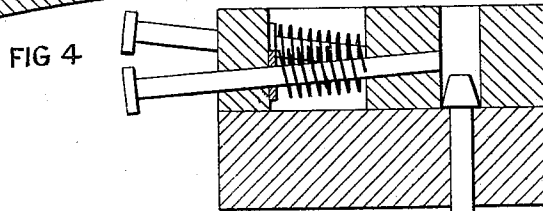
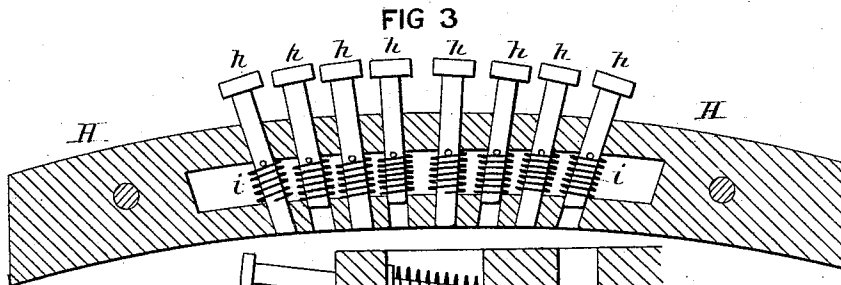
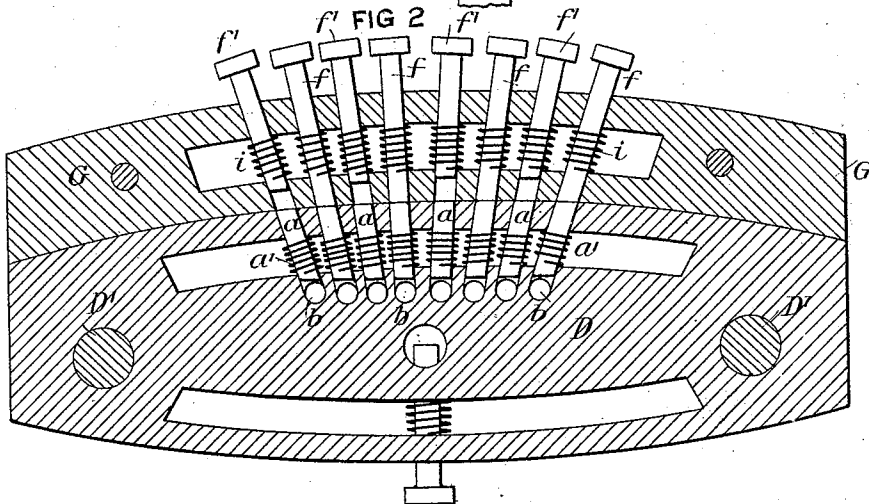
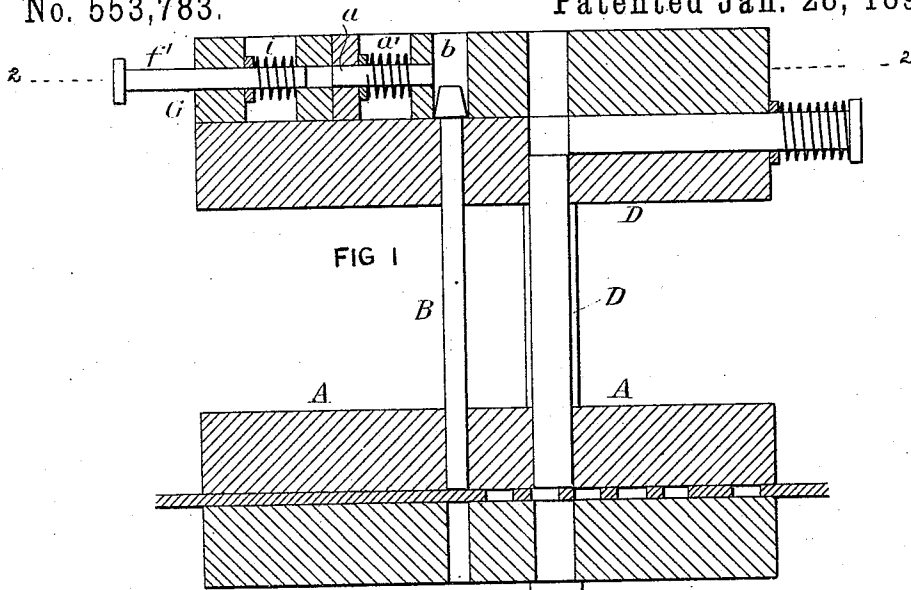


(No Model.)

H. HARDWICK.
JACQUARD CARD PUNCHING MACHINE.

No. 553,783.

Patented Jan. 28, 1896.



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HARRY HARDWICK, OF PHILADELPHIA, PENNSYLVANIA.

JACQUARD CARD-PUNCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 553,783, dated January 28, 1896.

Application filed March 5, 1894. Serial No. 502,431. (No model.)

To all whom it may concern:

Be it known that I, HARRY HARDWICK, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Jacquard Card-Punching Machines, of which the following is a specification.

My invention relates to machinery for punching the cards used in the Jacquard
10 mechanism of a loom, the object of my invention being to so construct such a card-punching machine that cards for producing special fabrics requiring a peculiar manipulation of the warp-threads can be punched
15 without the exercise of the care and skill on the part of the attendant which are demanded in punching such cards upon an ordinary machine. This object I attain in the manner hereinafter set forth, reference being had to
20 the accompanying drawings, in which—

Figure 1 is a longitudinal section of sufficient of a card-punching machine to illustrate my invention. Fig. 2 is a sectional plan view of the same on the line 2 2, Fig. 1, on a somewhat smaller scale and with slight structural
25 modification of unimportant features. Fig. 3 is a sectional plan view of an alternating key-block for the machine, and Fig. 4 is a longitudinal section illustrating a modification.

30 A represents the base of the cutting-machine provided with suitable guides for the cards, which are fed through the machine by a succession of short forward movements so as to present successive portions of the card to the action of a row of punches B suitably
35 guided in openings in said base-plate, and in an upper sliding block D carried by rods D', to which vertical reciprocating motion is imparted at intervals by mechanism common in
40 this class of machines.

Suitably guided in the slide-block D are a series of bolts *a*, the inner ends of which terminate in line with a series of openings *b* formed in the slide-block D for the guidance
45 of the upper ends of the punches, each of these bolts being acted upon by a spring *a'*, tending to project it so as to withdraw its inner end from the corresponding punch-opening *b*, so that unless the bolt is pushed inward so as to project into said opening and
50 over the top of the punch said punch will not be depressed on the downward movement of

the sliding block, and hence will fail to form an opening in the card, those punches only acting upon the card which are locked to the
55 sliding head by reason of the projection of the inner ends of the bolts *a* over the upper ends of the punches.

Usually the outer ends of the bolts *a* terminate in keys to be manipulated by the attendant; but in preparing the cards for weaving certain classes of fabrics requiring a peculiar manipulation of the warp-threads—
60 such, for instance, as ingrain-carpet fabrics using more than the usual set of four warp or weft threads—the cards are not punched in the regular way—that is to say, taking the eight squares of a pattern-card representing the eight holes punched in the card by the
65 row of punches B certain colors may be punched wherever they appear. For instance, if a certain color covered the entire eight squares of the pattern-card the whole of the eight keys would be depressed and a
70 complete row of openings would be formed in the card; but in punching for certain other colors certain of the holes would have to be omitted from the card. For instance, in the
75 case of one of these latter colors covering the entire eight squares of the design alternate keys only—say the first, third, fifth and seventh—would have to be depressed, so that
80 only four holes would be formed in the card in this row. This is well known to those skilled in the art of card-punching.

85 When the attendant in charge of the card-punching machine has to bear in mind that in punching the card for a certain pattern before him some of the colors are to be punched full—that is to say, wherever they appear in
90 any square of the design—while others are to be punched only as regards certain squares of the design and not as to others, extreme care and attention are required, and even with
95 the exercise of the utmost care mistakes are likely to occur, which are not apparent until the loom is put to work and a piece of the fabric is produced. The aim of my invention, therefore, has been to so modify the construction
100 of a card-punching machine that the production of cards for the special kinds of fabric alluded to can be effected with the exercise of no more care and skill on the part of the attendant than would be required in punch-

ing the cards for an ordinary fabric where every color was to be punched full—that is to say, wherever it appeared upon a square of the design. With this object in view I, by preference, discard the usual plan of forming the keys directly upon the bolts which lock the punches to the sliding head and provide for use in connection with said sliding head and its locking-bolts two or more key-blocks each having the full complement of keys, each preferably acted upon by a spring *i*, only a portion of the keys of each block, however, being “active” keys, the others being “dummy” keys, the depression of which will not effect the operation of their corresponding locking-bolts. For instance, in Fig. 2 the four keys *f* of the block G (the first, third, fifth and seventh) are active keys, which when depressed will effect a corresponding movement of their respective locking-bolts *a*, while the four keys *f'* (the second, fourth, sixth and eighth) are each dummy keys, being shorter than the keys *f*. Hence the depression of these keys will not have the effect of rendering their corresponding locking-bolts operative. The cards are run through the machine while this key-block is being used and are punched in the regular way—that is to say, by depressing a key for each color to be punched wherever said color appears upon a square of the pattern. This will effect the proper punching of the cards for those colors which should only be partially punched, but it will only effect a partial punching of the cards for those colors which are to be punched full. Hence after the cards have been run through the machine the key-block G is removed and an alternate key-block, H, Fig. 3, is substituted therefor. In this key-block H the keys *h*, (the first, third, fifth and seventh,) which in the other key-block, G, were active keys, are dummy keys, and the keys *h'*, (the second, fourth, sixth and eighth,) which in the block G were dummy keys, are active keys. The cards are now again passed through the machine in regular succession and are again punched for such colors as are to be punched full, or for the partial punching of other colors, so that the punches which failed to act upon the cards when the latter were first passed through the machine will now be operative and the punching of the cards will be completed for such colors as are to be punched full, and if necessary a third or fourth passage of the cards may be resorted to, depending upon the number of colors in the pattern. Although this method requires passing the cards through the machine two or more times, the relief of the attendant from the care otherwise neces-

sary is such that a set of cards even with this repeated action of the machine can be produced in much less time than has hitherto been required, while the cards are accurate, since matters of calculation are determined by the active and dummy keys of the machine, and are not dependent upon the person who is operating the machine.

While in carrying out my invention I prefer to adopt the construction which I have described—that is to say, the use of alternate key-blocks each having a full complement of keys, some of which are active keys and others dummy keys—it will be evident that each block may, if desired, have but four keys, all of which are active. Thus one block may have keys 1, 3, 5, and 7, and the other may have keys 2, 4, 6, and 8. This arrangement, however, would be calculated to disturb the attendant, who is familiar with the usual continuous row of eight keys, and hence its use is not to be commended. On the other hand, the series of eight keys may be arranged in two banks, one above the other, the upper bank comprising, say, the keys 1, 3, 5, and 7, and the lower comprising the keys 2, 4, 6, and 8, as shown, for instance, in Fig. 4, the keys of but one bank being acted upon in punching for those colors which are only to be partially punched, and both banks being acted upon in punching for those colors which are to be full-punched.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of the punching mechanism of a card-punching machine, with a series of sets of keys each set adapted to control alternate punches, substantially as specified.
2. The combination of the punching mechanism of a card-punching machine, with a series of key-blocks, each carrying keys for controlling a portion only of the punches, substantially as specified.
3. The combination of the punching mechanism of a card-punching machine, with a series of key-blocks each carrying a full complement of keys, some of the keys of each block being “live” or active keys, and the others “dummy” keys, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HARRY HARDWICK.

Witnesses:

EDWIN C. FREEMAN,
WILLIAM A. BARR.