has twelve spaced holes in which are inserted the twelve combined sensing-punching elements. 35 The sensing pin 35 has a circular head portion 44 lying over the top of cross bar 40, and also a portion 45 (Fig. 2) extending below the lower end of the punching pin 36. The center blade 47 of transfer contacts 48 and 49 normally holds the combined sensing and punching elements upwardly out of the path of the card 10, to provide unobstructed movement of the card to sensing position. This, of course, is when each of the 40 interposers 20 is in the normal right-hand position, as shown in Fig. 1. The left end of each interposer 20 is provided with a beveled cam edge 50 which, when the interposer 20 is moved to the left, coacts with the head portion 44 and depresses the sensing pin 35 and the punch pin 36 downwardly.

If there should be a chadless hole corresponding to the key depressed at the initial downward movement of the sensing pin 35 the latter passes through the chadless hole, and in so doing the 45 contact 48 opens and the contacts 49 close, the lower part of the punching pin 36 now being in the position ready to completely sever the chadless hole since it has been assumed that the key depressed corresponds to the digit representation of the chadless hole.

It is explained that, as is customary, the lower end of each punch pin 36 passes through a hole in the stripper plate 52, and a hole in the die 53, the card 10, of course, being between plate 52 and die 53.

Each interposer 20, when shifted to the left by either the depression of a key 16 or other means to be described, causes by means of a stud 55 50 carried by each interposer to close contacts 57 and open contacts 56. It should be noted that there is a definite sequence in the operation of the various contacts when a key is depressed, and a reversed sequence when the key is returned. In order to understand this sequence before the 75

6

description of the machine is given in connection with the wiring diagram of Fig. 8 the following should be noted: As any key 16 is depressed its associated contacts 57 are closed and contacts 56 open and its sensing contacts 48, 49 are next 5 operated by means of the downward movement of the sensing pin by the interposer bevel 50 acting upon the sensing pin head 44 to thrust the sensing pin downwardly to close contacts 49 and open contacts 48. The continuing left-hand travel of the interposer 20 causes the bail 23 to be rocked about pivot 24 to close at a still later time the bail contacts 25. Finally, the elevation of the link 27 by bail 23 will close the punch contacts 31.

Referring now to the wiring diagram, it will be seen that for each sensing pin there is a set of contacts 49—48 and for each key there is a set of contacts 56 and 57. The related pair of sensing contacts and key contacts of the same 10 number are so wired between the line side 60 and a wire 90 that the correspondence between a depressed key and a chadless hole will enable an open circuit to be maintained between the line side 60 and the wire 90, effected by the closing 15 of contacts 57 and contacts 49 of a related pair. Assuming now that there is a correspondence between a depressed key and a chadless hole, as the key is depressed the associated contacts 57 will close, but the circuit to EL relay coil is still open at bail contacts 25. At a later time 20 when the beveled edge 50 of the associated interposer 20 depresses the combined sensing pin 45 and punch 36 so that the sensing pin penetrates the chadless hole in that index point position of the card, sensing contacts 49 will close so as to 25 open the circuit between the line side 60 and the wire 90 which was previously closed by closure of contacts 57. Thereafter, the bail 23 closes bail contacts 25 but due to the open circuit between line side 60 and wire 90 no circuit will be completed to line side 61 through the relay coil EL. Since the EL magnet coil is not energized its EL contacts will remain closed, enabling a circuit to be 30 completed when punch contacts 31 close from the line side 60, through punch contacts 31, EL contacts, punch magnets 32, to line side 61.

Referring now to Fig. 1 energization of punch magnets 32 attracts its armature 63 and through a link 64 bell crank 65 and link 66, the usual 35 punch plate 67 pivoted at 68 is rocked. When an interposer 20 is shifted the upper edge of the interposer is located beneath the punch plate 67 so that the latter strikes the interposer and depresses the punch 36 to push it through the die 53 and thus completely perforate the card at the index point position where a chadless hole was previously present. The chadless hole has now been verified and concomitantly transformed to a completely cut hole and herein, rectangular in form so as to control existing card controlled machines.

A projection 70 secured to the horizontal link 64 rocks the vertical link 27 to disengage hook 29 from the blade 30 of the punch contacts 31 and the latter thereupon open to deenergize the punch magnets 32. By means of a spring (not shown) which is attached to the link 64 the linkage and punch plate 67 are returned to their normal positions. When the pressure by the finger which actuated the depressed key is relieved the key and interposer 20 will return to normal position by the tension of spring 21 assisted by an interposer spring 71 which is a very light spring attached to the interposer 20. At the 75 initial right-hand travel of the interposer 20 the

bail 23 will rock clockwise to enable contacts 25 to first open, which is followed by the opening of contacts 49 and closing of contacts 48 when the bevel edge 50 moves out of coaction with the sensing pin head 44. The resiliency of the contact blade 47 opens contacts 49 and closes contacts 48 and also acts to raise the depressed punch pin 36 and sensing pin 37. If so desired a coil spring (not shown) encircling the punch pin 36 may be compressed when the punch pin is depressed and will function to assist spring contact blade 47 in returning the depressed punch pin 36 and sensing pin 37. At a still later time key contacts 57 open and contacts 56 close. By the operation of the above contacts in a reversed sequence the open circuit to the EL relay will be maintained when the depressed key is restored.

As is well known the machine is also provided with an escapement mechanism shown in Fig. 7 but which is fully shown and described in the patent to Schaff, No. 1,426,223 and herein is operated only when it has been found that the chadless hole corresponds to the key depressed. The escapement mechanism enables the card carriage to move the space of one column to bring the next card column to be verified into coordination with the combined punch and sensing elements.

Below all the interposers 20 is a bail 72 mounted on a shaft 73 (see Figs. 1 and 7). The top of the bail is engaged and rocked by all the interposers 20. Thus, the depression of any interposer will rock bail 72 about its shaft 73. Referring to Fig. 7 one end of bail 72 is provided with a screw 74 bearing on top of one arm of a lever 75 rotatably mounted on shaft 73. Lever 75 has a pin 76 extending loosely through a hole 77 in an escapement pawl 78. The escapement pawl 78 is loosely mounted by means of an elongated slot 78' on shaft 73, in a manner to permit movement of the pawl longitudinally of rack 15. A spring 79 acting on lever 75 holds the latter and bail 72 in counterclockwise position (Fig. 7). Pawl 78 is maintained in engagement with rack 15 by a spring 80 connected to the pawl.

Lever 75 has a screw 81 bearing on part of a member 82 rotatably carried by shaft 73 and urged clockwise (Fig. 7) by a spring 83. Member 82 has a pin and slot connection 84 with a holding dog 85. When in normal, upper, position bail 72 and lever 75 permit pawl 78 to engage rack 15 and prevent member 82 from moving dog 85 into engagement with the rack. When the shifted interposer 20 is depressed and rocks bail 72 clockwise due to the presence of a hole corresponding to the key depressed (Fig. 7), lever 75 is thereby rocked in the same direction and member 82 follows. As a result, pin 76 raises pawl 78 out of engagement with rack 15 and member 82 lowers dog 85 into engagement with the rack 15 before the rack can advance to the right (Fig. 7). When pawl 78 is raised its spring 80 moves it to the left to position its nose above the next rack tooth.

After the punching operation the rocked interposer rises and bail 72 and lever 75 are returned counterclockwise (Fig. 7) by spring 79. Pawl 78 is thereupon rocked counterclockwise by spring 80 into the rack tooth above which it had been positioned, while dog 85 is raised by member 82 to release the rack 15 for movement to the right by the usual spring motor (not shown). As the rack 15 moves to the right in Fig. 7, or to the left in Fig. 1, it actuates the en-

gaged pawl 78 in the same direction until the pawl is arrested by engagement of the left side of slot 78' with shaft 73. This limits movement of rack 15 to one step for each reciprocation of bail 72. The step of movement of the rack advances the card a distance equal to the width of a card column and now the next column is in position for verification of its chadless hole.

The operation of the machine will now be described when there is a disconformity between the key depressed and the chadless hole, or the absence of a chadless hole in a column. If a key is depressed which does not correspond to the chadless hole in the column being verified the lower portion 45 of the related sensing pin will be over an imperforate index point position, as shown in Fig. 3. When the associated key is depressed the related interposer 20 will be moved to the left to first close contacts 57 and open contacts 56 but the cam edge 50 now coacting with the sensing pin head 44 will merely cause a slight elevation of the interposer 20 at its left end, the connected spring 71 being a light spring to enable this movement. Hence, sensing pin 35 cannot be lowered and contacts 48 and 49 will remain in normal position, although contacts 57 associated with the depressed key will be closed. Thus, a circuit will be closed at a later time when bail contacts 25 close from the line side 60 (Fig. 8), through contacts 48 now in normal position and closed, thence through contacts 57 now closed, wire 90, bail contacts 25, EL relay coil, to line side 61. EL relay coil opens EL1 contacts, which are latched closed by a spring-urged armature latch member 91. Thus, it will be seen that at a later time when punch contacts 31 close the punch magnets 32 are not energized and therefore the punch plate 67 is not depressed to cause the perforation at the index point position where no chadless hole is present. Since the interposer 20 is not rocked downwardly to rock escapement operating bail 72 the card carriage will not space, thus signifying a disconformity. The card in error is now completely withdrawn or ejected from the machine and the operator will note that since there is a disconformity between the key depressed and the chadless hole there will still remain the chadless hole in the column in which a disconformity has been found. The operator can then determine whether the key depressed was correct or in error or whether a chadless hole was previously made at an incorrect or correct index point position. If it is desired to continue with the verifying operations without withdrawal of the card, the reset key 92 is depressed to close contacts 93 to energize the ER relay coil by an obvious circuit. The ER relay coil attracts armature latch 91 to unlatch contacts EL1 which go back to normal closed position. In this mode of operation the chadless hole is easily recognized after verifying the complete card since it is still present in a column found to be in disconformity with respect to the key depressed.

To enhance the value of the machine by enabling verification of both numerical and alphabetical data the modification shown in Fig. 9 is preferably utilized in connection with the selector magnet assembly including magnets 94 (see Fig. 1). The interposer operating key stems 17 are each swiveled to an actuating member 95 to which is attached an armature 96 positioned so that it may be attracted by a related selector magnet 94. Actuating members 95 are pivoted on a rod 97 so that energization of a magnet 94

will cause an interposer 20 to be operated in the same manner as if a key 16 were manually depressed.

For verifying alphabetic data the selector magnets 94 are wired combinationally, as shown in Fig. 9 to contacts 98 operated by keys of a keyboard, which may be, for example, the type shown in Figs. 1 and 12 of the patent to O. B. Shafer, No. 2,315,741. Such typewriter keyboard would be mounted in front of the operator for convenient manipulation. The keys are arranged according to the conventional typewriter keyboard and each of the keys is arranged to close one (numerical) or a pair (alphabetical) of contacts 98 according to a well known statistical code representing numerical data by a single unit code and alphabetical data by a two-unit code.

The record bearing the chadless holes is, of course, perforated according to this same code and verification is effected in the same manner previously described, except that for verifying alphabetic data two comparing circuits determine the energization of relay coil EL. For the verification of alphabetic data a pair of sensing contacts 48, 49 are operated and compared with a pair of presumably associated key contacts 56, 57. The closure of either or both comparing circuits indicates the lack of correspondence between the alphabet data designated in a column of the record and the alphabet key operated to cause the energization of the relay coil EL to prevent the punching out of the chadless holes. Retaining both comparing circuits opened indicates a correspondence between the alphabet key operated and the two chadless holes, which are then completely punched out.

While there have been shown and described and pointed out the fundamental novel features of the invention, 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 machine of the class described, the combination of a card carriage carrying a card having designations of one form at index point positions in a plurality of columns, column spacing means for said carriage, means comprising sensing pins for sensing each column of designations at a time, punching means, selective means comprising a plurality of keys for shifting related sensing pins to determine the presence of a designation of said one form corresponding to the key operated, and means controlled by said sensing pins and said keys to effect the operation of said punching means to punch a hole at the sensed index point position when it is determined that a sensed designation corresponds to a key operated, and the operation of said column spacing means.

2. A machine for verifying designations of one type on a record and converting said designations to punched designations of another type on the same record, comprising a keyboard having keys all of which are normally free to be operated, punching means controlled by said keys to effect punched designations of said other type on a record, punch operating means to operate said punching means independent of said keys, sensing means controlled by said keys for sensing said one type of designations on the same record, and

means controlled by said sensing means and said keys for permitting operation of said punch operating means and the punching means to effect punching of designations of said other type only when the keys operated and the designations of said one type agree.

3. A machine for verifying designations of one type on a record and converting said designations to punched designations of another type on the same record, comprising a keyboard including keys all of which are normally free to be operated, punching means to effect the punching of designations of said other type on a record, punch operating means to operate the punching means independent of said keys, sensing means controlled by said keys for sensing said one type of designations on the same record, and means controlled by said sensing means and said keys for permitting the operation of said punching operating means and the punching means only when the keys operated and the designations of said one type agree, and for preventing the operation of said punch operating and the punching means when the keys operated and the designations of said one type disagree.

4. In a combined card punching and verifying machine, means for sensing each of the index point positions of a record for determination of designations thereat, punches for over-punching the designations at each of said index point positions of the same record, a keyboard having keys one for each of said index point positions and which keys are normally free to be operated to select said punches, punch operating means to operate said punches independent of said keys, means controlled by each of said keys when operated for actuating a related sensing means for physical disposition in the designation for determination of the presence of a designation corresponding to the operated key, and means controlled by said related sensing means and said keys to effect upon sensing a designation corresponding to the operated key the operation of said punch operating means and, an associated punch to over-punch said sensed designation.

5. In a machine of the class described, means comprising pins for sensing index point positions in a column of a record for statistical representing designations, keys of a keyboard, means controlled by each of said keys to actuate a related sensing pin to determine the presence of a designation corresponding to the key operated, punching means, means controlled by each of said keys for selecting punching means to punch a card column corresponding to the key operated, means independent of said keys for operating the selected one of said punching means, means responsive to the key operated and related sensing pin when the latter senses a designation corresponding to the key operated for causing the operation of the punch operating means and the punching means associated with the key operated, means for inhibiting the operation of said punch operating means, and means controlled by a sensing pin and the associated key operated when said sensing means fails to sense a designation corresponding to the key operated for causing the operation of said inhibiting means to prevent operation of the punch operating means and the punching means associated with the key operated.

6. In a machine of the class described, the combination of a card carriage carrying a card having designations of one form at index point

positions in a plurality of columns, column spacing means for said carriage, means comprising sensing pins for sensing each column of designations at a time, punching means, selective means comprising a plurality of keys for shifting related sensing pins to determine the presence of a designation of said one form corresponding to the key operated, and means controlled by said sensing pins and said keys to effect the operation of said punching means to punch a hole at the sensed index point position when it is determined that a sensed designation corresponds to a key operated and the operation of said column spacing means, and to prevent the operation of the punching means, said column spacing means, and the further effective operation of all of said keys when the shifted sensing pin has determined that there is no designation corresponding to the key which has shifted said sensing pin.

7. In a machine of the class described for verifying designations of one form at index point positions in a plurality of columns, means comprising a column of sensing pins for sensing each column of designations at a time, a plurality of contacts each operated by a related sensing pin, a plurality of punching means for over-punching said designations, a plurality of keys, means controlled by each of said keys for shifting the related sensing pin and closing the related contacts only when a designation is sensed, a plurality of other contacts, means controlled by said keys for closing the associated one of said other contacts and for selecting the associated punching means, electromagnetic punch operating means, an energizing circuit controlled by each key to energize said electromagnetic punch operating means, and a plurality of comparing circuits controlling said energizing circuit, each of which includes the contacts closed by a sensing pin and the associated one of said other contacts closed by the related key to permit the closure of said energizing circuit and the operation of said electromagnetic punch operating means to effect the punch operation when the pin sensing a designation in a column causes the closure of associated contacts corresponding to the contacts closed by the related key.

8. In a machine of the class described for verifying designations of one form at index point positions of a column, a column of sensing pins for sensing designations at said index point positions, a plurality of punching means for over-punching said designations, a plurality of keys for shifting the related sensing pins to determine whether there is a designation at an index point position corresponding to the key, and for selecting related punching means, electromagnetic punch operating means, an energizing circuit therefor, a bail operated by each of said keys, contacts closed by said bail to complete said energizing circuit, and a plurality of comparing circuits for controlling said energizing circuit and controlled by said sensing pins and said keys, each comparing circuit inhibiting the completion of said energizing circuit by said bail operated contacts when a sensing pin fails to sense a designation corresponding to the key which shifted said sensing pin, and for enabling the completion of said energizing circuit by said bail operated con-

tacts to cause the electromagnetic punch operating means to effect the punching operation when a sensing pin senses a designation corresponding to the key which shifted said sensing pin.

9. In a machine of the class described for verifying designations of one form at index point positions in a plurality of columns, means comprising a column of sensing elements for sensing each column of designations at a time, a plurality of contacts each operated by a related sensing element, a plurality of punching means, a plurality of keys, means controlled by said keys for shifting the related sensing element and closing the related contacts, a plurality of other contacts, means controlled by said keys for operating the associated one of said other contacts and for selecting the associated punching means, electromagnetic punch operating means, and a plurality of comparing circuits for controlling said electromagnetic punch operating means, each of which is controlled by the contacts operated by said sensing element and by said other contacts operated by the associated key to enable the operation of said electromagnetic punch operating means when the pin operated and key operated contacts in the same comparing circuit are simultaneously operated, and to inhibit the operation of the electromagnetic punch operating means when the key operated contacts are operated but the pin operated contacts in the same comparing circuit are unoperated.

10. In a machine of the class described for verifying designations of one form at index point positions of a column, a column of sensing pins for sensing designations at said index point positions, a plurality of punching means for over-punching said designations, a plurality of keys for shifting the related sensing pins to determine whether there is a designation at an index point position corresponding to the key, and for selecting related punching means, electromagnetic punch operating means, an energizing circuit therefor, a bail operated by each of said keys, contacts closed by said bail to complete said energizing circuit, an error relay adapted when energized to open said energizing circuit, and a plurality of comparing circuits for controlling the energization of said relay and controlled by said sensing pins and said keys, each comparing circuit enabling the energization of said relay to prevent the completion of said energizing circuit by said bail operated contacts when a sensing pin fails to sense a designation corresponding to the key which shifted said sensing pin, and for preventing the energization of said relay and enabling the completion of said energizing circuit by said bail operated contacts when a sensing pin senses a designation corresponding to the key which shifted said sensing pin.

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