(No Model.) 4 Sheets—Sheet 1.

W. P. UHLINGER.

JACQUARD CARD REPEATING MACHINE.

No. 438,508. Patented Oct. 14, 1890.

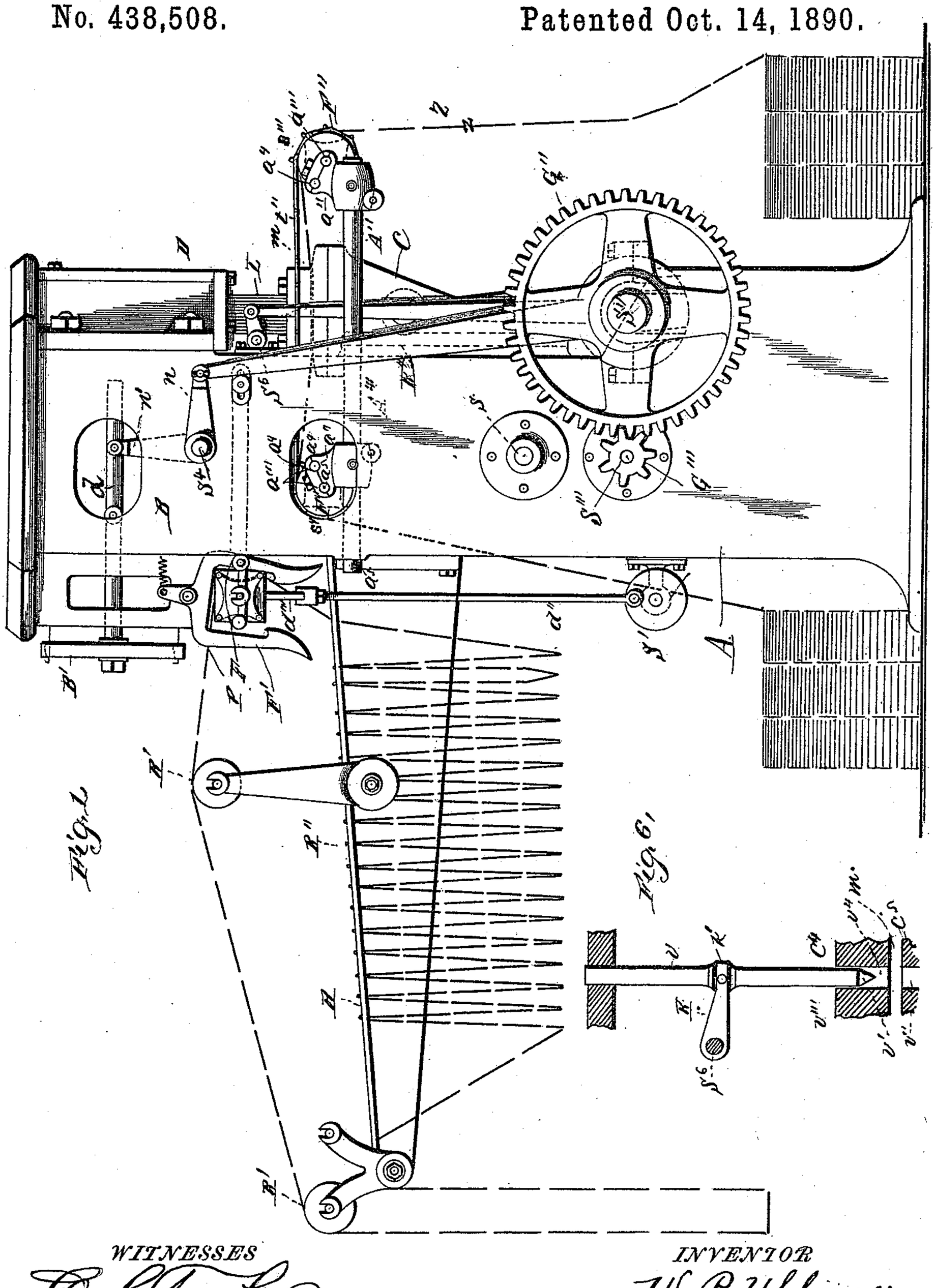

Fig. 1.

Fig. 6.

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Fig. 2.

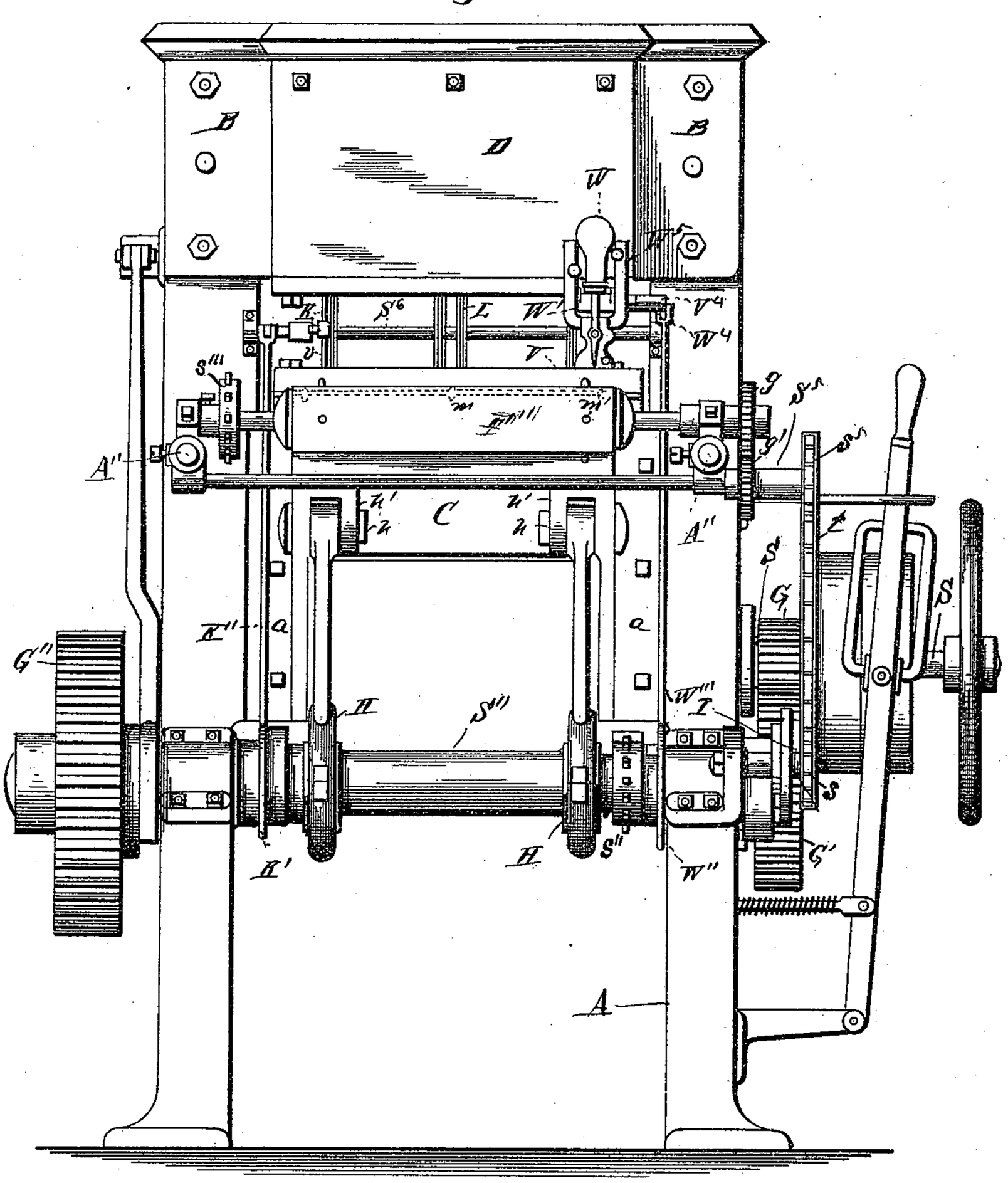
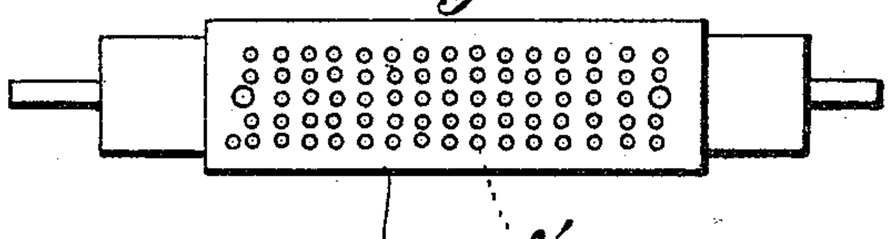


Fig. 7.



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JACQUARD CARD REPEATING MACHINE.

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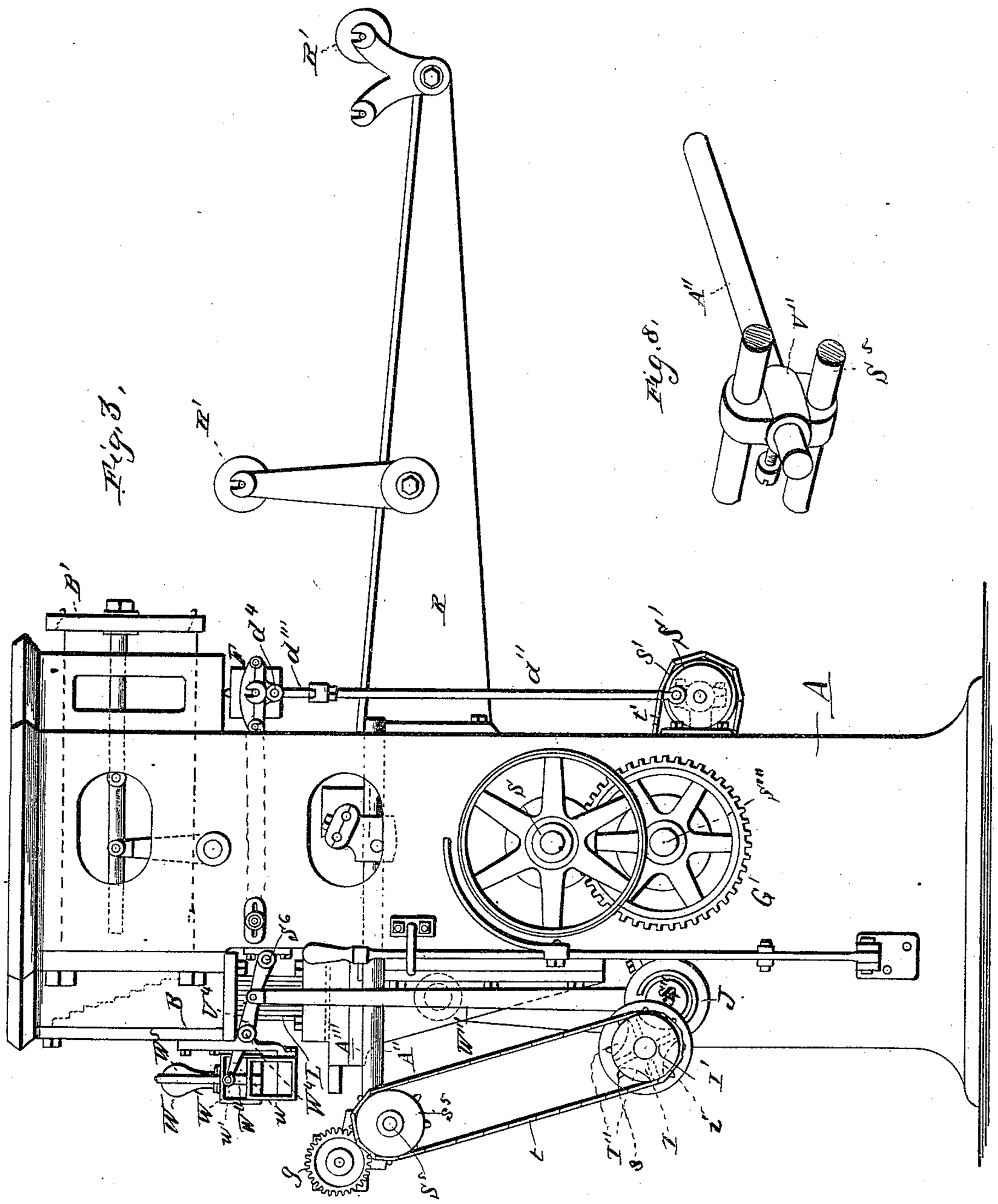

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JACQUARD CARD REPEATING MACHINE.

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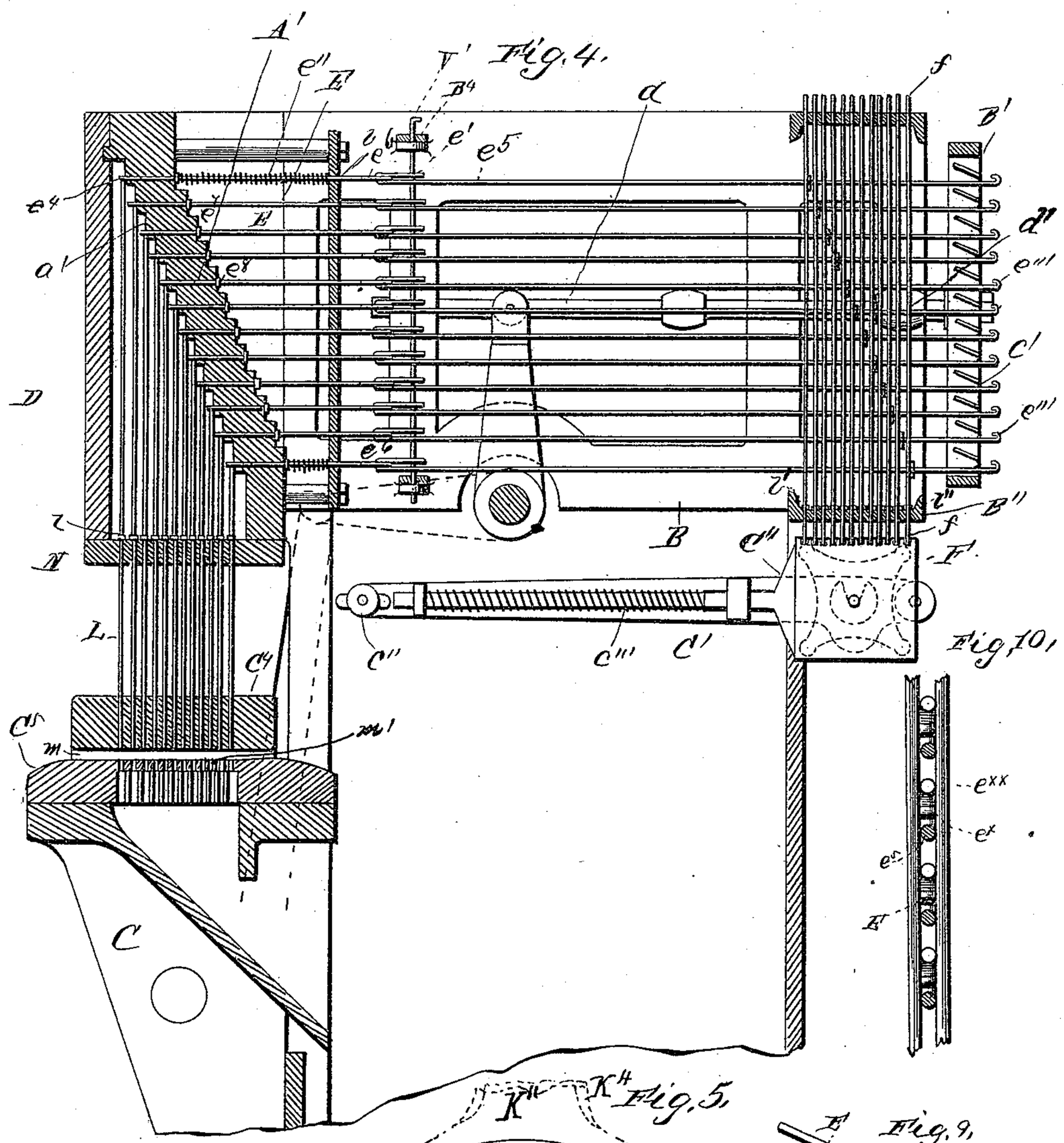
Fig. 4.



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JACQUARD-CARD-REPEATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 438,508, dated October 14, 1890.

Application filed October 31, 1889. Serial No. 328,793. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. UHLINGER, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Card-Repeating Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a representation of a side view of the machine. Fig. 2 is a front view. Fig. 3 is a view of the opposite side of the machine. Fig. 4 is a sectional view of the upper portion of the machine. Fig. 5 is a section showing the main cams. Fig. 6 is an enlarged detail view, partly in section, and a side view of one of the adjusting-pins and its adjustive parts for adjusting the blank for the action of the punchers. Fig. 7 is an enlarged detail plan view of the Jacquard cylinder herein employed. Fig. 8 is an enlarged detail perspective view of the adjustable support for taking up the slack of the feed-chain t''. Fig. 9 is an enlarged detail perspective view disclosing more clearly the connection between the abutment-keys E and e^5. Fig. 10 is a detailed sectional view showing more fully the retention in an upright position of the hooked ends of the wires e^5 by the guide-rods V′.

This invention has relation to machines for providing series of Jacquard cards which shall be in the disposition of their perforations exact duplicates, card for card, of the series of pattern Jacquard cards which for the time automatically regulate the operation of the punching-machine.

The invention consists in the novel combination and construction of parts whereby the action of machines of this character is simplified and made more certain, and whereby its strength, durability, and precision are provided for, as hereinafter set forth, and more particularly pointed out in the appended claims.

In the accompanying drawings, the letter A designates a substantial framing having at its upper portion a boxing B, and in front lateral guides a for the vertically-reciprocating die-carriage C, above which is located the punch-head D. In the boxing B is located the system of horizontal abutment-keys, which are arranged in tiers, as shown, and in the rear portion of said boxing are the adjusting-wires, which are respectively connected to said keys and are automatically operated by the pattern-card to retract the abutment-keys from over the punchers which are not required to perforate the blank card, as hereinafter described.

The keys E are longitudinally movable, and are placed in bearings b and e^7 of the boxing B.

B′ is a slide-rack which has reciprocating motion in rear of said boxing. The front or abutment ends of the keys E extend through the bearings e^7 of the oblique partitions A′ of the boxing, which is provided in front with overhanging steps or shoulders a', arranged in series one above another, each step above projecting a little beyond the next below it, as shown, so that a transverse shoulder or step is provided above each row of vertical punches in the punch-head. The keys are provided with stops or collars e^8, which limit their forward movement, and with springs e'', which hold them normally in forward or projected position, their abutment ends in this position extending beyond the front facets or risers of the partition A′ a distance equal to the breadth of the shoulders a' over the same. The slide-rack B′ is provided with horizontal guides d, moving in bearings d' of the boxing B, these guides carrying the vertical transverse rack-frame, which is formed with a vertical series of transverse bars or catches c', which are usually slightly inclined downward from the front to their rear or engagement edges. In the construction illustrated one of these transverse catch-bars is located above each tier of keys just over the rear ends of said keys, which are each provided with an operating-wire having a rear upward-turned hook end e'''. Normally these hook ends lie between the catch-bars of the rack B′; but when said rack is moved forward and the keys are raised in rear by their adjusting rods or wires f the hook ends of said keys will be elevated sufficiently to engage the catch-bars of the rack B′ when the latter is moved to the

rear, and consequently the keys will be drawn backward, so that their front or abutment ends will not project beyond the partition A′ of the boxing B. When so drawn back the keys will offer no obstruction to the upward movement of the punchers, which will therefore be free to rise to the shoulder of said partition above their upper ends. Said shoulder is located usually a half-inch or more above the lower or abutment surfaces of the ends e^4 of said keys, in order that there will be sufficient vertical distance to permit the punchers to vary in length in each row, so that they will not operate exactly together in passing through the card in the die-carriage, but will act in a successive manner, thereby easing the operation of the machine.

The action of the keys is controlled by the pattern-cards P as they pass intermittently over the Jacquard cylinder F, which is located below the overhanging rear end of the boxing B of the frame. This cylinder is of the usual rectangular form, having the full number of perforations f' extending through it from side to side and from top to bottom, said perforations being equal in number on each side to all the perforations which a Jacquard card of the size employed can carry. This is also the number of the keys, of the adjusting-wires attached to said keys, and of the punchers in the front of the machine. The Jacquard cylinder moves up and down intermittently, its journals being seated in bearings of the arms C′, which are pivoted at c'', said arms carrying the steady-heads C″, their slide-stems, and the springs c''' thereof. The pivotal points c'' are located about even with the lower surface B″ of the overhanging rear portion of the boxing B, so that when the Jacquard cylinder is brought up against the same it will work squarely against it, its position being precisely ascertained, so that its perforations are exactly under the lower ends of the respective adjusting series of the keys, said ends projecting below the surface B″ a distance sufficient for the amount of throw required to raise the hook ends of the keys to engage the catch-bars of the rack B′. Pivoted to the side of the boxing B is the double or reversible turning-hook F′, which is adjustable, being provided with the adjusting-springs, of which one serves when in engagement to hold the turning-hook in position to turn the cylinder as the latter reciprocates in one direction, while the other will operate when in engagement to turn it in the opposite direction. The Jacquard cylinder F is reciprocated intermittently by means of crank-pins on the transverse shaft S′, to which are connected the pitman-rods d'', which are adjustable in the yokes d''', which are carried on the journal-pins d^4 of the arms C′. The shaft S′ is provided with a sprocket-wheel s', which is operated by a chain t', connected to a sprocket-wheel s'' on the lower front transverse shaft S″, which is provided with a large gear-wheel G″, engaging a pinion G‴ of the shaft S‴ in rear of and parallel to the shaft S″. The shaft S‴ is turned by the driving-shaft S by means of the engaging gear-wheels G and G′.

In front the frame is provided with the projecting arms A″, upon which are the adjustable bearings a'', which are provided usually with journal-seats a''' and a^4, of different elevation, to accommodate feed-cylinders of different size. These arms A″ are located at the sides of the frame and extend rearward, as indicated at A‴, in the lateral recessed or boxed sides of said frame to their rear bearings at a^5. The inner portions of said arms also carry adjustable bearings a'', provided with journal-seats a''' and a^4 at different heights.

F″ indicates the front and rear feed-cylinders, which are pivoted in the bearings a'', and which are provided with the sprocket-wheels s''' s^4, which are connected by the chain t''. The front feed-cylinder is provided with a pinion g on its shaft, which engages a pinion g' on a parallel shaft S^5 below it, the latter shaft carrying a sprocket-wheel s^5, which is connected to the sprocket-wheel s'' of the adjustable intermittent wheel I by the chain t. The wheel I is provided on the side opposite to the sprocket-wheel s with the cross-slot cam I′, having its four sections I″ provided with the concave outer bearings i, and it is operated by engagement with the intermittent circle and pin-cam J on the shaft S″. This cam governs and regulates the intermittent rotation of the pattern-cylinder F and the feed-cylinders F″ F″, the rotation of the shaft S″ being continuous.

On the shaft S″ are the laterally-arranged eccentrics H, which engage the yoke-arms, which extend vertically upward and are pivoted to strong pins h in bearings h' of the die-carriage C. This carriage is therefore reciprocated by the shaft S″ through said eccentrics and yoke-arms, which being paired and located laterally and immediately below the die-carriage operate to give it a perfectly steady and true movement notwithstanding the varying manner in which the punchers operate with the die-carriage. The pattern-card on the Jacquard cylinder F is constantly being changed as the successive pattern-cards reach said cylinder, and therefore different sets of punchers are constantly being set to punch the blank cards Z, and as the distribution of the perforations of the pattern-card P is usually uneven and sometimes extremely so more punchers are usually set for action on one side of the punch-head than the other, and therefore it is important to provide for a steady and true movement of the die-carriage on which the blank card is carried, and into the die-perforations of which the operating ends of the punchers descend in cutting the card. The punchers L are vertical steel rods, which are seated in the guide-shelves in the punch-head D. They are arranged in transverse rows, one row back of another, and above each punch the abutment end of its key projects

from the partition A′. The front rows of punchers are of gradually-increasing length, as shown, and each punch is provided with a stop or collar *l*, whereby it rests when in normal position on the perforated stop-shelf or guide-shelf N. The lower or cutting ends of the punchers extend into the upper or directing plate C^4 of the die-carriage C, and said plate is made of sufficient thickness to embrace the full play of the punchers, so that they never rise above it, and unless set in action by the pattern-card of the Jacquard cylinder F do not enter the die-plate C^5 below the guide-plate. Between the die-plate C^5 and the guide-plate C^4 is the feed-slot or interspace *m*, which is provided with the lacing-grooves *m′*, extending from front to rear and designed to permit the lacings of the series of cards Z to move freely through the slot *m* as the cards are fed to position by the intermittent movement of the feed-cylinders F″.

The distance between the feed-cylinders F″ is regulated by adjusting the bearings on the arms A″ A‴, so that those cards Z which extend from one of said cylinders to the other will be exactly sufficient and in proper position to bring the blank to be acted upon by the punchers to place in the feed-slot *m*, where it is precisely adjusted by the reciprocating set-pins *v*, which have conical ends *v′* and extend through perforated seats or ways v^4 in the guide-plate C^4 into perforations *v″* of the die-plate C^5.

A rock-shaft S^6 back of the punch-head D is provided with lateral arms K, which are provided with pins engaging slot-bearings *k′* of the set-pins *v*, and said shaft is operated by the grooved cam K′ on the shaft S″ through its engagement with the pitman K″, which is provided with a pin *k″*, engaging the cam-groove. After the card Z to be punched has come to position in the feed-slot the re-entrant portion of the cam-groove rocks the shaft S^6 to cause the set-pins to descend, and their conical ends entering adjusting-perforations *z*, which are provided in the blank cards Z before feeding them to the machine, bring the cards to true and exact position under the punchers. The rack-slide B′ of the boxing B is reciprocated by means of a similar groove-cam K‴ on the shaft S″, a pitman K^4, having at its lower end a yoke carrying a pin k^4, which engages the cam-groove of said cam and operates the crank-shaft S^4, which is provided with the lateral sets of arms *n* and *n′* in angular relation to each other, said arms being respectively pivoted to the pitman and connected by links to lateral guide-rods of the rack B′.

The hook ends *e″* of the keys E are suspended in normal position between the catch-bars of the rack B′ by means of the adjusting-wires *f*, which have stops *l′* near their lower ends, which engage the horizontal bearings *l″* of the boxing B″. The keys, as I prefer to construct them, consist of the cylindrical slide-rods or keys proper and the wires e^5, having the front loops $e^\times$, connected to eyes $e^{\times\times}$ in the rear ends of said slide-rods. The slide-rods are seated in bearings in the oblique partition A′ and in the vertical partition in rear thereof, and vertical removable guide-rods V′, arranged in series and extending through the transverse top bar B^4 of the boxing B, serve to afford bearings at the sides of the loops e^6, so that the wires e^5 are prevented from turning, and their hook ends *e‴* are held in proper upturned position for engagement with the catch-bars of the rack.

The frame of the machine is usually provided with rearward-extending arms R, having supporting-cylinders R′, over which the series of pattern-cards is drawn by the Jacquard cylinder F, said cards, after passing the Jacquard cylinder, returning along the inclined track rods or rails R″ on the inside of said arms.

One of the arms *a″* of the frame is provided with an adjustable support V″ for taking up the slack of the feed-chain *t″*.

The cards, as they are punched, are designed to be numbered in succession or in sets of two, three, four, &c., in accordance with the character of the work and the number of shuttles employed under the pattern. This is important for the guidance of the weaver and to avoid error in replacing a card in the pattern series.

The numbering device W may be of ordinary reciprocating character, having the usual numbering-wheels and carrying-pawls and a vibratory pawl-operating shaft having a crank-arm *w*, slotted to receive the actuating-pin *w′* of the reciprocating portion W′. The numbering device is located on the punch-head over the extension-plate V, which projects from the die-plate, and it is operated by the cam W″ on the shaft S″, said cam engaging the pin of a pitman W‴, which is pivoted at its upper end to the crank-arm v^4 of a short shaft W^4, which is provided with a yoke or connection W^5, engaging the reciprocating portion W′ and pivoted to an arm or arms on the opposite side of said shaft. In this manner the weight of the pitman is utilized in raising the yoke and allowing the spring of the pitman W‴ to elevate the printing-platen of the numbering device for the next printing operation. The printing is effected just after the die-carriage reaches its most elevated position, and the platen rises promptly before the feed of the cards takes place.

In the operation of this machine, when the die-carriage is moved downward after the operation of punching the card, the set-pins are raised and the Jacquard cylinder, having descended to its lowest position, commences its upward movement. As the die-carriage reaches its lowest position, the cylinder F″ turns, feeding the next card Z to the die-slot. The rack B′ moves forward a little after the commencement of the descent of the die-carriage to disengage the adjustment-wires *f* and

allow the abutment ends of the keys which had retracted to project into the punch-head. As the Jacquard cylinder moves away from the adjusting-wires, it is turned one-quarter round, and being then held by the steady-heads of the arms A″ presents the next pattern-card uppermost. As the die-carriage moves upward, the slide-rack, having been moved to the rear and having retracted certain keys by its engagement with the hook ends of their wires, is held stationary, as also are the set-pins, until the punching is effected between the plates of the die-carriage. As the rack-slide B′ reaches its forward position, releasing the keys which had been held back by its catch-bars, the Jacquard cylinder rises and carries upward certain of the adjusting-wires which are over the imperforate portions of the pattern-card P to raise said wires. Then the rack-slide, returning upon its backward movement, engages the hook ends of the key-wires by means of its transverse catch-bars and draws the keys back into their seats in the oblique partition A′, so that their ends will not project and the corresponding punchers will not be operated to produce perforations in the card Z. The retracted rack-slide and retracted keys are held in this position until the punching is effected by the rise of the die-carriage and the engagement of the protruding ends of the keys which have not been retracted with their corresponding punchers. When the rack-slide B′ is in its forward position, all the hook ends of the key-wires project in rear beyond its catch-bars; but when the rack-slide is moving to its rear position its catch-bars pass over said hook ends and do not engage the same unless they are raised by the adjusting-wires pressed upward by the imperforate portions of the pattern-card. The time of the intermittent cam feeding the cards Z takes place as the die-carriage reaches its lowest position.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. In a card-repeating machine, the combination, with the punches and their supporting-frame and the die and guide plates, of the keys consisting of rods looped together, the guide-rods engaging the rear sections of said keys and the looped portions thereof at the sides, the adjusting wires or rods of said keys, the rack carrying catches engaging said keys at their upturned ends, and the Jacquard cylinder engaging the lower ends of said adjusting rods or wires, substantially as set forth.

2. In a card-repeating machine, the combination of the punchers, the keys engaging the same, the key-adjusting rods or wires, the Jacquard cylinder, the vibrating arms therefor, the crank-shaft S′, having connection with the latter by a pitman and eccentric, the sprocket-wheels on the shafts S′ S″, the chain encompassing said sprocket-wheels, the rack having catches engaging said keys, the shaft S^4, having the lateral sets of arms n n', one connecting with the guide-rods of said rack, said shaft S^4 being connected by the other arm n with the pitman K^4, engaging a grooved cam on the shaft S″, the feed-cylinders carried in boxes supported upon arms A″, provided with an adjustable support, the shaft S^5 and gearing g g', the belt encompassing the sprocket-wheels of said feed-cylinders, the belt t, sprocket-wheel s, and wheel I, together with mechanism for actuating the aforesaid parts, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM P. UHLINGER.

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