No. 650,340. Patented May 22, 1900.

V. ROYLE & W. COCHRAN.

MACHINE FOR REPEATING PATTERN CARDS.

(Application filed Oct. 14, 1899.)

(No Model.) 4 Sheets—Sheet 1.

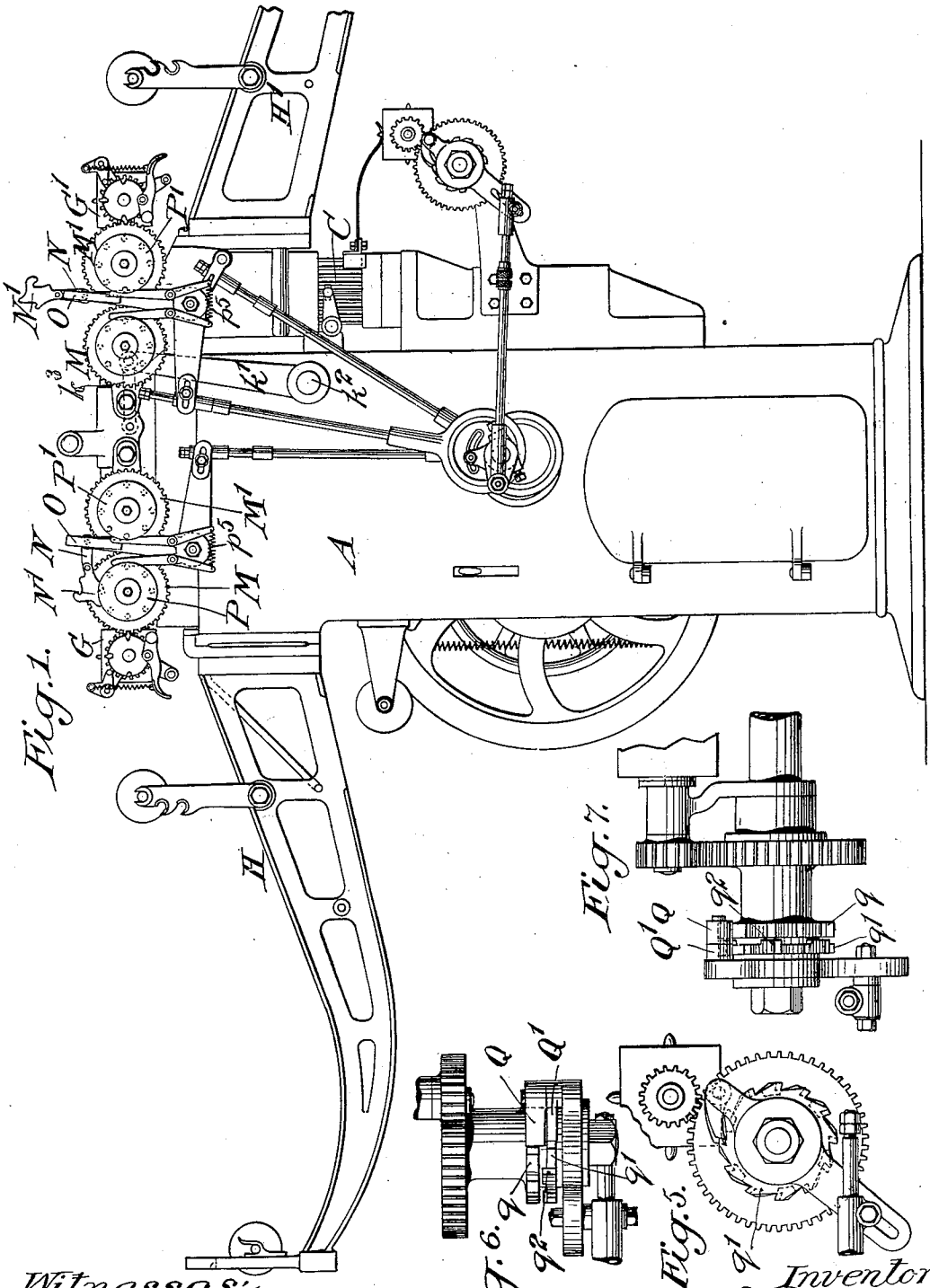


Fig. 1.

Fig. 7.

Fig. 6. Fig. 5.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 4 Sheets—Sheet 2.

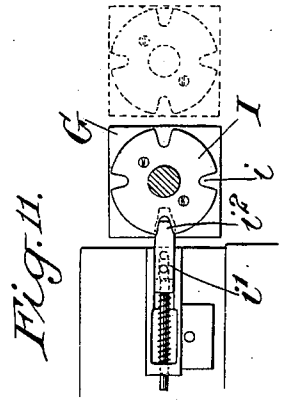


Fig. 11.

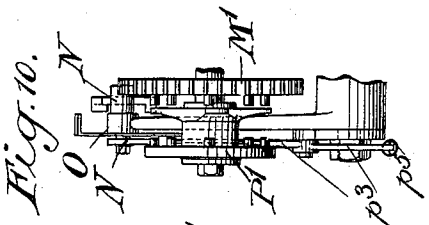


Fig. 10.

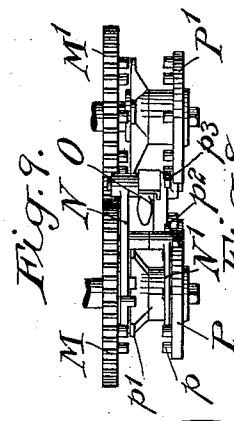


Fig. 9.

Fig. 8.

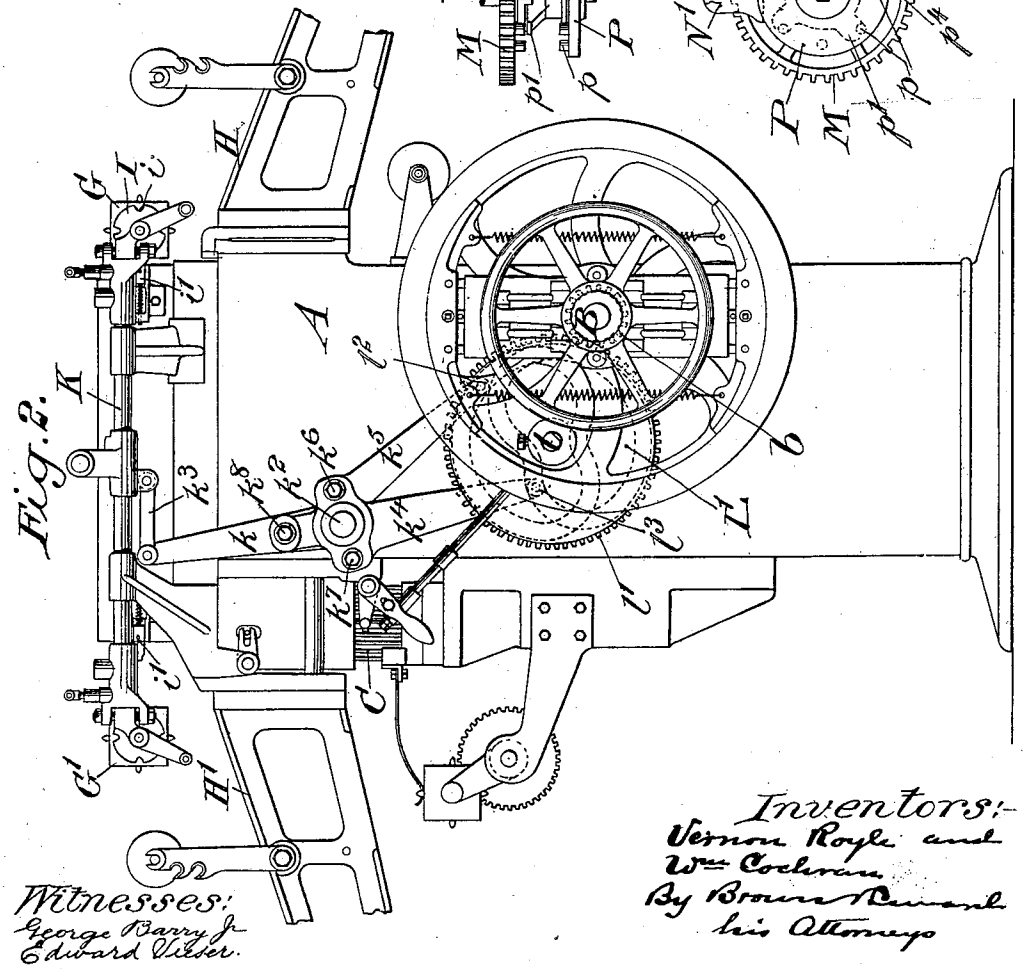


Fig. 2.

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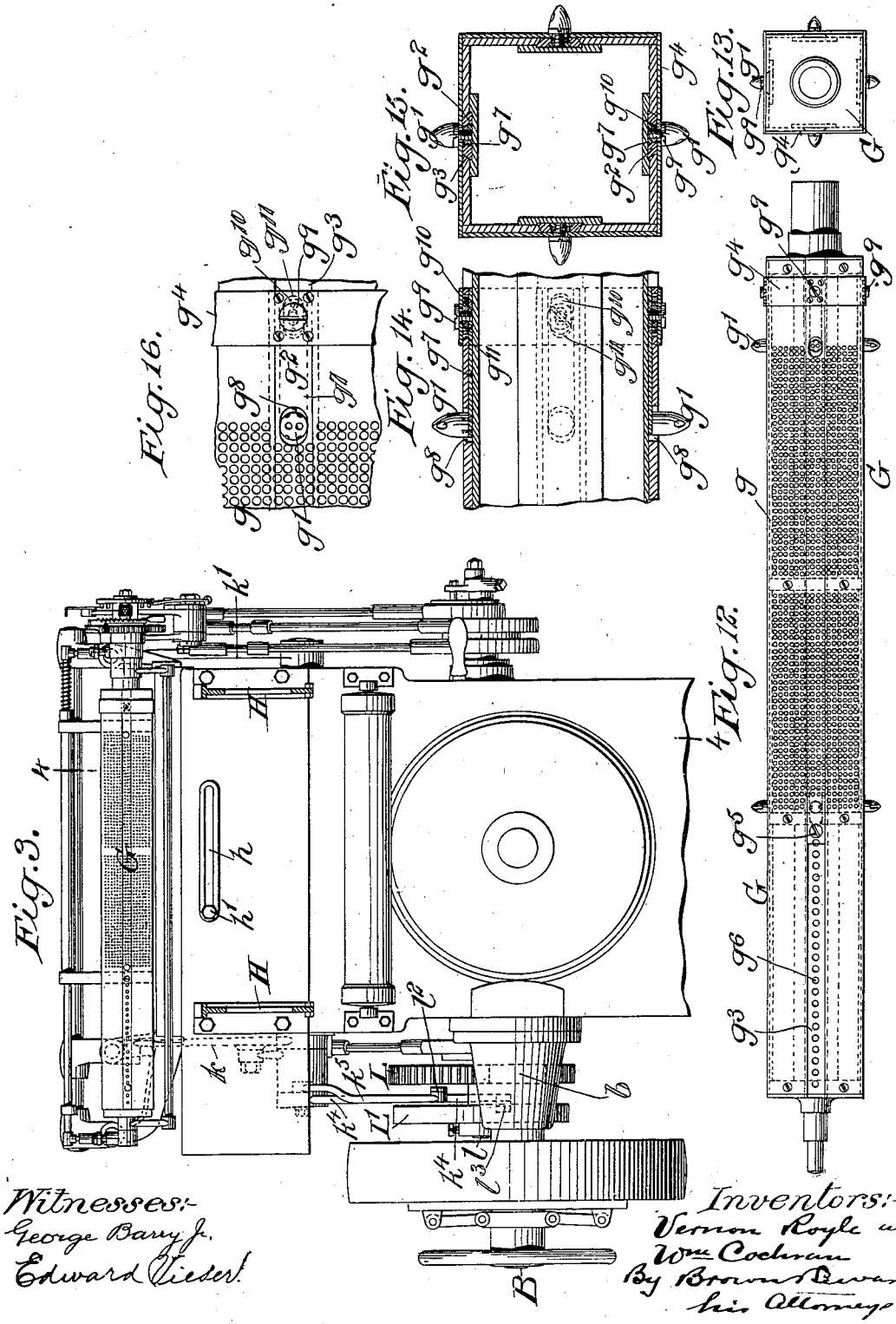
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(Application filed Oct. 14, 1899.)

(No Model.) 4 Sheets—Sheet 3.



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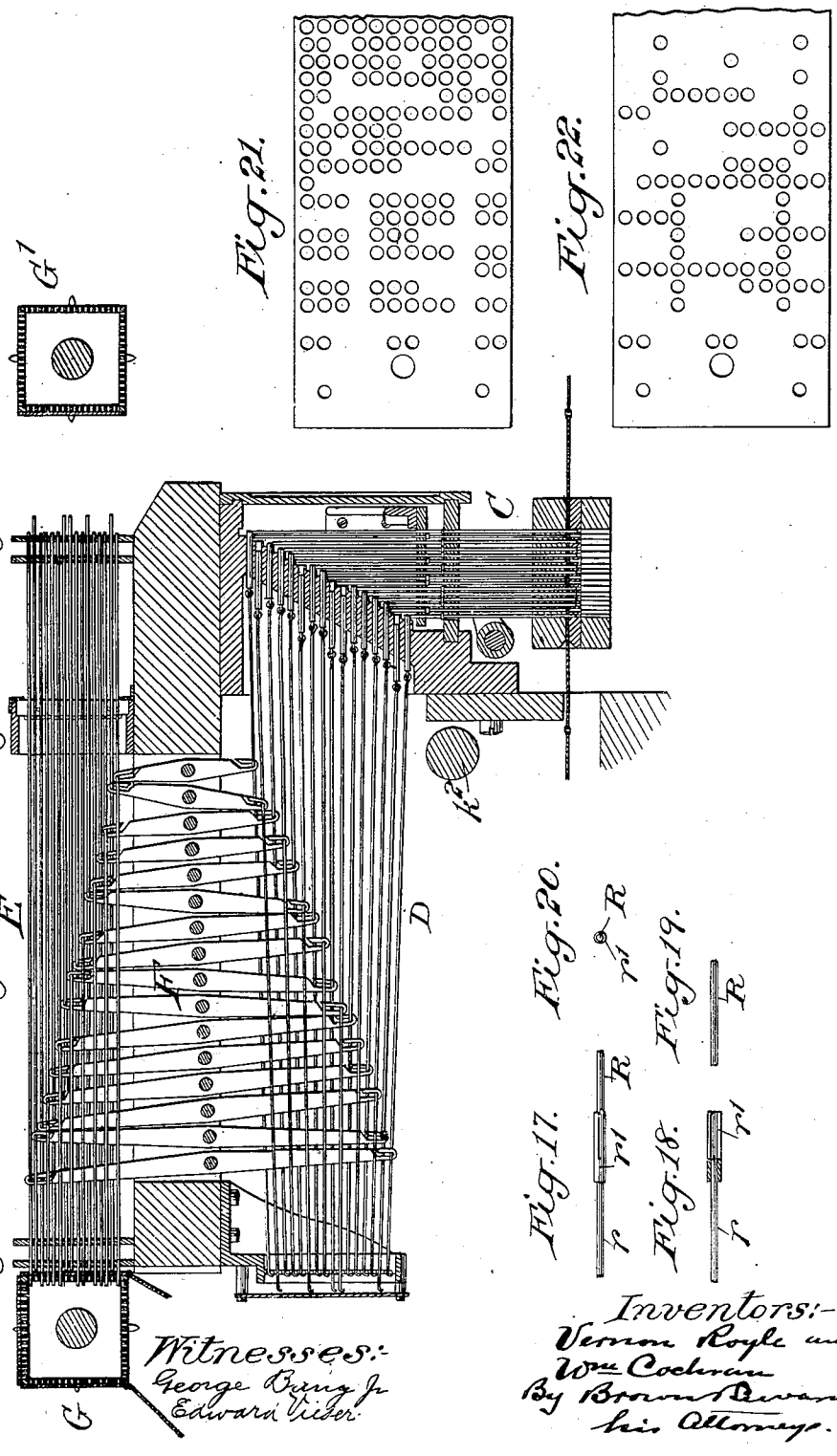
No. 650,340. Patented May 22, 1900.

V. ROYLE & W. COCHRAN.

MACHINE FOR REPEATING PATTERN CARDS.

(Application filed Oct. 14, 1899.)

(No Model.) 4 Sheets—Sheet 4.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

VERNON ROYLE AND WILLIAM COCHRAN, OF PATERSON, NEW JERSEY.

MACHINE FOR REPEATING PATTERN-CARDS.

SPECIFICATION forming part of Letters Patent No. 650,340, dated May 22, 1900.

Application filed October 14, 1899. Serial No. 733,572. (No model.)

To all whom it may concern:

Be it known that we, VERNON ROYLE and WILLIAM COCHRAN, citizens of the United States, and residents of Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Machines for Repeating Pattern-Cards, of which the following is a specification.

Our invention relates to a machine for repeating pattern-cards and is directed particularly to a structure which will admit of repeating the whole or a part of the pattern or the negative of the pattern at pleasure.

A practical embodiment of our invention is represented in the accompanying drawings, in which—

Figure 1 is a view of the machine in side elevation. Fig. 2 is a view of the same in opposite side elevation. Fig. 3 is a partial view in front elevation. Fig. 4 is an enlarged partial vertical section from front to rear in the plane of the line 4 4 of Fig. 3. Figs. 5, 6, and 7 represent enlarged detail views of the mechanism for feeding the chain of cards to be punched. Figs. 8, 9, and 10 represent enlarged detail views of the means for feeding the chain of pattern-cards in either of two opposite directions and at different rates of speed. Fig. 11 is an enlarged view in detail, showing the means for centering and retaining the pattern-cylinders accurately in position for action upon the selecting-needles. Fig. 12 is an enlarged view, in side elevation, of the pattern-cylinder constructed to present more or less of the pattern-card to the needles at pleasure. Fig. 13 is an end view of the same. Figs. 14, 15, and 16 are still further enlarged views of portions of the pattern-cylinder, illustrating more clearly its structure. Figs. 17, 18, 19, and 20 represent views in detail of the structure of the selecting-needles with their removable tips; and Figs. 21 and 22 represent parts of cards, the former representing what we are pleased to term the "positive" pattern and the latter what we are pleased to term the "negative" pattern.

The arrangement of the supporting-frame A, the drive-shaft B, and the means for applying power thereto, as well as the arrangement of the punches C, the punch-retaining key-rods D, the selecting-needles E, and the levers F for connecting the selecting-needles with the punch-retaining key-rods is quite similar to that shown and described in Patent No. 556,775, granted to V. Royle, March 24, 1896, and in Patent No. 304,864, granted to V. Royle and J. Royle, Jr., September 9, 1884, and a particular description of the same is omitted from the present case.

Our present invention comprises a card-race and a pattern-card cylinder which for purposes of explanation will be distingished from a pattern-card cylinder at the opposite end of the machine as a "positive-pattern-card" cylinder, the card-race and chain of the cards on the positive-pattern-card cylinder being made adjustable laterally of the machine in order to shift the pattern-cards one or more rows of holes laterally, so as to repeat more or less of the width of the pattern, as may be desired, the positive-pattern-card cylinder being of special construction to adapt it to this lateral adjustment.

Our invention further comprises a pattern-card cylinder which we term the "negative-pattern-card" cylinder, mounted at the opposite end of the machine from the positive-pattern-card cylinder and operated by a cylinder-carriage common to the two pattern-card cylinders, a pattern-card-cylinder feed mechanism, both direct and reverse, for each of the said pattern-card cylinders and actuated from the common drive-shaft, one or both of the feed mechanisms being of special construction to vary the intervals of feed, means for beginning the reciprocating movements of the pattern-cylinder carriage at different intervals with respect to the feed of the chain of pattern-cards to be punched, means for varying the intervals between the different steps of feed of the chain of cards to be punched, means for throwing out of action one or more of the selecting-needles at pleasure, and certain details of structure in connection with the above-stated features for insuring the practical operation of the parts in harmony.

The detailed explanation of the several parts will follow, as near as may be, the outline hereinabove set forth.

The positive-pattern-card cylinder is denoted as a whole by G. It is made longer than the length of a pattern-card—in the present instance sufficiently long to permit the shifting of the chain of pattern-cards laterally a distance equal to one-half the length of a pattern-card. That portion of it which the chain of pattern-cards normally occupy is made skeleton, being provided on each of

its four sides with a perforated plate g for permitting the free longitudinal movement of the selected needles through its wall. The pegs for engaging the peg-holes in the chain of pattern-cards to feed the chain forward at intervals are denoted by g' and are arranged in two sets for engaging the opposite ends of the pattern-card. The pegs g' are attached to dovetailed strips g^2, extending longitudinally of the cylinder and located at the middle of each side of the cylinder, the said dovetailed strips being adapted to slide longitudinally along the dovetailed grooves g^3, formed in the sides of the cylinder. The several dovetailed strips g^2 are arranged to be operated simultaneously by means of a band g^4, which encircles the cylinder and is fixed to each of the said dovetailed strips. The said strips may be secured in their adjustment longitudinally along the cylinders by means of screws g^5, adapted to engage one of a series of perforations g^6, formed in the bottom of the groove g^3, in which the dovetailed strip slides. In addition to the simultaneous adjustment of the two sets of pegs longitudinally along the cylinder the individual pegs g' have a limited adjustment independent of the strip to which they are secured by means of thin strips g^7, seated in shallow recesses in the under side of the dovetailed strips g^2 and carrying at one end the peg g', (see Fig. 14,) which extends up through an elongated opening g^8 in the dovetailed strip, the thin peg-carrying strip g^7 being itself secured to the band g^4 by a set-screw g^9, which passes through the band g^4 and through an intermediate spacing-block g^{10}, fixed to the peg-carrying strip g^7 and having a limited longitudinal movement in an opening g^{11} in the face of the dovetailed strip g^2. In like manner the pegs g' at the opposite end of the card have a limited adjustment toward and away from the center, the peg itself in this instance being screwed directly into the strip in the bottom of the dovetailed strip and clamping it and the peg tightly to the dovetailed strip at the desired adjustment.

The above-described structure of the positive-pattern-card cylinder admits of adjusting the sets of pegs with great accuracy to suit the exact distance of the peg-holes in the opposite ends of the cards and at the same time admits of adjusting the sets of pegs simultaneously along the cylinder, so as to cause the chain of pattern-cards to omit one or more needles at the right up to one-half the length of a pattern-card. It is to be understood, further, that this limitation is not absolute; but it is at the present time all that is found necessary, as it may in the future be found desirable to shift the chain of pattern-cards a greater or lesser distance than that herein provided for.

To correspond with the shifting of the chain of pattern-cards along the positive-pattern-card cylinder G, the card-race H itself, of well-known or approved form, is made adjustable laterally of the machine by means of an elongated slot h, (see Fig. 3,) formed in its end plate adjacent to the machine and provided with a bolt or set-screw h' for holding it firmly to the machine in its lateral adjustment.

The negative-pattern-card cylinder is denoted by G' and is in its structure and arrangement quite similar to that shown and described in connection with the Letters Patent hereinabove referred to. It is mounted on the same carriage which carries the positive-pattern-card cylinder G, at the opposite end thereof, and there is provided at the rear end of the machine, to work in conjunction with the cylinder G', a card-race H' of well-known and approved form. This card-race H' may be removed from the machine when the negative cylinder G' is not used for controlling the punches; but the cylinders G and G' have a double function, each being used when the other is carrying the chain of pattern-cards for controlling the punching, as a means for throwing the selecting-needles all back into normal position. This is accomplished by simply hanging a blank card on the face of that cylinder not carrying the pattern-cards which is adjacent to the needles, so that when the carriage moves in a direction to carry the cylinder which is carrying the chain of pattern-cards away from the needles the opposite cylinder will bring this blank card into engagement with the bank of needles and set them all in position to be acted upon by the cylinder which is for the time being employed to carry the pattern-cards. Needle-boards e e' are provided, one at each of the opposite ends of the bank of selecting-needles.

We have shown in detail in Fig. 11 means for centering and holding the pattern-card cylinder as it approaches the needles to operate upon them for the purpose of keying certain of the punches, the said centering and holding mechanism consisting of a disk I, fixed to rotate with the pattern-card cylinder and provided with V-shaped notches i in its periphery, one notch for each face of the cylinder, and a spring-actuated plunger i', fixed on the frame of the machine and provided with a tapered nose i^2, adapted to enter the V-shaped notch i which faces it, and by its engagement with the one or the other of the walls of the notch giving the cylinder that slight rotary motion (in case it is not in the exact position to engage the needles) to put it into the exact position required.

The tension device for regulating the movement of the selecting-needles is indicated at J and is of the same type as that shown and described in Letters Patent No. 556,775, hereinabove referred to.

The carriage K for supporting and reciprocating the cylinders G G' is extended in width to accommodate the extended positive-pattern-card cylinder G and is also provided at its opposite end with means for supporting

the negative-pattern-card cylinder G′. With these exceptions it is constructed and mounted in a manner quite similar to that shown and described in the patent before referred to, and a detailed description is omitted.

The lever arm or, as in the present instance, arms k k' for reciprocating the carriage are fixed on a rock-shaft k^2, extending transversely through the supporting-frame of the machine, and are connected with the carriage by links k^3. From one end of the shaft k^2 two levers k^4 k^5 extend downwardly to a point between a pair of operating cam-wheels L L′, mounted on a shaft l, extending transversely across the supporting-frame and driven from the drive-shaft B by means of gear l on the cam-wheel L, arranged to intermesh with a pinion on the drive-shaft B, (indicated at b, Figs. 2 and 3.) The cam-wheels L L′ are provided with cam-grooves on their faces, (indicated in dotted lines in Fig. 2,) one of them to engage a laterally-extended roller l^2 on the arm k^5 and the other a laterally-extended roller l^3 on the arm k^4. The cam-wheels L and L′ are fastened to the rock-shaft l by a set-screw or other well-known or approved means which will permit them to be shifted along the shaft into and out of engagement with the one or the other of the arms k^4 k^5, as may be desired, for the purpose of starting the reciprocating movement of the carriage in the one or the other direction from the central position of its stroke, as may be desired. For example, the cam-wheels L L′ being simultaneously rotated in the same direction, when the cam L is engaged with the lever k^5 it will start the reciprocating movement of the carriage in one direction from the central position of its movement, and when the cam-wheel L′, with a similar cam-groove on its face, is engaged with the lever k^4 and the cam-wheel L thrown out of engagement with the lever k^5 it will start the reciprocating movement of the carriage in the opposite direction from the central position of its movement, and this will have the effect of changing the interval between the presentation of successive cards on the pattern-card cylinder with respect to the feed of the chain of cards to be punched. The levers k^4 k^5 are made adjustable with respect to each other by bolts k^6 k^7, which extend through one of the levers and through elongated curved sockets in the opposite lever, and the levers k^4 k^5 are made simultaneously adjustable with respect to the connecting-arm k by means of a bolt k^8, which extends through the extended head of the lever k^5 and through an elongated curved socket in the arm k.

There are two sets of mechanisms for rotating the pattern-card cylinders, one set for each cylinder. These mechanisms are substantial duplicates of one another and are both carried by the carriage K and operated by eccentrics on the shaft l in a manner quite similar to that shown and described in connection with the former patent hereinabove referred to. They have, however, the following important modification, as follows: The pawl for operating the one or the other of the intermeshing gear-wheels M M′, through which motion is communicated to the pattern-card cylinders to rotate them forwardly or backwardly, has an auxiliary pawl carried by it, which may be thrown into and out of action to cause the main pawl to vary the intervals between successive movements of the pattern-card cylinder. The main pawl is denoted by N and is pivoted to the rocking lever O to be swung into engagement with the one or the other of the gear-wheels M M′, as may be required. The pawl N has attached at its side the auxiliary pawl N′, (see Figs. 8, 9, and 10,) which may be thrown down into position (see Fig. 8) to engage lateral teeth on a disk P, mounted concentric with the gear-wheel M, or may be thrown back out of position to engage the lateral teeth p on said wheel. The disk P has fixed to rotate therewith a series of guard-fingers p'—in the present instance only half the number of guard-fingers that there are teeth on the disk P and on the gear-wheel M. The teeth p on the disk P correspond in the present instance to the teeth on the wheel M, with which the main pawl N engages. The guard-fingers p' are so arranged that when they come opposite a tooth on the gear-wheel M they will hold the main pawl N out of engagement with that tooth, so that it will work idly and will not operate the pattern-cylinder at that stroke. The result is that when the auxiliary pawl N′ is thrown in position to rotate the disk P, as shown in Fig. 8, it will at every alternate stroke rotate one of the guard-fingers p' opposite a tooth on the gear-wheel M and cause the pawl N to skip that tooth, preventing the rotation of the pattern-cylinder, and thus causing the pattern-card on the cylinder to determine the operation of the same set of punches for two successive steps of feed, repeating the pattern to that extent. When the pawl N, with its auxiliary N′, is thrown over into engagement with the gear-wheel M′, it will in like manner delay the operation of the pattern-card cylinder in its backward movement during one or more steps of feed, according to the number of guard-fingers, with relation to the number of teeth with which the pawl engages. On the other hand, when the auxiliary portion N′ is thrown back out of engagement with the teeth on the disk P, the pawl N will operate the gear-wheel M or the gear-wheel M′ at each step or stroke. A similar arrangement of pawls is shown in connection with the mechanism for operating each of the pattern-cylinders; but it may be utilized in connection with one set or both, as may be desired. Tension is conveniently applied to the disks P P′, the one in connection with the gear-wheel M and the other in connection with the gear-wheel M′, by means of a pair of pivoted arms p^2 p^3, having slight recesses p^4 in their opposite faces for partially receiving the teeth on the disks and having

their opposite arms connected by a spring p^5, by means of which the arms are constantly pressed in a direction toward the disks P P′ to hold them in the position in which they may be temporarily placed by the action of the pawl N′. This serves to prevent the guard-fingers from unintentional working into position to interfere with the constant action of the main pawl N when the auxiliary pawl is thrown out of action and also insures the holding of the guard-fingers p' in the proper relation to the teeth on the gear-wheel to cause the main pawl to ride over the tooth without engaging it whenever it is desired to utilize this action. The mechanism for feeding the chain of cards to be punched is also provided with an auxiliary pawl, which operates, in conjunction with the main pawl, to produce a result quite similar to that produced by the pawls hereinabove described in connection with the mechanism for rotating the pattern-card cylinders; but in this instance the main pawl Q (see Figs. 5, 6, and 7) is made wider than the width of a ratchet-tooth q on the ratchet-wheel which actuates the feed, and an auxiliary pawl Q′ is pivoted concentric with the main pawl Q and operates a ratchet-disk q', mounted concentric with the ratchet-wheel which actuates the feed and free to rotate independently of the said ratchet-wheel, the said ratchet-disk q' being provided at intervals with laterally-projected teeth q^2, in the present instance located opposite every alternate tooth on the ratchet-disk and projecting into the path of the main pawl Q, so that when one of the extended teeth q^2 of the ratchet-disk comes opposite one of the teeth on the ratchet-wheel it will prevent the main pawl Q from engaging the ratchet-tooth, and hence the feed will be delayed until the succeeding stroke, when the disk q' will have been moved one step forward, thereby leaving the ratchet-tooth q free to be engaged by the main pawl Q.

By means of the changing of the intervals of feed of the chain of cards to be punched and also the intervals of feed of the pattern-cards both on the positive cylinder and upon the negative cylinder a great variety of variations of the original pattern may be produced. This variety may be still further augmented by the changing of the chain of pattern-cards laterally on the positive-pattern-card cylinder and by the change in direction of the initial movement of the carriage.

The diagrams Figs. 21 and 22 show portions of a positive and negative card, the one represented in Fig. 21 being punched by the punches under the control of the chain of pattern-cards on the positive-pattern-card cylinder G and the one represented in Fig. 22 being punched by the punches under the control of the same pattern-card on the negative-pattern-card cylinder G′. In short, all those punches which were thrown into action by the pattern-card on the cylinder G were thrown out of action by the same pattern-card on the cylinder G′, for the reason that the same selecting-needles which were thrown in one direction by the card on the cylinder G were thrown in exactly the opposite direction by the same card on the cylinder G′.

For the purpose of throwing certain of the selecting-needles temporarily out of action we provide removable needle-tips R, (see Figs. 17, 18, 19, and 20,) which are removably connected to the selecting-needles by means of split socket-pieces r', the latter being fixed permanently to the body r of the needles at one end and provided at their opposite end with split sockets adapted to receive the tips R and grip them sufficiently tight to cause them to operate successfully in connection with the needles and at the same time admit of their being removed by a strong endwise pull.

It is evident that changes might be resorted to in the form and arrangement of the several parts without departing from the spirit and scope of our invention. Hence we do not wish to limit ourselves strictly to the structure herein set forth; but

What we claim is—

1. The combination with a punching mechanism, of an extended pattern-card cylinder for permitting the adjustment of the chain of pattern-cards laterally and intermediate mechanism for placing the punching mechanism under the control of the chain of pattern-cards, substantially as set forth.

2. The combination with an extended pattern-card cylinder, of means for adjusting the chain of pattern-cards at intervals along the cylinder, substantially as set forth.

3. The combination with an extended pattern-card cylinder, of means for adjusting the chain of pattern-cards step by step along the cylinder in a direction lateral with respect to the chain of pattern-cards at intervals corresponding to the distance between two successive rows of holes in the pattern-card, substantially as set forth.

4. The combination with an extended pattern-card cylinder, a peg-supporting frame and means for adjusting the peg-supporting frame lengthwise of the cylinder to hold the chain of pattern-cards in different lateral adjustments, substantially as set forth.

5. The combination with an extended pattern-card cylinder, of tongue-pieces to which the pegs are secured and means for adjusting the tongue-pieces relative to the cylinder, substantially as set forth.

6. The combination with the extended pattern-card cylinder, of a card-race arranged to coöperate with the cylinder and means for adjusting the card-race laterally to accommodate the chain of pattern-cards in different positions on the cylinder, substantially as set forth.

7. The combination with a bank of selecting-needles, of pattern-card cylinders arranged to operate upon the opposite ends of the bank of selecting-needles and a punch-

ing mechanism under the control of the said needles, substantially as set forth.

8. The combination with a pattern-card cylinder, selecting-needles and a punching mechanism for repeating a card on the pattern-card cylinder, of a second pattern-card cylinder arranged to control the punching mechanism to produce a negative of the pattern-card from the same pattern-card which was repeated, substantially as set forth.

9. The combination with a bank of selecting-needles, a pattern-card cylinder arranged to operate upon the needles and a bank of punches under the control of the said needles, of means for locking the punches under the control of the needles opposite the holes in the card and means for locking the punches under the control of the needles opposite the blank portion of the card, at pleasure, substantially as set forth.

10. The combination with a punching mechanism and a bank of selecting-needles, of pattern-card cylinders arranged at the opposite ends of the bank of selecting-needles and needle-boards at each end of the bank for directing the needles accurately to the pattern-card cylinders, substantially as set forth.

11. The combination with a bank of selecting-needles, a punching mechanism under the control of the selecting-needles and pattern-card cylinders arranged at the opposite ends of the bank of selecting-needles, of needle-boards at the opposite ends of the bank of selecting-needles and a tension device intermediate of the needle-boards, substantially as set forth.

12. The combination with the pattern-card cylinders and the punching mechanism under the control of each of the cylinders at will, of independent mechanisms for rotating the cylinders, substantially as set forth.

13. The combination with the punching mechanism and a pattern-card cylinder for controlling the punching mechanism to repeat the card, of a pattern-card cylinder for producing the negative of the card and a removable card-race for said second pattern-card cylinder, substantially as set forth.

14. The combination with the punching mechanism, the bank of selecting-needles for controlling the punching mechanism, a pattern-card cylinder for controlling the selecting-needles and a reciprocating carriage for moving the pattern-card cylinder toward and away from the selecting-needles, of cams for operating the carriage and means for throwing the one or the other of the cams into operation to carry the initial movement of the carriage, substantially as set forth.

15. The combination with the reciprocating carriage and a carriage-operating arm and lever, of cams for operating the lever and hence the carriage and means for adjusting the cams to throw them into and out of engagement with the lever, substantially as set forth.

16. The combination with the reciprocating carriage and a double lever for operating the carriage, of cams for operating the double lever and means for throwing one of the cams into and out of engagement with one part of the double lever and the other cam into and out of engagement with the other part of the double lever, substantially as set forth.

17. The combination with the selecting-needles, of removable tips secured to the needles for throwing one or more of the needles out of use, at pleasure, substantially as set forth.

18. The combination with the selecting-needle provided with a split socket at its end, of a needle-tip adapted to be removably held in said split socket, substantially as set forth.

19. The combination with a bank of selecting-needles and punches under the control of the needles, of means for suspending the action of one or more of the selecting-needles, at pleasure, substantially as set forth.

20. The combination with the punching mechanism and means for feeding a chain of cards to be punched, of means for automatically suspending the feed at intervals, substantially as set forth.

21. The combination with the pattern-card cylinder and means for rotating it step by step, of means for automatically suspending the rotation of the pattern-card cylinder at intervals, substantially as set forth.

22. The combination with the ratchet and pawl for producing a step-by-step feed, of an auxiliary pawl and a toothed disk in position to engage the auxiliary pawl, the said toothed disk being provided with projections for automatically throwing the pawl-and-ratchet feed out of use at intervals, substantially as set forth.

23. The combination with the punching mechanism and pattern-card cylinders arranged to control the punching mechanism, of means for feeding a chain of pattern-cards along the punching mechanism and means for automatically interrupting the feed while permitting the pattern-card cylinders to operate, substantially as set forth.

24. The combination with a punching mechanism and means for feeding a chain of cards along the punching mechanism, of pattern-card cylinders for controlling the punching mechanism and means for automatically delaying the action of the pattern-card cylinders during one or more steps of feed of the chain of cards along the punching mechanism, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 28th day of August, 1899.

VERNON ROYLE.
WILLIAM COCHRAN.

Witnesses:
SEBASTIAN HUBSCHMITT,
DANIEL B. VAN BUREN.