Aug. 25, 1964 A. A. BERLINSKY ETAL 3,145,920

FLOATING-POINT KEYPUNCH MACHINE

Filed June 19, 1962 12 Sheets-Sheet 1

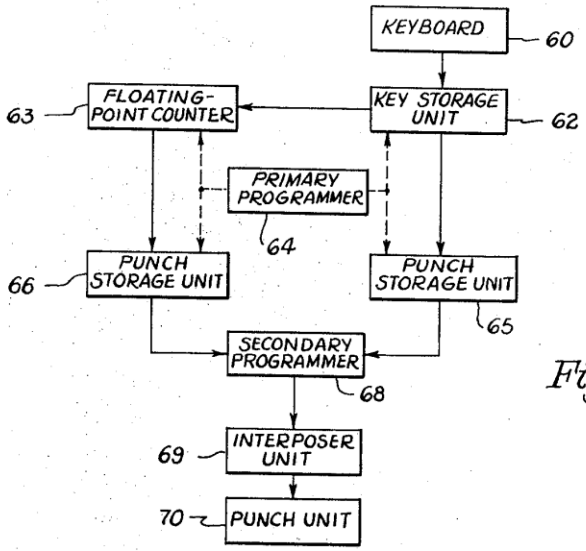

Fig. 1

Fig. 8
Fig. 9
Fig. 10
Fig. 11
Fig. 12
Fig. 13
Fig. 14
Fig. 15
Fig. 16
Fig. 17

Fig. 2

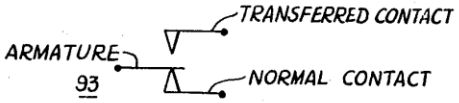

Fig. 3

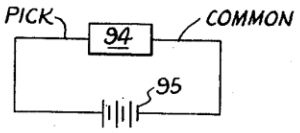

Fig. 4

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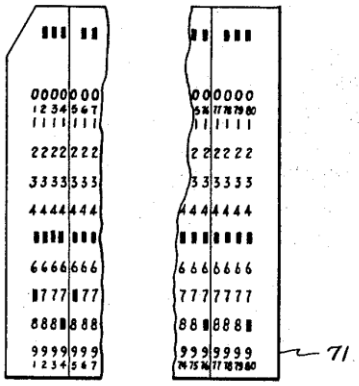
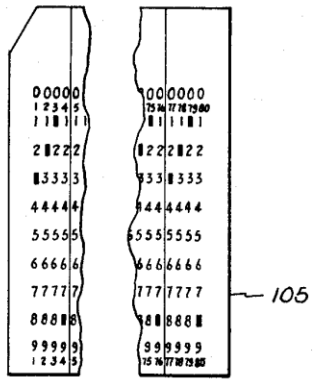


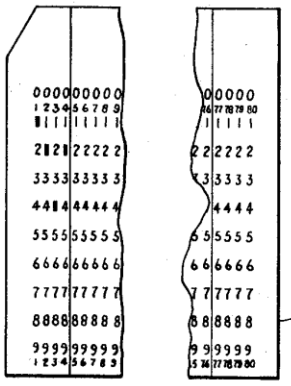
PRIMARY PROGRAM CARD

Fig. 5

Fig. 6



SECONDARY PROGRAM CARD



INFORMATION CARD

Fig. 7

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3,145,920

FLOATING-POINT KEYPUNCH MACHINE

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10 Claims. (Cl. 234—55)

This invention relates to a keypunch machine that records a floating-point count in a card.

In the Hollerith code, the position of a perforation in a vertical column in a card indicates the value of a digit. The field or area on the card allotted to a category of information is determined by the number of digits necessary to record the information.

Very often, statistical information, taken from printed material, is recorded in the Hollerith code in several cards. When the nature of the statistics is such that the numbers can be rounded off, by using a floating-point punching technique, the cards may be provided with identical fields patterns. This results in a reduction of the number of columns and the time required in routing the cards through the machine. Another advantage obtains when the information on the card is recorded on magnetic tape and then fed into a computer. Since all the columns of the card are filled, the information on the tape is continuous without the blank portions normally found on the tape when the fields in the card vary in size. Since the fields in the card are uniform, all data related to one set of statistics is punched in sequence and thus comes out on the magnetic tape in a single, continuous array.

Because of these advantages and others apparent from the description below, the present invention provides a floating-point keypunch machine. The operator, using this machine and observing a number to be recorded in a card, sequentially strikes the keys on his keyboard corresponding to the digits of the number. The significant digits are stored in a key storage unit; the remaining digits are counted by a floating-point counter. When the add key is depressed, the significant digits and a count of the remaining digits are recorded in the card.

Accordingly, an object of the present invention is to provide a keypunch machine that permits the use of a method of reducing the number of digits required to express information in a card.

Another object is to provide a machine that automatically records in a card the significant digits and a count of the remaining digits of a number.

Another object of the present invention is to provide a machine with an automatic floating-point operation that is controlled by a program card so that the operator requires no additional instruction.

In the figures:

FIG. 1 is a block diagram of an embodiment of the present invention;

FIG. 2 is a block diagram showing the manner in which the circuit diagram in FIGS. 8 to 16 is assembled;

FIGS. 3 and 4 illustrate some of the terminology employed in this description;

FIGS. 5 to 7 represent the primary program card, secondary program card, and information card, respectively, used herein; and

FIGS. 8 to 17 comprise a circuit diagram incorporated in an embodiment of the present invention.

Brief Description

In using the embodiment in FIG. 1, the operator sequentially depresses the keys, in keyboard **60**, corresponding to the digits of a number to be recorded. The significant digits are stored in key storage unit **62** and the remaining digits are counted by floating-point counter **63**. When the add key is depressed, primary programmer **64** is activated; the significant digits are transferred to punch storage unit **65**; and the count of the remaining digits is transferred to punch storage unit **66**. The primary programmer then resets key storage unit **62** and floating-point counter **63**. Secondary programmer **68** is activated and operates the magnets in interposer unit **69** in dependency upon the information stored in the punch storage units. The interposer magnets in turn control punch unit **70** to record the significant digits in respective columns and the count of the remaining digits in another column of a field of the card. The primary programmer **64** then resets punch storage units **65** and **66**.

The following components in FIG. 1 are well-known in the art and are used in IBM keypunch machine 027: keyboard **60**; key storage unit **62**; primary and secondary programmers **64**, **68**; punch storage unit **65**; interposer unit **69** and punch storage unit **70**. These various units are modified, as described below, to cooperate with floating-point counter **63** and punch storage unit **66** to achieve the objects of the present invention.

Terminology and Notations

Before considering the remaining figures, the terminology and notations employed will be described. When FIGS. 8 to 17 are arranged as shown in FIG. 2, it will be noted that numbers ranging from 0 to 23 appear in the left-hand margin and letters A and B appear along the top of FIG. 8 of the composite drawing. This forms a coordinate system which may be conveniently used to locate the contacts of the relays in the figures. For example, relay coil **42P** is associated with rectangle **42**, FIG. 8, which represents relay **42** and is divided into sections marked 9A, 0B, 2A, 14B, representing contacts **42–1** to **42–4**, or contacts **1** to **4** of the relay, respectively. The notation in each section designates the location of the associated contact in the figures. Thus, to use the notation 9A to locate contacts **42–1**, find the area between numbers 9 and 10 in the left-hand margin of FIG. 12 and proceed to the A or left-hand portion of this figure.

Every relay and relay coil is represented by a number in a rectangle. When a rectangle has a P nearby, it represents a pick coil of a relay, the number of which appears in the rectangle. A pick coil is energized quickly and is used for operations that are not to be maintained for a long period of time. When a rectangle has an H nearby, it represents a coil used in a hold circuit for the relay whose number appears in the rectangle. Finally, when a rectangle is denominated by a number and LP or a number and LT, it represents the coil of a latch-trip relay. If the former is energized, it latches an armature closing the relay contacts; if the latter is energized, it releases that armature, opening the relay contacts.

When a rectangle is divided into sections and either AL, AU, or BL is found below a section, the letters and the relay number, appearing above the rectangle, designate the contacts located at the coordinate position indicated in the associated section. Thus, contacts 2AL of relay **2** in FIG. 13 are located at 16A.

Some of the terminals in the drawings are represented by the number of the terminal over a coordinate, for example,

$$\frac{1}{6B}$$

at 3A. This indicates that the terminal is connected to one marked

$$\frac{1}{3A}$$

which may be found at 6B.