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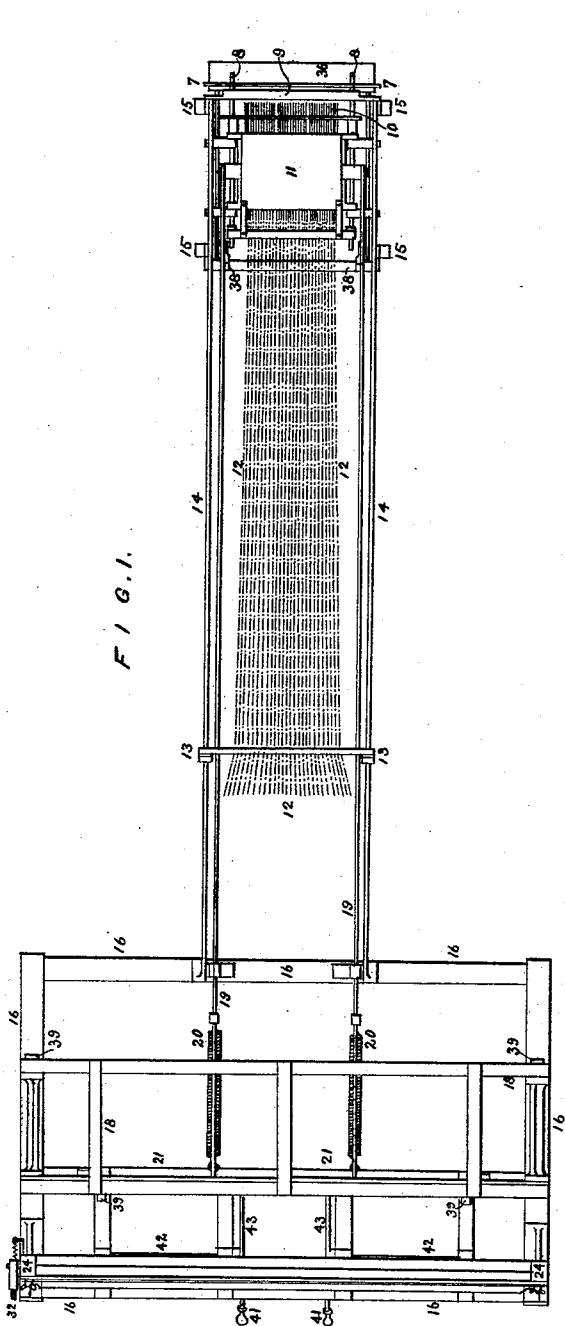
B. TOONE.

3 Sheets—Sheet 1.

JACQUARD PUNCH SELECTING APPARATUS.

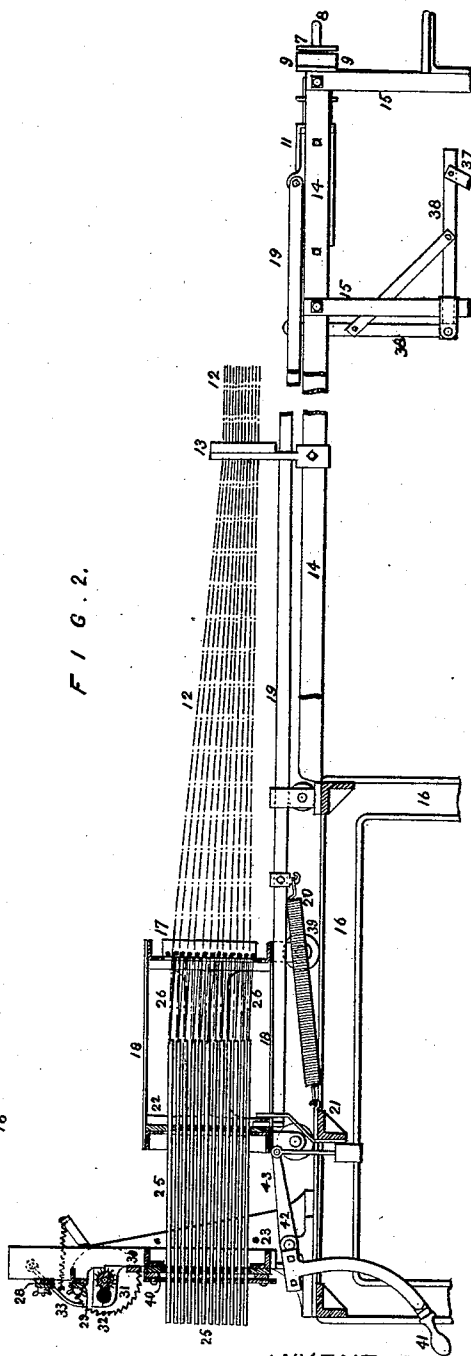
No. 487,499.

Patented Dec. 6, 1892.



WITNESSES

George Baumann
James Gracie



INVENTOR

Benjamin Toone
By his attorney
Hawson & Hawson

(No Model.)

3 Sheets—Sheet 2.

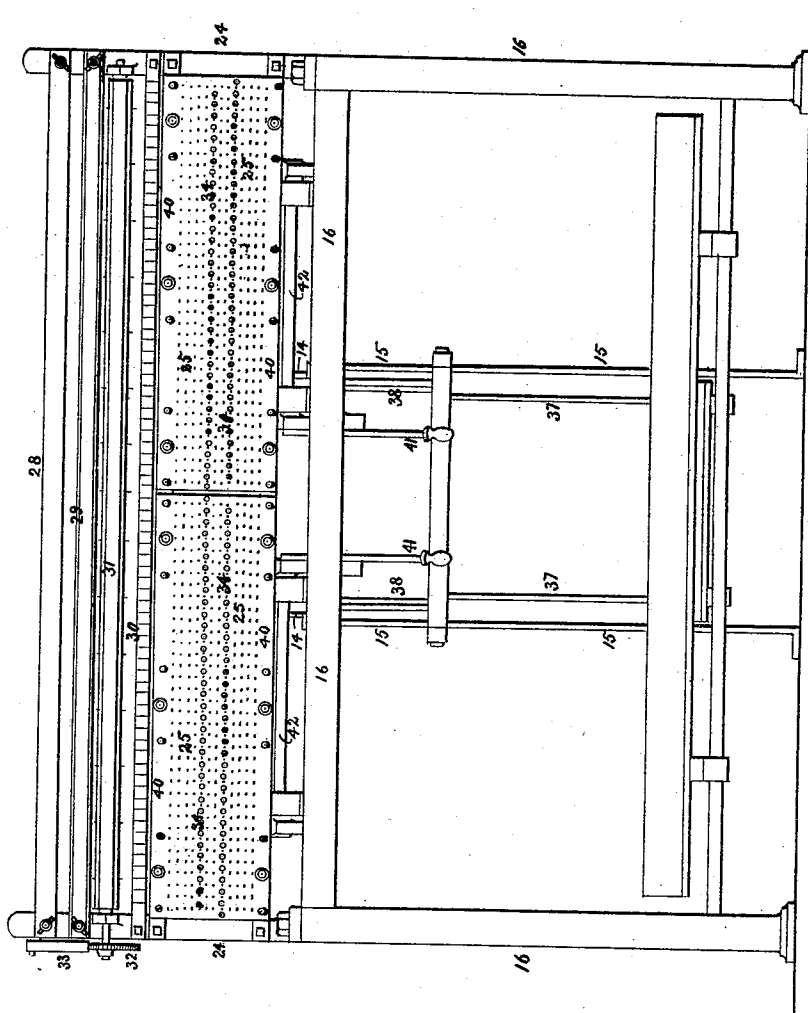
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3 Sheets—Sheet 3.

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FIG. 6.

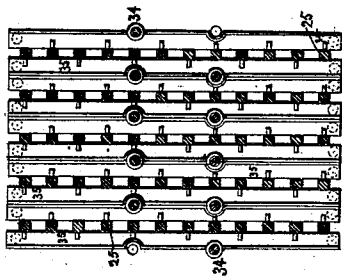


FIG. 4.

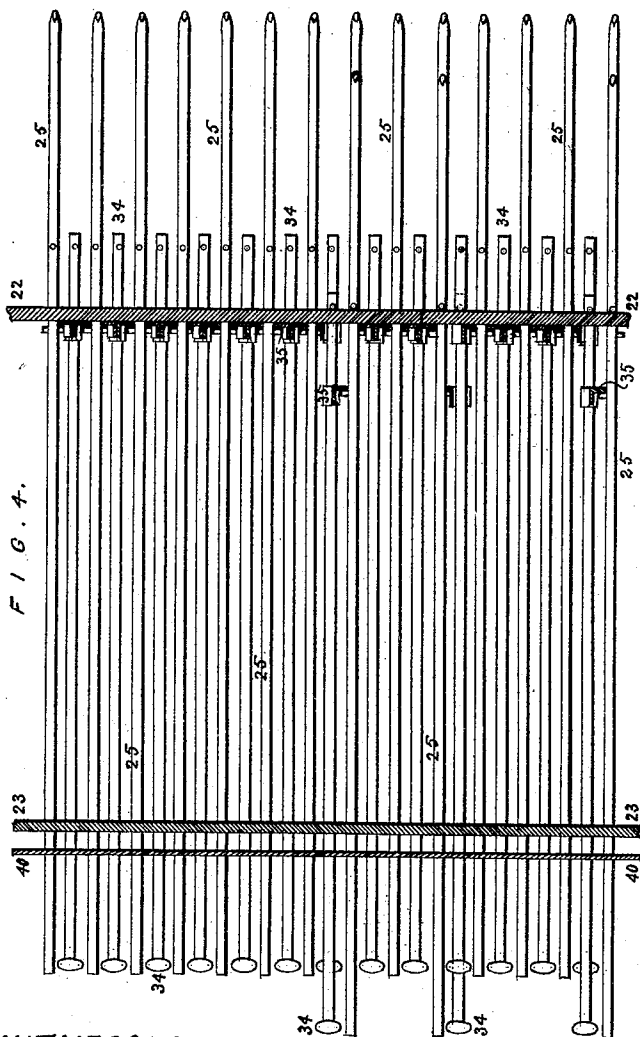
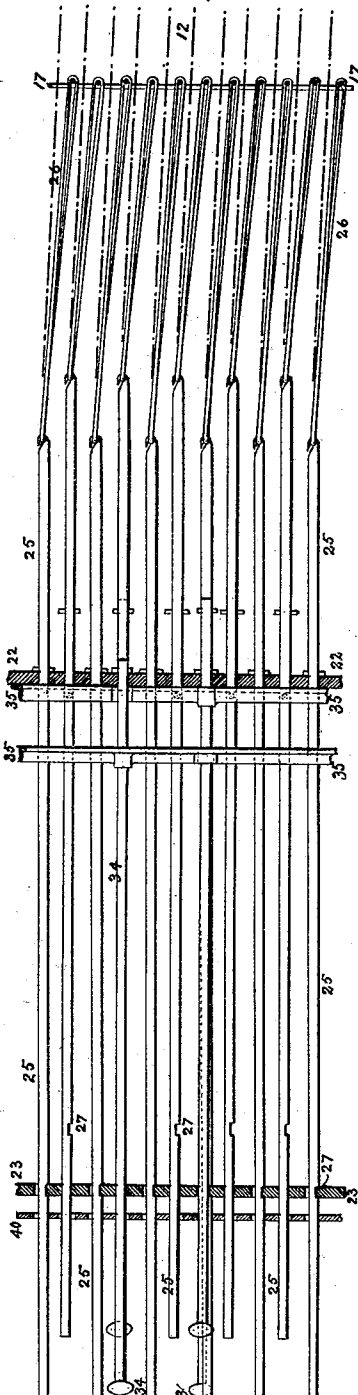


FIG. 5.



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UNITED STATES PATENT OFFICE.

BENJAMIN TOONE, OF NOTTINGHAM, ENGLAND.

JACQUARD PUNCH-SELECTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 487,499, dated December 6, 1892.

Application filed August 1, 1892. Serial No. 441,806. (No model.) Patented in England November 19, 1886, No. 15,034; in Germany August 20, 1887, No. 45,650, and in France August 27, 1887, No. 185,524.

To all whom it may concern:

Be it known that I, BENJAMIN TOONE, a subject of the Queen of Great Britain and Ireland, and a resident of Nottingham, in the county of Nottingham, England, have invented Improved Jacquard Punch-Selecting Apparatus, (for part of which apparatus I have obtained a British patent, dated November 19, 1886, No. 15,034; also a German patent, dated August 20, 1887, No. 45,650, and also a French patent, dated August 27, 1887, No. 185,524,) of which the following is a specification.

My improved apparatus is designed to replace previously-existing apparatus comprising the following parts, namely: a long horizontal framing, at one end of which is fixed the punch-block containing the set of punches which are to be selected, according to the pattern, and pushed out and into the movable block, which is transferred to the actual punching-press. Near the punch-block there is a selecting frame or block carrying selecting-needles, which act on the punches and which have springs applied to them and pressing them sufficiently to cause them to move the punches when the selecting-block is moved toward the punch-block, but allowing those of them to be drawn back which are not to act on the punches. The selecting-needles have attached to their inner ends threads or strings, which pass through a sley-plate or hole-board fixed on the framing and are by it guided so as to pull the selecting-needles in the directions of their lengths, the threads or strings diverging more or less backward from the sley-plate. The threads or strings, which have their front ends attached to the selecting-needles, have their back ends attached to the front ends of a set of intermediate needles carried and guided in an intermediate block. The number of intermediate needles is, however, considerably smaller than that of the selecting-needles, each intermediate needle being connected by threads or strings to two or more selecting-needles, according to the number of repeats of the pattern or of any portion of the pattern that has to be punched on each card. The back ends of the intermediate needles have threads or strings attached to them, and these threads or strings (hith-

erto known as "wales" or "wale-strings") pass backward through a sley-plate or hole-board, which guides them so as to pull the intermediate needles in the directions of their lengths, and they extend thence to the back end of the framing. Hitherto for every card of a set or pattern a cross-string, known as a "lash," has been interlaced transversely through the wale-strings to separate the strings corresponding to the punches which are to be selected for each card from the others, and the operator, taking each lash-string in succession as a guide, passes a lash-roller through between the selected and unselected strings and by means of a lever acting on the lash-roller depresses the unselected strings, so that they draw back the corresponding selecting-needles and prevent their acting when the selecting-block is moved forward. The primary reading of the pattern and placing the lash-strings to suit it through the wale-strings has hitherto been performed apart from the machine that has been partly hereinbefore described and by aid of separate apparatus, at the expense of labor and time. By my invention, however, I am enabled to do without this separate primary lashing and to effect the reading directly from the design on pattern-paper to the threads or strings which are attached to the back ends of the intermediate needles or directly to the intermediate needles, saving in this way time, labor, and cost of apparatus.

In carrying out my invention the needles hereinbefore termed the "intermediate needles" become a set of elongated back needles at the back end of the machine. They are preferably square and extend through guide-holes in vertical plates and have notches in their under sides to catch in the guide-plates and be thereby retained when drawn outward. An operator stationed at the back end of the framing and having the pattern on design-paper placed in front of him draws outward such of the back needles as correspond to the parts not to be punched in the card about to be operated on, and these needles are retained in the drawn-out position by means of their notches.

My invention comprises improved means for releasing the back needles prior to oper-

ating for a fresh card and also certain parts for operating on a plurality of needles at once, whereby with some kinds of patterns the "reading" or selecting operations are much facilitated and expedited.

In the accompanying drawings, Figure 1 is a small-scale diagrammatic plan of the apparatus, but without various details, which are well understood or are more fully shown in other figures. Fig. 2 is a longitudinal vertical section showing part of the apparatus, and Fig. 3 is an elevation of the back end, these two figures being drawn to a somewhat larger scale than Fig. 1. Figs. 4 and 5 are horizontal and vertical longitudinal sections, enlarged, showing the back needles and some parts connected with them; and Fig. 6 is a corresponding transverse vertical section.

In Fig. 1 the front end of the machine is at the right-hand end of the figure. The movable punch block or frame 7 is shown as placed on the guide-pins 8, but as not quite close to the stationary punch-block 9, with which it is held in close contact when receiving the selected punches from it. When the movable punch-block 7 has received the selected punches for a card, it is transferred with them to the punching-machine, which is of the kind commonly used for the purpose, as are also the arrangements of the movable and stationary punch-blocks 7 9 and the selecting-needles 10. The selecting-needles 10 are held in a block or box 11, also arranged as heretofore, in which they have springs applied to them of sufficient strength to sustain any needle in pushing the corresponding punch from the fixed block 9 to the movable block 7, but yet capable of being drawn or held back in the case of needles which are not to act on punches. To the inner ends of the selecting-needles 10 are attached wales or strings 12, which pass through a sley-plate or hole-board 13.

In all cases any part herein termed a "sley-plate" may consist of a plate or board perforated with holes for strings or needles or a grating formed by horizontal and vertical wires held in a suitable frame. The sley-plate 13 is fixed to longitudinal side bars 14, which are fixed to and connect the framing 15 at the front end of the machine and the framing 16 at the back end. From the sley-plate 13 the strings 12 diverge, as they extend backward, to another sley-plate 17, which forms the front plate of a kind of open box 18, capable of moving on wheels 30 on the top side rails of the back framing 16. The box 18 has fixed to it bars 19, which extend forward to the needle-selecting block 11 near the front end, to which block they are fixed; but springs 20, fixed to the bars 19 and to a cross-bar 21 of the back framing 16, keep the box 18 and the needle-selecting block 11 in their most backward positions. The box 18 is made with a sley-plate 22 at its back part, while at the extreme back end of the machine there is a sta-

tionary sley-plate 23, which is fixed to framing 24, forming an upward extension of the back part of the back framing 16. Manipulating or back needles 25 (shown enlarged in Figs. 4, 5, and 6) lie in holes in the back sley-plate 23 and the sley-plate 22 at the back of the box 18, and the strings 12 are hooked or otherwise attached to the front ends of the back needles 25, which have also attached to them rubber cords 26, fixed to the front part of the box 18 and acting as springs to draw the back needles 25 forward.

The back needles 25 are of square section, and their guide-holes in the sley-plates 22 23 are also square. The needles extend sufficiently far outward from the back sley-plate 23 and are conveniently arranged, so that any one can be easily taken hold of by the reader or operator. When any needle 25 is drawn out, it is retained by the back sley-plate 23 in consequence of a notch 27, formed on the under side of the needle, engaging with the bottom edge of the hole in the sley-plate. The operator reads from a pattern on design-paper, which is placed above the back sley-plate 23, being held between fixed bars and outer clamping-bars 28 29, with the line that is being read at any time close to a lower fixed bar 30, which has divisions marked on it, each division corresponding to a vertical row of the back needles 25 and to the small squares of the design-paper in the line which is being read, corresponding, severally, to such vertical sets of needles.

To facilitate the shifting of the design-paper from line to line, it is passed between a pair of rollers 31, one of which has at its end a ratchet-wheel 32, held by a pawl 33. It frequently happens that either every back needle 25 of a vertical row or every alternate needle of such row has to be drawn out, and obviously much time can be saved if in each such case all the needles or all the alternate needles of a vertical row can be drawn at once. For the purpose thus indicated two headed wires 34 are arranged in each space between the vertical rows of back needles 25. These headed wires 34 extend through and are guided by the back sley-plate 23 and the sley-plate 22 at the back of the box 18, and stop-pins are fixed across their inner ends to prevent them from being drawn out farther than is necessary. Each headed wire 34 has fixed on it a narrow vertical plate 35, of an angle form in horizontal section, and of the two wires 34 between any two vertical rows of back needles 25 one has its transverse flange to the right, that of the other being to the left. The back needles 25 have small pins fixed in their sides, to be engaged by the vertical plates 35, and of each vertical row of the needles the odd ones have these pins fixed in their left-hand sides, the even ones having the pins fixed in their right-hand sides. When the operator wishes to draw out the odd or even needles of a row, he draws out the proper

headed wire 34, and when he wishes to draw out all the needles in a row he draws out the two proper headed wires.

When all the back needles 25 for a card have been drawn out, an operator at the front end of the machine depresses a treadle 36, (shown only in Fig. 1,) which treadle by a pair of rods 37, Fig. 2, moves a pair of bell-cranks 38 at the sides of the front framing 15, and these bell-cranks 38 by their upper ends move forward the bars 19, and with them the needle-selecting block 11 and also the box 18 on the back framing 16. All the selecting-needles 10 corresponding to the pulled-out back needles 25 are held back and only the punches corresponding to the other needles are transferred from the stationary punch-block 9 to the movable punch-block 7.

In order to restore the apparatus for dealing with a fresh card, among other things the pulled-out back needles 25 have to be released from the back sley-plate 23, so that their springs 26 may draw them inward. I formerly employed for this purpose an inclined bar arranged to rise and by the action of its inclined surface against the needles to lift them to clear their notches and move inward. This device has, however, been found defective in practice, being liable to jam the needles against the upper edges of the holes in the sley-plate 23, and I have adopted a new and perfectly-satisfactory device, this consisting of a pair of thin releasing-plates 40, hung with slightly-elongated holes on pins, one plate outside of one half of the back sley-plate 23 and the other outside of the other half. These releasing-plates 40 are made with holes, through which the back needles 25 pass, these holes being slightly elongated vertically, and when they are raised (to an extent limited by the elongated holes by which they are hung) they lift any pulled-out needles just enough to make their notches clear the bottoms of the sley-plate holes, and then the needles are at once drawn back by their springs 26. For moving the releasing-plates 40 there are provided two hand-levers 41, which are fast on

rocking shafts 42, having on them short levers or projections, which act on the bottom edges of the releasing-plates 40 when the hand-levers 41 are moved outward and upward. Each rocking shaft 42 has on it a weighted arm 43 to turn it back when the hand-lever 41 is let go.

What I claim in Jacquard punch-selecting apparatus is—

1. In combination, back needles to be manipulated by the reader, connected by strings to the punch-selecting needles, a stationary back sley-plate perforated with holes to guide the back needles, notches in the back needles to engage with the back sley-plate when the back needles are pulled out, retracting-springs applied to the back needles, additional wires with vertical angle-plates arranged for acting at once on a plurality of back needles, and outer releasing-plates having holes through which the back needles extend, and on being raised by hand-levers lifting the back needles to clear their notches from the back sley-plate, the said parts being arranged and operating substantially as herein set forth.

2. In combination with the back needles of apparatus of the kind described, additional wires with vertical angle-plates arranged for acting at once on a plurality of back needles, substantially as and for the purposes herein set forth.

3. In combination with the back needles and back sley-plate of apparatus of the kind described, outer releasing-plates having holes through which the back needles extend and on being raised by hand-levers lifting the back needles to clear their notches from the back sley-plate, substantially as and for the purposes herein set forth.

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

BENJAMIN TOONE.

Witnesses:

ARTHUR SMITH TOONE,
JOHN BUXTON.