May 24, 1955

M. MAUL

2,708,971

DECK SHIFT CONTROL FOR A CARD PUNCH

Filed Oct. 27, 1952

3 Sheets-Sheet 1

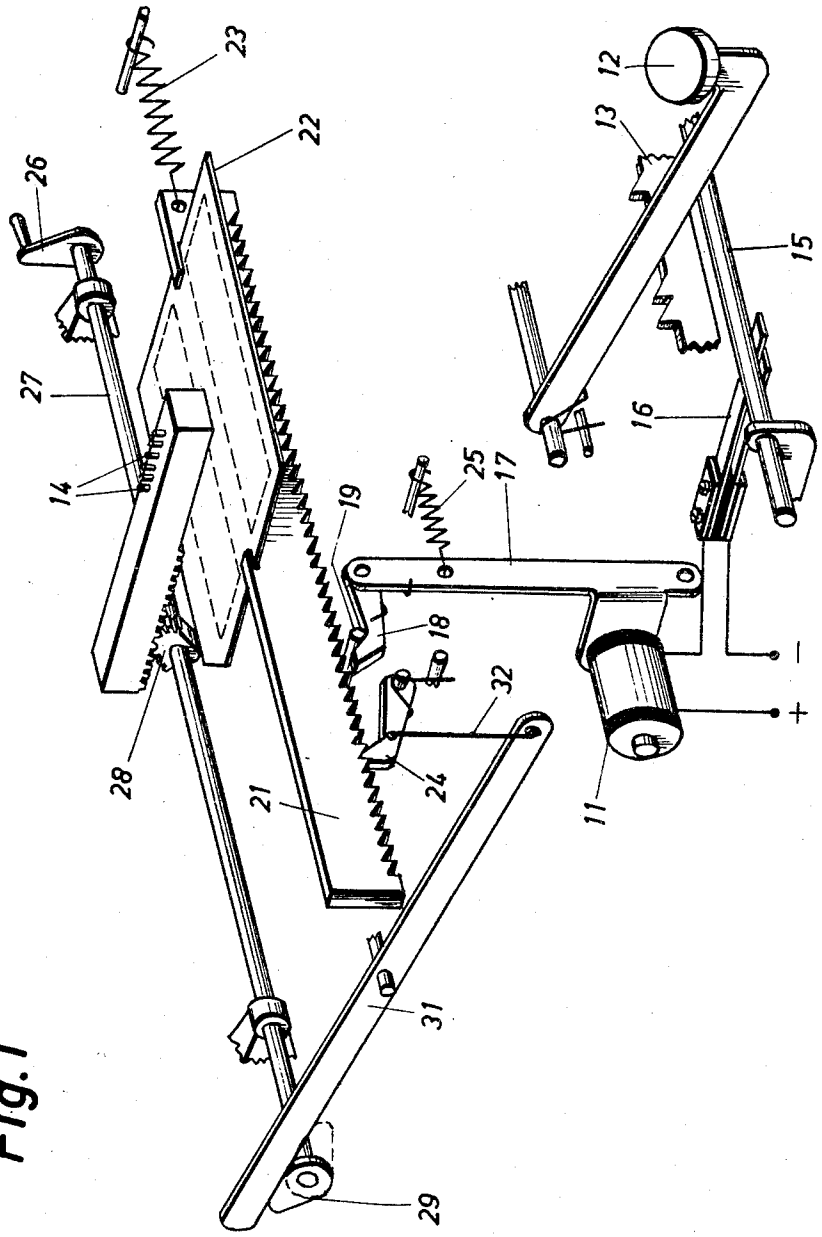


Fig.1

Inventor:
Michael Maul

BY

ATTY.

May 24, 1955

M. MAUL

2,708,971

DECK SHIFT CONTROL FOR A CARD PUNCH

Filed Oct. 27, 1952

3 Sheets-Sheet 2

Fig. 3

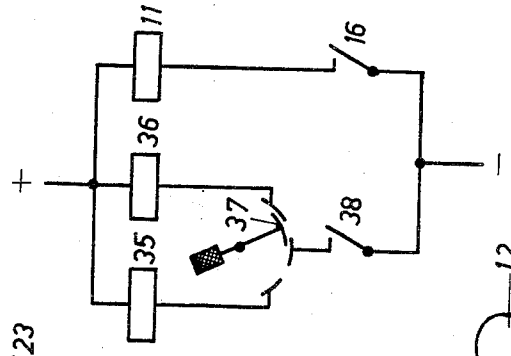
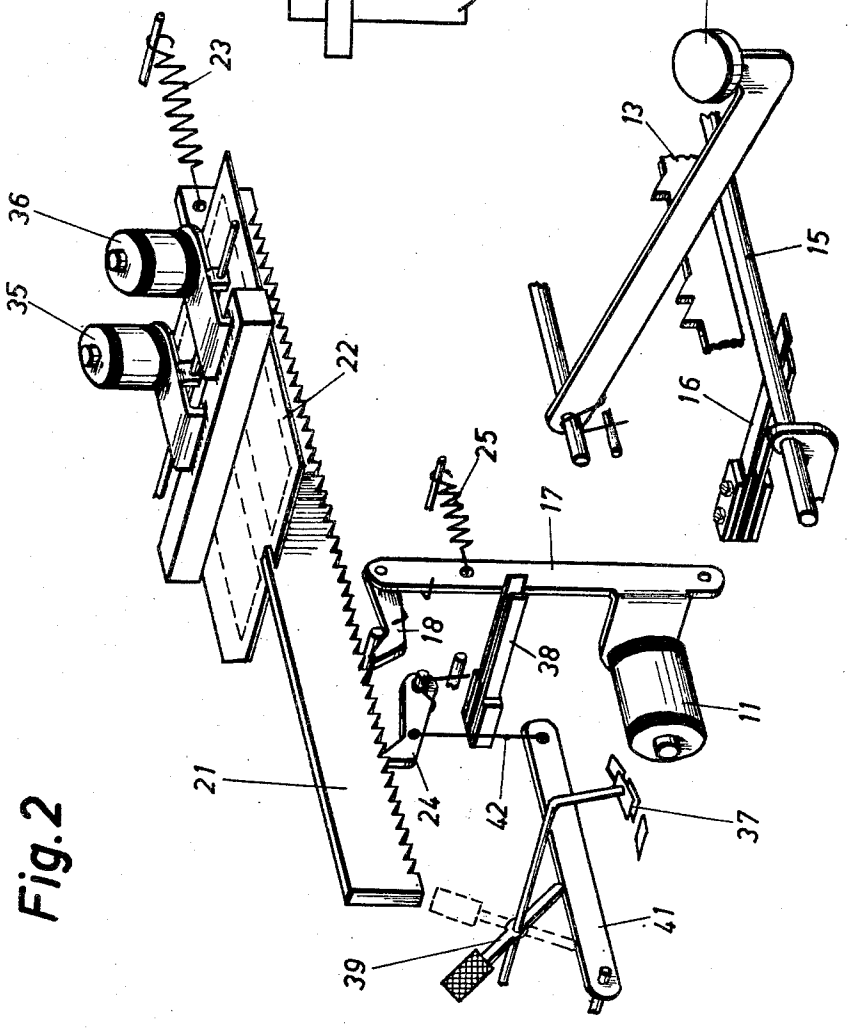


Fig. 2



Inventor:
Michael Maul

BY Geo. Inniss
ATTY.

May 24, 1955

M. MAUL

DECK SHIFT CONTROL FOR A CARD PUNCH

2,708,971

Filed Oct. 27, 1952

3 Sheets-Sheet 3

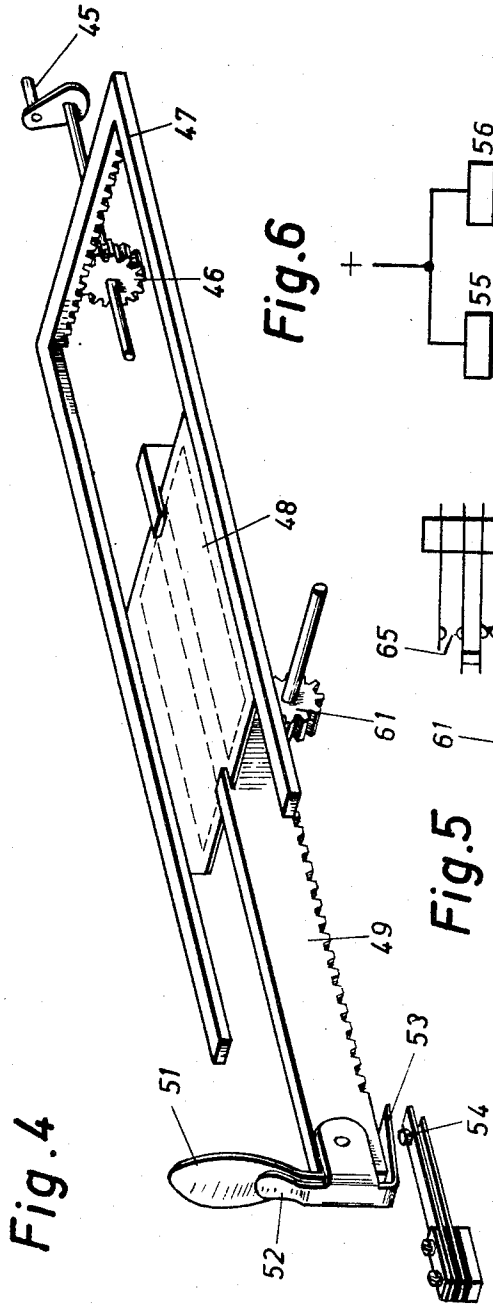


Fig.4

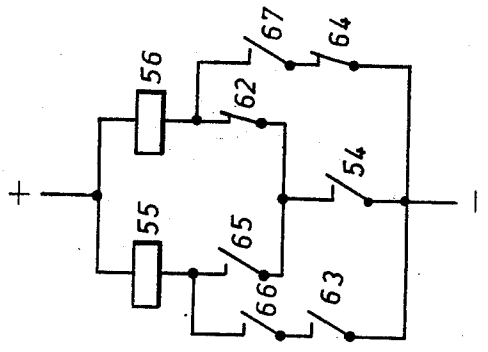


Fig.6

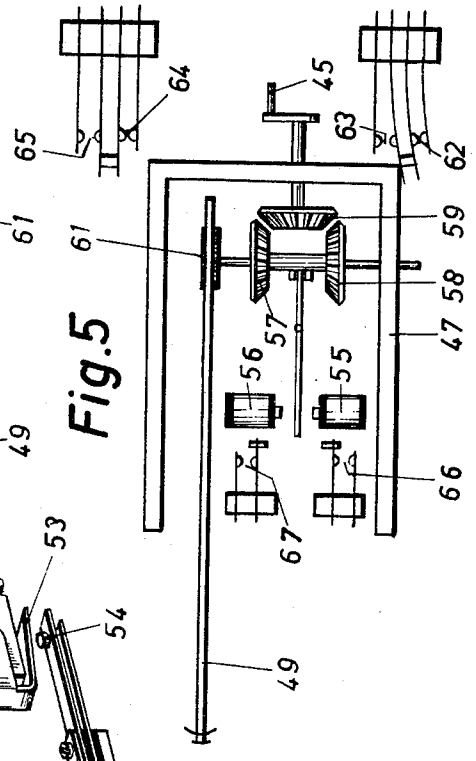


Fig.5

Inventor:
Michael Maul

BY

ATTY.

United States Patent Office

2,708,971

Patented May 24, 1955

2,708,971

DECK SHIFT CONTROL FOR A CARD PUNCH

Michael Maul, Schwabach, near Nurnberg, Germany

Application October 27, 1952, Serial No. 316,985

Claims priority, application Germany November 13, 1951

1 Claim. (Cl. 164—112)

In perforated record cards it is usual to provide a plurality of superpositioned rows of perforated characters which are included in adjacent perforation columns. This arrangement is particularly desirable if hole combinations are used in order to obtain a utilization of the card as far as possible with a favourable relation of the width of the card to the length of the same. The rows of perforation columns are known as perforation decks.

Now, in punching machines having column by column perforation of the cards, the individual decks are punched one after the other. For this purpose it is necessary that after the perforation of each deck the card is again fed back by the card carriage to the starting position for perforation and in addition thereto the selection of the next deck must be effected by the deck selector device. Accordingly, in such known machines two separate manipulations are necessary upon deck change.

Now, according to the invention operation of the machine of the indicated type is simplified. For this purpose the deck selecting device and the card feeding device are operatively connected to each other in such manner that the return of the card to starting position for punching, and the deck selection are effected together. Accordingly only a single manipulation is required to cause the return of the carriage to starting position for perforation and to cause the deck change. Preferably however, the arrangement is made in such manner that also the carriage return to starting position can be effected in a known manner independently of the deck selection or that the deck selection can be effected independently of the carriage return to starting position.

It is of subordinate importance for the invention in which manner the deck selection is effected. The deck selection can be effected in the one type of known machines by moving the card and a set of punches common to all decks deckwise relatively to each other. Such an arrangement wherein the set of punches is displaceable deckwise relatively to the card is known from the German Patent 704,256. However, in the converse manner the card may be displaceable deckwise relatively to the set of punches common to all decks, as is known from the German Patent 654,130. Moreover there is the possibility of providing for each deck a separate set of punches of which selectively only that set associated with the desired deck, is selected for punching, as is the case in the machine according to U. S. Patent 1,962,607. In all these devices the deck selection and the carriage return to home position may be brought in operative connection with each other according to the invention.

The manner of card feeding is also of subordinate importance for the invention. A particularly desirable solution is obtained if upon key actuation the card carriage is shifted step by step past the punches against spring action in which case the card travels from its starting position past the punches from the right to the left for punching. With such a construction of the card feed it is then possible to disengage the locking pawl for the card carriage upon deck shifting so that the carriage will again run back under spring action to its starting position for perforation while at the same time deck shifting is effected.

In another type of card shifting, as frequently used the operation is reversed. Upon key actuation the card is fed by spring action by means of an escapement mechanism column by column from the right to the left. With this arrangement the return of the carriage from the left hand inserting position to the right hand starting position for perforation may be operatively connected to the deck displacing device in a mechanical manner so that the displacement work for the deck shifting is derived from the carriage return. The deck displacement can be effected in a known manner by displacing the card with respect to the set of punches or by moving the set of punches relatively to the card.

As will be realized from the foregoing the inventive idea may be carried into practice in various ways. Some embodiments are illustrated in the accompanying drawings essentially diagrammatically:

Fig. 1 shows the embodiment wherein upon key actuation the card is displaced electromagnetically against spring action from the right to the left past the set of punches. In this case the set of punches is common to all decks and can be displaced by a deck shifting device selectively upon one of the two decks. Since the control for the punches by the keys as well as the deck shifting are known in essential parts from the German Patent 704,256 mentioned above, this portion of the machine is not illustrated in detail.

Figs. 2 and 3 show an embodiment wherein carriage shifting is effected in a similar manner as in Fig. 1. For each deck, however, a separate set of punches is provided of which each one may be selectively rendered effective by deck shifting means. The parts of the machine relating thereto are however, not illustrated in detail since they are known essentially from the above mentioned U. S. Patent 1,962,607.

Figs. 4 to 6 finally show a further embodiment which is distinguished from the preceding ones essentially in that another type of card feed is provided. In this case the card is fed manually by means of the carriage to the right hand starting position for perforation and runs column by column to the left under spring action, and under control of a key actuated escapement mechanism. The device according to the invention is constructed in such a manner that, upon the manually effected movement of the carriage from the left to the right, the drive for the deck adjusting means, which latter is operatively connected to the card carriage, is derived from the movement of the latter. The displacement is effected in this instance by displacing the card relatively to the set of punches common to all decks as already known from the above mentioned German Patent 654,130. The punching device and its control by the key board are also known from this patent and are therefore also not illustrated in detail. Instead of moving the card with respect to the set of punches, however, when employing the carriage shifting means according to Fig. 4 the set of punches could equally well be moved with respect to the card as is the case in the German Patent 704,256 and as has also been assumed in the embodiment according to Fig. 1.

Further preferred features of the invention will be seen from the specification and the claims.

The embodiment illustrated in Fig. 1 is based in its essential parts on the construction of a punching machine according to German Patent 704,256. Differing therefrom however is the displacing of the card carriage the

latter being moved in the embodiment by a step by step shifting mechanism, actuated by the magnet **11**.

If a character key **12**, of which in Fig. 1 only a single one is illustrated, is depressed it will encounter the translator bars **13** (of which also only one is shown) by means of which the punches **14** are selected in a known manner for the perforation. The key **12** however also engages the common bar **15** which is depressed downward. The latter actuates the contact **16** which closes the current circuit through the magnet **11** so that the same will be energized and will attract its armature **17**. The pawl **18** is mounted on the armature **17** and slides off the pin **19** into the teeth of the card carriage **21** holding the card **22** whereupon the pawl will take with it the card carriage for one step to the left against tension of the spring **23**. The locking pawl **24** will click in this case into the next tooth of the card carriage **21**. If the key **12** is again released the key and also the common bar **15** will return to their home position. By this means the contact **16** and therefore the current circuit through the magnet **11** will be interrupted. The armature **17** will drop and will be drawn to the right by means of the spring **25**. In this operation the pawl **18** will skip over the teeth and will be removed from the same by the pin **19**. In this manner the stepwise shifting of the card to the left under the punches is effected until the card has reached the left hand end position which is the insertion position.

If now the lower deck is to be punched the set of punches must be adjusted upon the lower deck. This is effected by means of a handle **26** on the shaft **27** and through the toothed segment **28**. Simultaneously with the displacing of the set of punches the cam **29**, also fast on the shaft **27**, is rocked in counter-clockwise direction to the position indicated by dotted lines. Thereby it will rock the lever **31** in clockwise direction whereby the latter will remove the locking pawl **24** by means of the bar **32** from the teeth of the card carriage. Thereby the card carriage is released and will be drawn by spring **23** to the right into starting position for perforation.

Fig. 2 shows the release of the carriage return for electrical deck selection. The manner of operation is only indicated in principle while the construction is similar as that of the punching machine described in the U. S. Patent 1,962,607. The construction of the carriage shifting means is just the same as in the embodiment described above and is therefore not explained in detail any more. Parts having the same function as described in Fig. 1, are indicated by the same reference numbers. Differing with respect to the first embodiment there is provided for each deck a separate set of punches and punching magnet **35** or **36**. Depending upon the deck selection by means of a switch **37** either the one or the other punching magnet is included in the current circuit of the machine. In order to ensure that punching can only be effected if the shifting step of the carriage has been completed, there is provided the contact **38** which is actuated by the armature **17** and closes the current circuit to the punching magnets. The contact **38** is so adjusted that it is closed only in the last moment of the armature movement and the card carriage movement respectively.

If punching of one deck has been completed and if a change to the other deck is to take place, the change to the other punching magnet is effected by means of the shift lever **39**. The shift lever **39** rocks the lever **41** downward which moves the locking pawl **24** from the teeth by means of bar **42** thereby releasing the card carriage which is drawn by the spring **23** to the right into the starting position.

Figs. 4 to 6 show an embodiment of the invention for the usual carriage shifting wherein the carriage is shifted step by step through an escapement mechanism and must be brought to starting position by hand. In this instance the deck shifting is derived from the movement of the carriage. The deck selection is effected by moving the card by means of a frame past the fixed set of punches as is shown in the German Patent 654,130.

Deck setting can be effected independently of the carriage movement by means of the crank **45** as described in the above mentioned patent. On the other hand it is possible to derive the deck adjustment from movement of the card carriage. Deck setting is effected by moving the frame **47** by means of gear **46** which can be moved by the crank **45** or the bevel gear **59**. The gear **46** engages the teeth of the frame **47**. The card **48** is guided in the frame **47** and is moved by the carriage **49** transversely of the columns. The carriage is shifted step by step by an escapement mechanism of a known type as described in the above mentioned patent.

The carriage **49** is brought by hand by means of handle **51** to starting position for perforation. In front of the handle **51** there is a smaller handle **52** which is rockably mounted on the carriage **49**. If upon carriage return pressure is excited on the handle **52**, its lip **53** will rock downward and will temporarily close the contact **54**. Depending upon the position of the frame **47** one of the two clutch magnets **55** or **56** is energized and will engage the bevel gear **57** or **58** into the teeth of the bevel gear **59**. The movement of the carriage **49** is transferred to the bevel gears **57** and **58** by means of gear **61**. One of these latter bevel gears drives the bevel gear **59** depending upon which clutch magnet is energized. The bevel gear **59** is fast together with the gear **46** and the crank **45** on the shaft and displaces by this means the frame **47**.

The selection of the magnet and therewith the selection of the position of the frame **47** is effected by the contacts **62**, **63**, **64** and **65**. Depending upon the position of the frame **47** it will actuate the contacts **62** and **63** or **64** and **65**. If for instance the set of punches is adjusted upon the upper deck, and if accordingly the frame **47** is in its lower position, the two contacts **62** and **63** are actuated, as shown in Fig. 5, the contact **62** being closed and the contact **63** open. The contacts **64** and **65** on the other hand are not actuated so that the contact **65** is open and contact **64** is closed. Now, if the carriage is moved by means of the handle **52** to the right and the contact **54** is temporarily closed the clutch magnet **56** will receive current through the two contacts **54** and **62** (Fig. 6). The clutch magnet **56** is energized and engages the bevel gear **57**. At the same time it will close the contact **67** which establishes a holding circuit so that the magnet **56** remains energized even if the contact **54** has opened again. The magnet **56** will receive current through the two contacts **64** and **67**. Since now the bevel gear **57** engages the bevel gear **59** and since the card carriage **49** is moved to the right, the frame **47** is moved by gear **46** upward so that the lower deck passes under the punching device. By this means the contact **62** opens while the contact **63** is closed. When the frame **47** has reached its upper end position it opens the contact **64** and closes the contact **65**. Thereby the holding circuit to the magnet **56** through the two contacts **64** and **67** will be interrupted so that the magnet becomes deenergized and the bevel gear **57** will be disengaged from the bevel gear **59**.

If punching of the lower deck has been completed and if now the carriage is again fed back to the right with a new card, the contact **54** will instantaneously close and will now establish the current circuit to the clutch magnet **55** whereby the frame **47** will be again moved downward so that the upper deck is set for perforation again. The magnet **55** will herein remain energized through contact **66** the latter being closed upon response of the magnet. In this instance the holding circuit is interrupted by the contact **63**.

I claim:

In a key actuated punching machine for multiple deck

record cards, means for feeding the card upon key actuation column by column past punching means from an initial position to a terminal position, means for selecting any one of said decks of said record cards for punching, said selecting means being movable in two opposite directions, and means controlled by said deck selecting means independent of the direction of the selecting movement for feeding the card independently of its location between said initial and said terminal position back to

initial position upon actuation of the deck selecting means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,445,597	Kawamura	Feb. 13, 1923
1,962,607	Maul	June 12, 1934
1,983,698	Kaufmann	Dec. 11, 1934
2,566,931	Cunningham et al.	Sept. 4, 1951