Nov. 14, 1939. N. JONES 2,180,058

JACQUARD CARD AND VERDOL PAPER ROLL REPEATER CUTTING MACHINE

Filed July 26, 1938 5 Sheets-Sheet 1

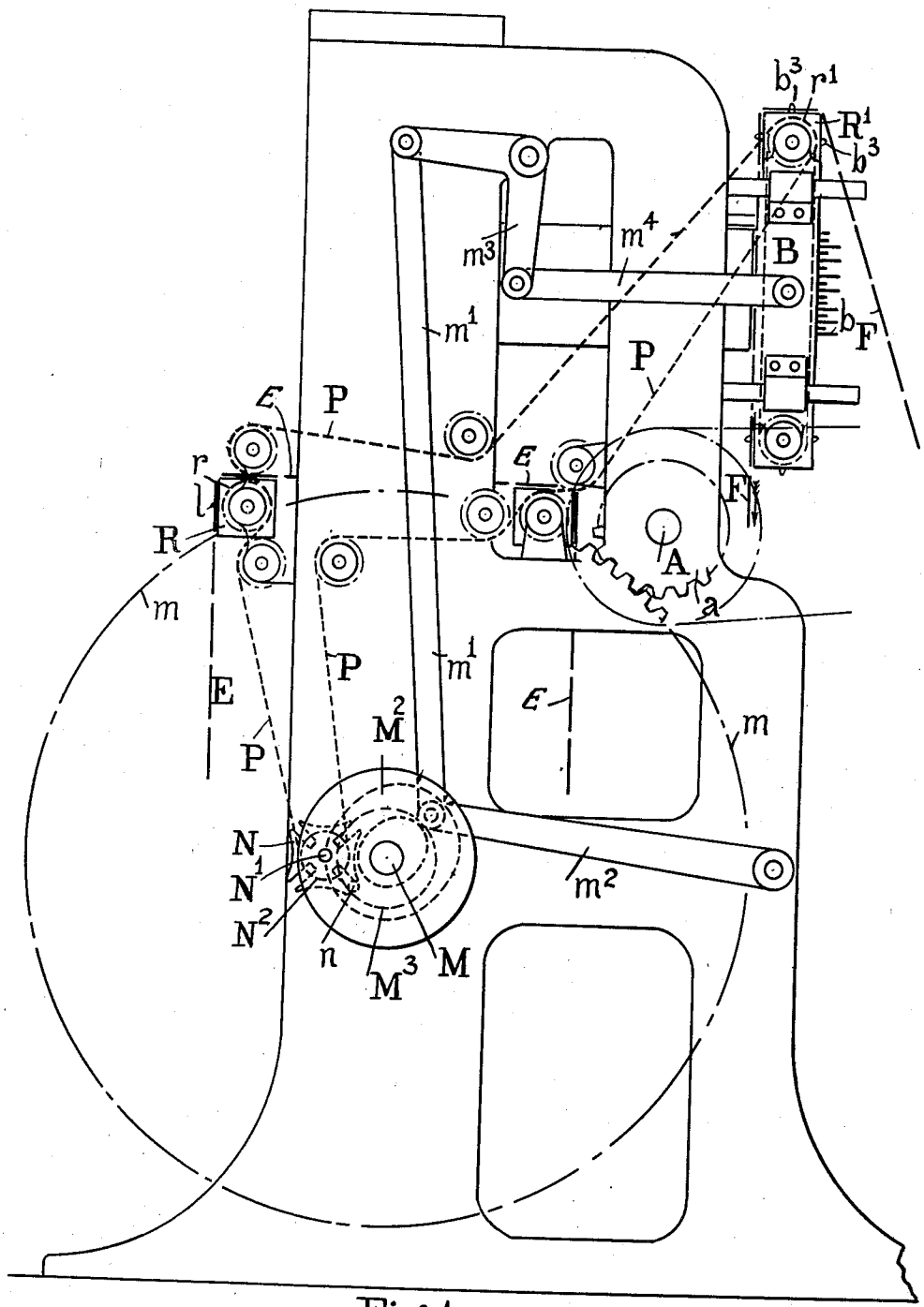


Fig.1

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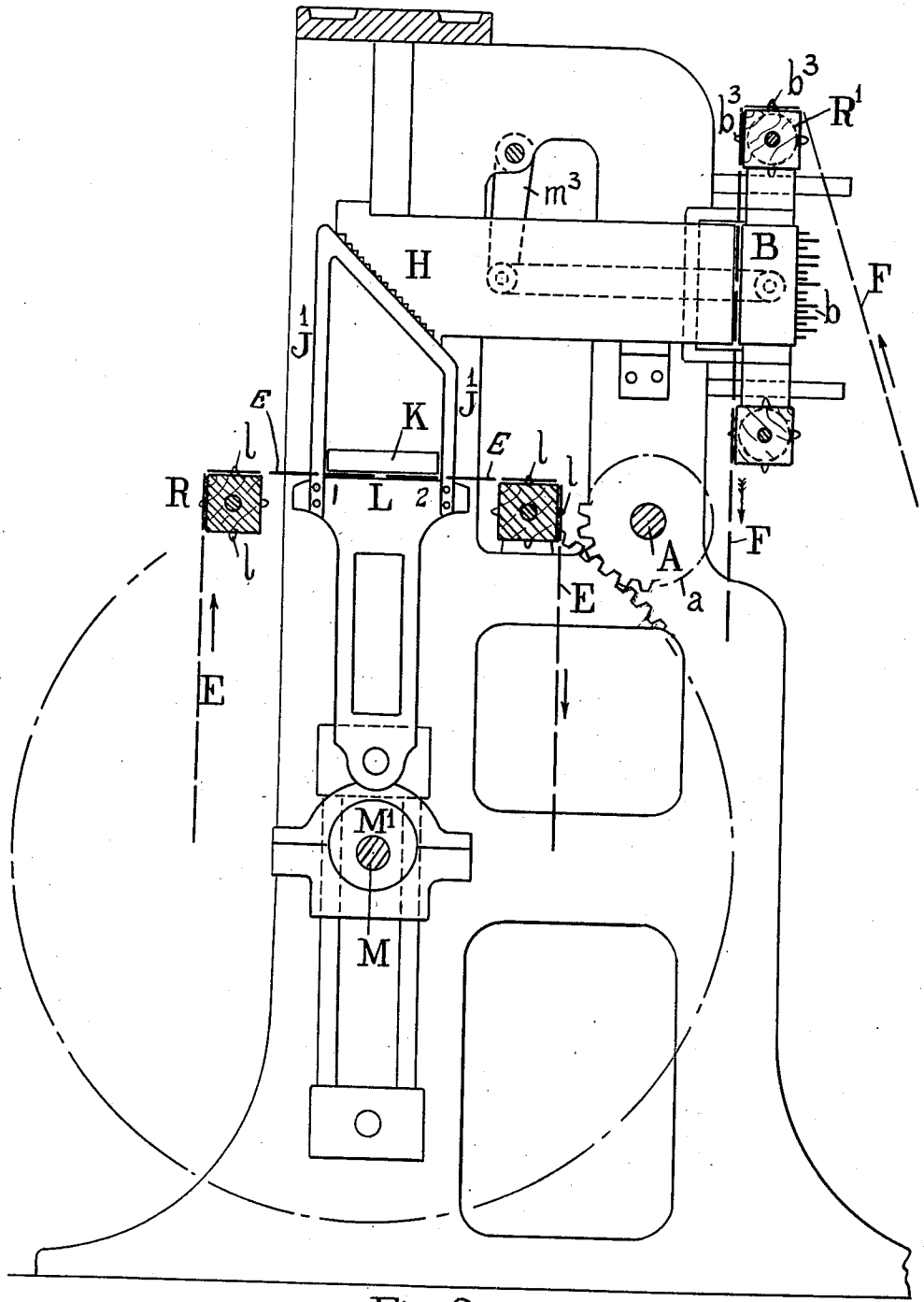


Fig.2.

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JACQUARD CARD AND VERDOL PAPER ROLL REPEATER CUTTING MACHINE

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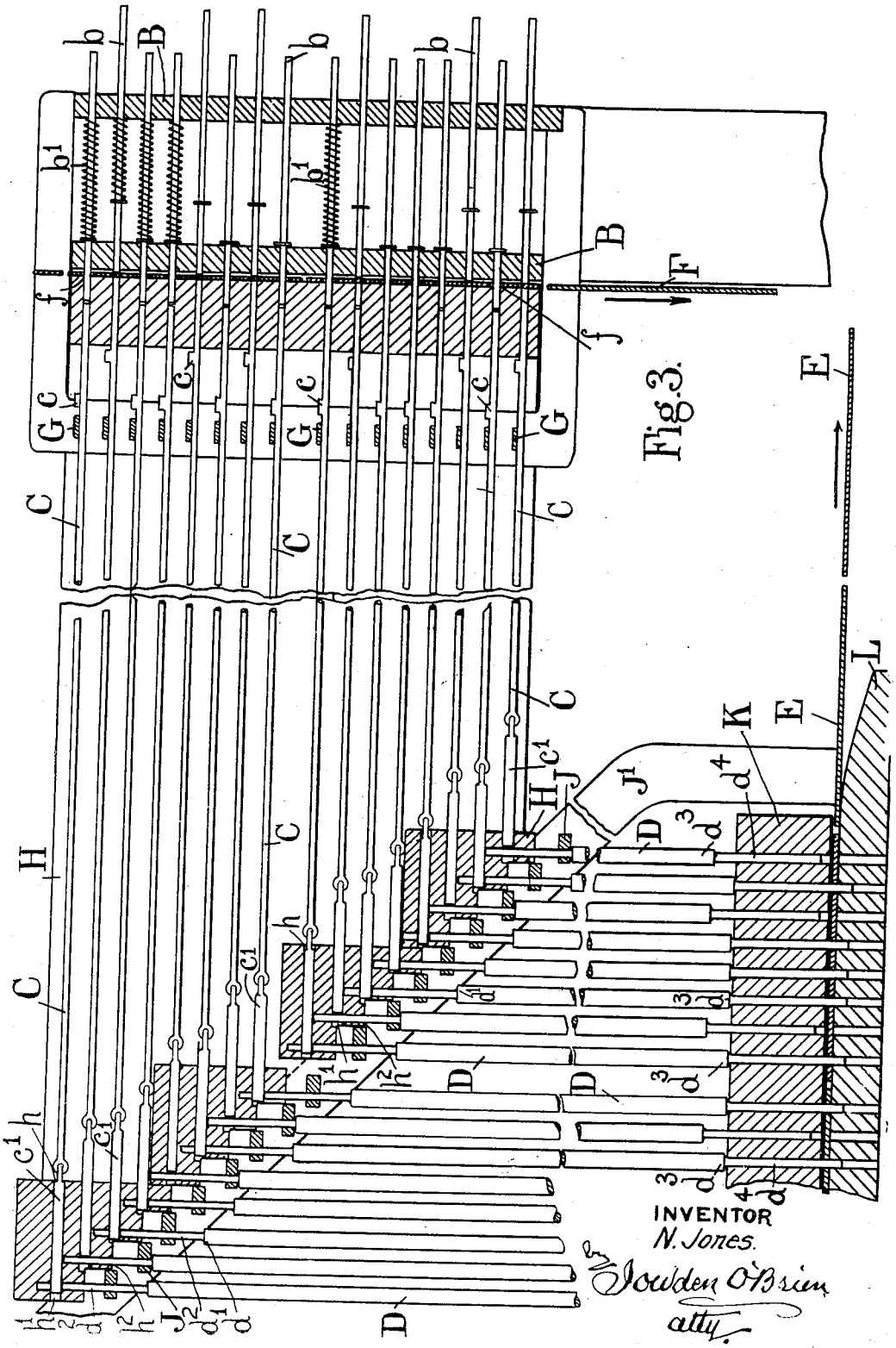


Fig. 3.

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JACQUARD CARD AND VERDOL PAPER ROLL REPEATER CUTTING MACHINE

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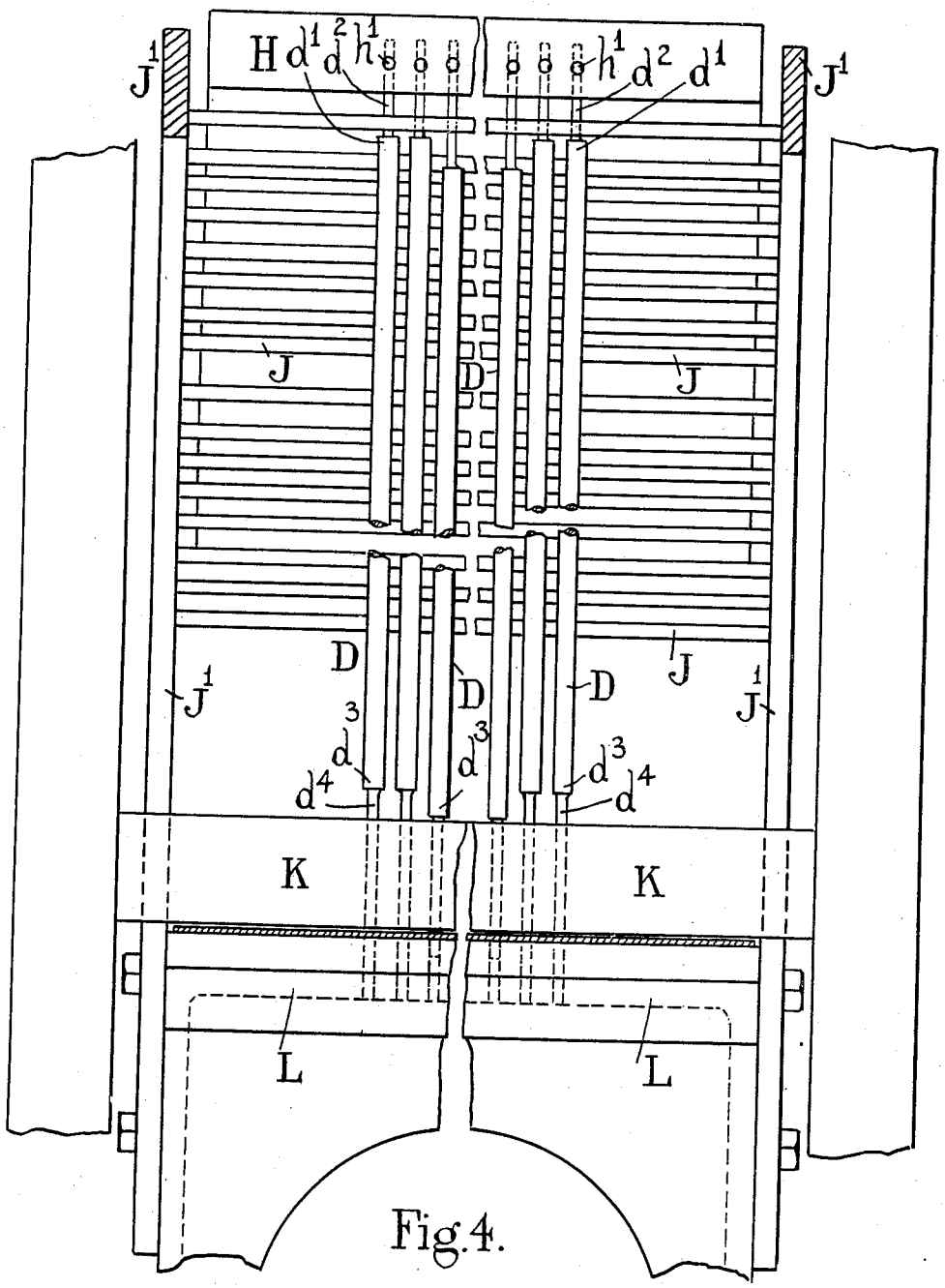


Fig.4.

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JACQUARD CARD AND VERDOL PAPER ROLL REPEATER CUTTING MACHINE

Filed July 26, 1938 5 Sheets-Sheet 5

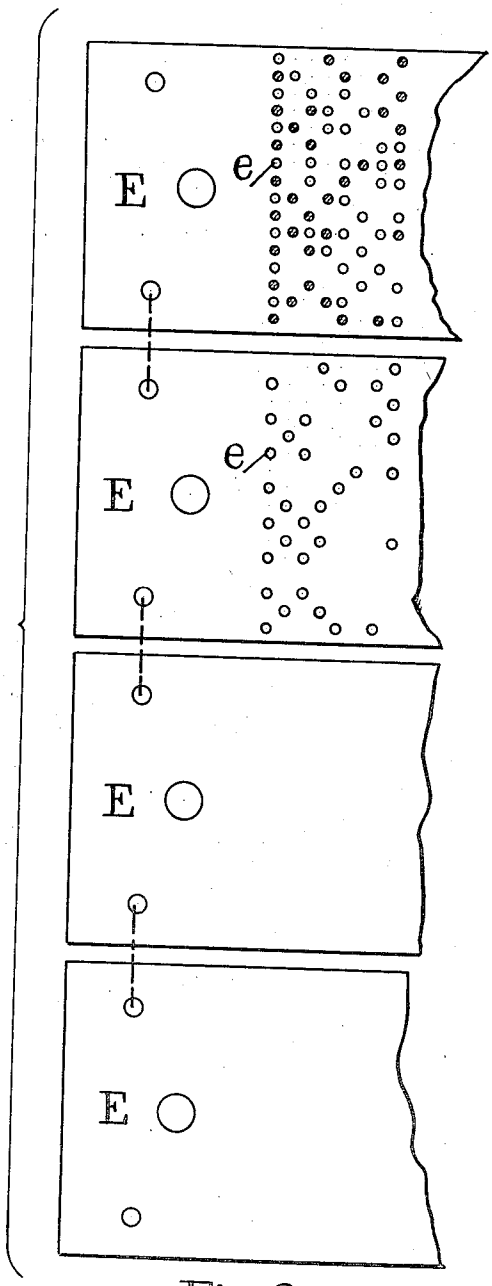


Fig.6.

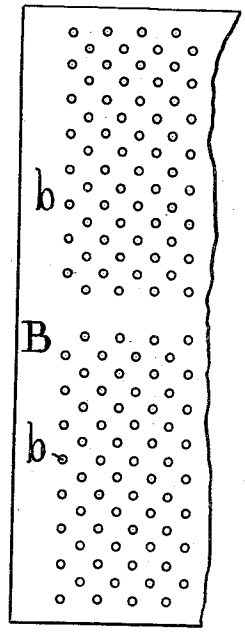


Fig.5.

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Patented Nov. 14, 1939 2,180,058

UNITED STATES PATENT OFFICE

2,180,058

JACQUARD CARD AND VERDOL PAPER ROLL REPEATER CUTTING MACHINE

Norman Jones, Manchester, England

Application July 26, 1938, Serial No. 221,447
In Great Britain July 30, 1937

7 Claims. (Cl. 164—114)

This invention relates to improvements in jacquard card or verdol paper roll repeater punching machines.

According to the invention, the original cards or verdol paper are located between the ends of the repeater needles controlling the punches and a spring needle box the needles of which are in alignment with the repeater needles, the space between the ends of the two sets of needles being sufficient to allow one or more of the original set of cards or paper to pass between them, the original cards or paper being registered on to the repeater needles by the movement of the spring needle box in a direction parallel with the needles; thus where there are holes in the original cards or paper the spring needles will pass through and operate the corresponding repeater needle to push them over the ends or heads of the repeat card or paper cutting punches and prevent the latter rising with the repeat card or paper, so that corresponding holes will be punched therein. If on the other hand there are no holes in the original card or paper the spring needles will be pushed back into the box by the card or paper and will not operate on the corresponding repeater needles and the latter will not be pushed over the ends of the punches, which therefore will not be held but will lift with the repeat card or paper without punching holes therein.

All the repeater needles are returned to their normal position away from the heads of the punches after each stroke of the spring needle box by suitably placed plates or bars operating on projections on the needles and working in conjunction with the needle box.

A repeater card cutting machine having the features of this invention is particularly applicable for use in cutting jacquard cards which are of ordinary size but have a larger number of holes than in standard cards as it allows the repeater needles and the spring box to be made twice the width of a single card and the punching plate and punches to be made twice the width of a single card whereby two cards can be registered at one operation of the needle box.

The invention will be described with reference to the accompanying drawings in which it is shown applied to a jacquard repeater card punching machine arranged to cut two cards simultaneously at each movement of the machine.

In these drawings

Fig. 1 is a side elevation of the machine.

Fig. 2 is a transverse section thereof.

Fig. 3 is a section on a larger scale of the spring needle box, repeater needles, punching plate and punches.

Fig. 4 is a front elevation of Fig. 3.

Fig. 5 is a part rear elevation of the needle box.

Fig. 6 is a view of four consecutive cards illustrating how the holes therein are punched.

The original cards F are fed downwards between a spring needle box B and the ends of the repeater needles C which control the punches D for punching the holes in the repeater cards E.

The needle box B contains an equal number of needles *b* to the repeater needles C, the needles *b* being in alignment with the repeater needles C and each needle *b* being controlled by a separate spring b^1. The original cards F are fed downwards between the spring needle box B and the ends of the repeater needles C, the cards being fed forward one card for each inward and outward movement of the needle box. When a card F is in position and the needle box B is moved towards the ends of the repeater needles C where there is a hole *f* in the card a spring needle *b* will pass through and operate a corresponding repeater needle C to push it forward but where there is no hole the corresponding spring needle will be pushed back against the pressure of the spring b^1, by contact with the surface of the card F and the corresponding repeater needle C will not be operated. On the needle box B being moved away from the ends of the repeater needles C the needles *b* which have been pushed back owing to there being no corresponding holes in the card will be returned to their normal position by the springs b^1 with their front ends projecting from the front of the box.

Each repeater needle C is formed with a projection *c* and during the outward movement of the spring needle box B the projection *c* on each needle C which has been moved forward by a needle *b* is engaged by a bar G connected to the needle box and drawn back thereby to its normal position.

The ends of the repeater needles C which control the punches D are enlarged or strengthened, or as shown in Fig. 3 are attached to an enlarged bar or head C^1 of sufficient size to form a locking device of the necessary strength to resist the upward pressure of the punches D and hold them against the punching pressure of the repeater card E.

The enlarged end or head c^1 of each of the repeater needles C slides in a hole *h* formed in a metal head H arranged at right angles to the

direction of travel of the punches D and when a head C^1 is in position for locking the corresponding punch D it is supported at both sides of the latter by entering an extension h^1 of the hole h beyond the punch D.

As previously stated the holes h in which the heads or enlarged ends c^1 of the repeater needles C slide are formed in a metal head H and this head is stepped down to accommodate the different tiers of horizontal rows of repeater needles C. Each step of this head is formed with vertical holes h^2 in which the upper ends d^2 of the punches D slide. These vertical holes h^2 cross the holes for the ends of the needles C to permit of the latter moving into position above the punches to lock them when the needles are operated. The punches D are made in varying lengths to fit the steps in the head H and each is provided with a shoulder d^1 which is engaged by a bar J during the downward movement of the repeater card E after cutting to ensure that all the punches return to their normal positions. The lower ends of the punches D pass through holes in a fixed guide plate K and are formed with shoulders d^3 which by engagement with the plate K limit the downward movement of the punches D.

The repeater cards E are carried by a punching plate L which raises the cards to bring them into engagement with the punches D and the bars J are preferably carried by frames J^1 which are affixed to the punching plate L so that the bars J move in unison therewith.

The cards E are moved one at a time over the punching plate L which is raised each time the needle box B has been moved inwards to cause the operation of certain of the repeater needles C to lock the corresponding punches D. These punches are prevented from rising and punching holes in the car E below them whereby the holes punching in the cards E correspond with those in the original card F.

To obtain additional strength in the locking ends c^1 of the needles C and in the punches D particularly when punching cards E of the kind having double the number of customary holes e therein the spring needle box B and the stepped head H are made twice the width for a single original card F and two original cards F and the repeater cards E are registered at the same time. The upper half of the spring needle box B, carries needles b to register only with alternate holes f in a card F in which every hole would be cut and the lower half of the box carries needles b to register only with the other holes f in the card.

The punches D also occupy an area equal to two repeater cards E and two of the latter are thus cut simultaneously at each operation of the machine, one card being cut with one portion of the holes e at station 1 and the other which has previously been cut with one portion of the holes at station 1 being completely cut with the second portion at station 2. The cards at stations 1 and 2 then move one card forward, a new card being partially punched at station 1 and the partially punched card being completely punched at station 2, the same operation being continued step by step for the whole series of cards.

As the holes punch at the first operation at station 1 are staggered in pitch in relation to those punched at the second operation at station 2 twice the normal amount of room is obtained for the locking end c^1 of each repeater needle C one for each punch D. This enables the shanks d^3 of the punches D to be employed which are twice as large in diameter and therefore much stronger than those which would otherwise have to be employed for a given hole since only the punching end as shown in Fig. 3 need be the same diameter as the hole e and such portion of smaller diameter is supported by the guide plate K which will prevent it from bending. The first blank card punched is wasted due to incomplete punching, as it passes out of the range of the punches at station 1.

Thereafter the original cards F move forward the width of one card in the box B simultaneously with the movement of repeater card E from station 1 to station 2.

The upper half of the needle box B carries needles to register only with alternate holes in the card F and the lower half of the needle box B carries needles to register only with the remaining holes in the card.

Although the lengths of the punches D vary according to their position in the stepped metal head H of the machine the length of the narrower punching end d^4 is the same for each punch and the shoulder between the cutting end d^4 and the shank d^3 of greater diameter forms the necessary stop to engage the guide plate K and enable the punches to take the strain of clearing the card after the punching operation.

The alignment of the cards on the repeater registering device and on the cutting plate respectively is preferably made by tapered pegs or projections b^3 or l co-operating with registration holes in the cards.

In cases where the pitch of the holes in the card is too fine to allow the horizontal drilling of the stepped head these steps can be elongated to give the necessary room for drilling and this greater pitch obtained by employing spring or bent repeater needles which will allow a certain amount of play between the two ends.

It is necessary that the movement of the spring box B, the movement of the cutting plate L, the feed of the original cards F and the feed of the repeater cards E should all be synchronised and for this purpose the movement of all the parts is obtained from a common shaft A driven in any suitable manner. The shaft A carries a pinion a which drives a wheel m on a second shaft M. The shaft M carries an eccentric M^1 and a cam M^2 the first of which M^1 controls the up and down movement of the cutting plate L and with it the bars J whilst the other M^2 operates through a link m^1 affixed to pivoted lever m^2, a bellcrank lever m^3 and arm m^4 to give the to and fro movement of the spring needle box B. A pin n eccentrically mounted on a disc M^3 also affixed on the shaft M gives an intermittent movement to a star wheel N affixed on a pin or shaft N^1 carrying a sprocket wheel N^2 around which passes a chain P. This chain P passes over a sprocket wheel r mounted on the spindle of the cylinder R which feeds the repeater cards E over the cutting plate L and also a sprocket wheel r^1 on the spindle R^1 which delivers the original cards F between the spring needle box B and the ends of the repeater needles C. The movements of all the different parts of the machine are thus suitably synchronised.

What I claim as my invention and desire to protect by Letters Patent is:

1. A jacquard card or verdol paper roll repeater punching machine, comprising the combination with a plurality of repeater needles and a corresponding number of punches operated

thereby, of a spring needle box, a plurality of needles within said box, corresponding in number to and in alignment with the repeater needles, the normal space between the ends of the two sets of needles, being sufficient to allow the original set of cards or paper to pass between them, and means for moving the spring needle box to register the cards or paper on to the repeater needles, in a direction parallel with the needles, whereby where there are holes in the original cards or paper, the spring needles will pass through and operate the corresponding repeater needles, to push them over the ends of the repeat card or paper punches, and prevent the latter rising with the repeat card or paper, so that the corresponding holes will be punched therein, but where there are no holes in the original card or paper, the spring needles will be pushed back into the box by the card or paper, and will not operate on the corresponding repeater needles, and the latter will not be pushed over the ends of the punches, which therefore will not be held but will lift with the repeat card or paper, without punching holes therein, the repeater needles, being of twice the width of an original card, whereby two original cards are registered at one operation of the needle box, the upper half of the needle box carrying needles to register only with alternate holes in a card, in which every hole would be punched, and the lower half of the needle box carrying needles to register only with the other holes in the card.

2. A jacquard card or verdol paper roll repeater punching machine, comprising the combination with a plurality of repeater needles, and a corresponding number of punches operated thereby, of a spring needle box, a plurality of needles within said box, corresponding in number to and in alignment with the repeater needles, the normal space between the ends of the two sets of needles being sufficient to allow the original set of cards or paper to pass between them, means for moving the spring needle box, to register the cards or paper on to the repeater needles, in a direction parallel with the needles, whereby where there are holes in the original cards or paper, the spring needles will pass through and operate the corresponding repeater needles, to push them over the ends of the repeat card or paper punches, and prevent the latter rising with the repeat card or paper, so that corresponding holes will be cut therein, but where there are no holes in the original card or paper, the spring needles will be pushed back into the box by the card or paper, and will not operate on the corresponding repeater needles, and the latter will not be pushed over the ends of the punches which therefore will not be held but will lift with the repeat card or paper without cutting holes therein, a stepped head, to accommodate different tiers of the horizontal rows of repeater needles, each step being formed with vertical holes in which the upper ends of the punches slide, these vertical holes crossing the horizontal holes for the ends of the needles, to permit the latter moving into position above the punches, to lock the latter when the needles are operated, and enlarged heads on the ends of the repeater needles, to form a locking device of the necessary strength to withstand the upward pressure of the punches, and hold them against the cutting pressure of the card or paper.

3. A jacquard card or verdol paper roll repeater punching machine, comprising the combination with a plurality of repeater needles, and a corresponding number of punches operated thereby, of a spring needle box, a plurality of needles within said box, corresponding in number to and in alignment with the repeater needles, the normal space between the ends of the two sets of needles being sufficient to allow the original set of cards or paper to pass between them, means for moving the spring needle box, to register the cards or paper on to the repeater needles, in a direction parallel with the needles, whereby where there are holes in the original cards or paper the spring needles will pass through and operate the corresponding repeater needles, to push them over the ends of the repeat card or paper punches, and prevent the latter rising with the repeat card or paper, so that corresponding holes will be cut therein, but where there are no holes in the original card or paper, the spring needles will be pushed back into the box by the card or paper, and will not operate on the corresponding repeater needles, and the latter will not be pushed over the ends of the punches, which therefore will not be held but will lift with the repeat card or paper, without punching holes therein, a stepped head to accommodate different tiers of the horizontal rows of repeater needles, each step being formed with vertical holes in which the upper ends of the punches slide, these vertical holes crossing the horizontal holes for the ends of the needles, to permit the latter moving into position above the punches to lock the latter when the needles are operated and means for returning the punches to their positions after having been lifted by a repeat card or paper.

4. A jacquard card or verdol paper roll repeater punching machine, comprising the combination with a plurality of repeater needles, and a corresponding number of cutting punches operated thereby, of a spring needle box, a plurality of needles within said box, corresponding in number to and in alignment with the repeater needles, the normal space between the ends of the two sets of needles, being sufficient to allow the original set of cards or paper to pass between them, means for moving the spring needle box, to register the cards or paper on to the repeater needles, in a direction parallel with the needles, whereby where there are holes in the original cards or paper the spring needles will pass through and operate the corresponding repeater needles, to push them over the ends of the repeat card or paper punches and prevent the latter rising with the repeat card or paper, so that corresponding holes will be cut therein, but where there are no holes in the original card or paper, the spring needles will be pushed back into the box by the card or paper, and will not operate on the corresponding repeater needles, and the latter will not be pushed over the ends of the punches, which therefore will not be held but will lift with the repeat card or paper, without punching holes therein, a stepped head to accommodate different tiers of the horizontal rows of repeater needles, each step being formed with vertical holes in which the upper ends of the punches slide, these vertical holes crossing the horizontal holes for the ends of the needles, to permit the latter moving into position above the punches to lock the latter when the needles are operated.

5. A jacquard card or verdol paper roll repeater punching machine, comprising the combination with a plurality of repeater needles, and a corresponding number of punches operated

thereby, of a spring needle box, a plurality of needles within said box, corresponding in number to and in alignment with the repeater needles, the normal space between the ends of the two sets of needles being sufficient to allow the original set of cards or paper to pass between them, means for moving the spring needle box to register the cards or paper on to the repeater needles, in a direction parallel with the needles, whereby where there are holes in the original cards or paper, the spring needles will pass through and operate the corresponding repeater needles, to push them over the ends of the repeat card or paper punches, and prevent the latter rising with the repeat card or paper, so that corresponding holes will be punched therein, but where there are no holes in the original card or paper, the spring needles will be pushed back into the box by the card or paper, and will not operate on the corresponding repeater needles, and the latter will not be pushed over the ends of the punches, which therefore will not be held but will lift with the repeat card or paper, without cutting holes therein, and a stepped head to accommodate different tiers of the horizontal rows of repeater needles, each step being formed with vertical holes in which the upper ends of the punches slide, these vertical holes crossing the horizontal holes for the ends of the needles, to permit the latter moving into position above the punches to lock the latter when the needles are operated, the spring needle box, the repeater needles and the stepped head being of twice the width of an original card, whereby two original cards are registered at one operation of the needle box, the upper half of the needle box carrying needles to register only with alternate holes in a card, in which every hole would be punched and the lower half of the needle box carrying needles to register only with the other holes in the card.

6. A jacquard card or verdol paper roll repeater punching machine, comprising the combination with a plurality of repeater needles, and a corresponding number of cutting punches operated thereby, of a spring needle box, a plurality of needles within said box, corresponding in number to and in alignment with the repeater needles, the normal space between the ends of the two sets of needles, being sufficient to allow the original set of cards or paper to pass between them, means for moving the spring needle box to register the cards or paper on to the repeater needles, whereby where there are holes in the original cards or paper, the spring needles will pass through and operate the corresponding repeater needles, to push them over the ends of the repeat card or paper punches, and prevent the latter rising with the repeat card or paper, so that corresponding holes will be punched therein, but where there are no holes in the original card or paper, the spring needles will be pushed back into the box by the card or paper, and will not operate on the corresponding repeater needles, and the latter will not be pushed over the ends of the punches, which therefore will not be held but will lift with the repeat card or paper without cutting holes therein, a stepped head, to accommodate different tiers of the horizontal rows of repeater needles, each step being formed with vertical holes in which the upper ends of the punches slide, these vertical holes crossing the horizontal holes for the ends of the needles, to permit the latter moving into position above the punches, to lock the latter when the needles are operated, the spring needle box, the repeater needles and the stepped head being of twice the width of an original card, whereby two original cards are registered at one operation of the needle box, the upper half of the needle box carrying needles to register only with alternate holes in a card in which every hole would be punched and the lower half of the needle box carrying needles to register only with the other holes in the card, and the area of the cutting ends of the punches being twice that of a repeater card, and a cutting plate equal in width to two cards, whereby two cards are cut simultaneously at each operation of the plate, one card being punched with one portion of the holes, and the other, which has previously been punched with one portion of the holes corresponding to the previous original card being completely punched with the second portion thereof, the cards being then moved forward one card so that the next card is partially punched and the partially cut card completely punched.

7. A jacquard card or verdol paper roll repeater punching machine, as in claim 6, in which the shanks of the punches are twice the diameter of the punches.

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