No. 627,256. Patented June 20, 1899.

J. A. GROEBLI.

JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

(No Model.) 10 Sheets—Sheet 1.

Fig. 1.

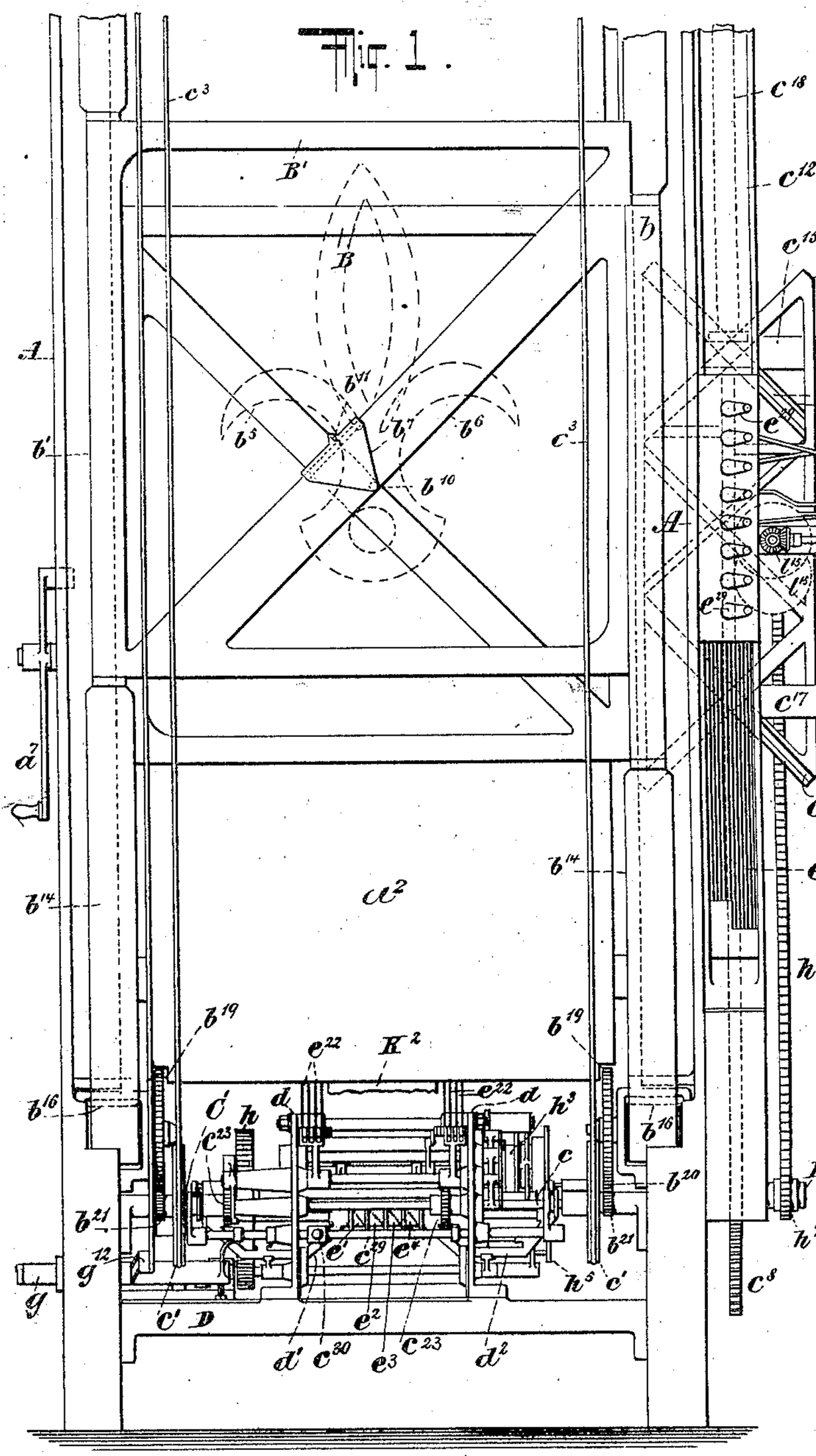


Fig. 10.

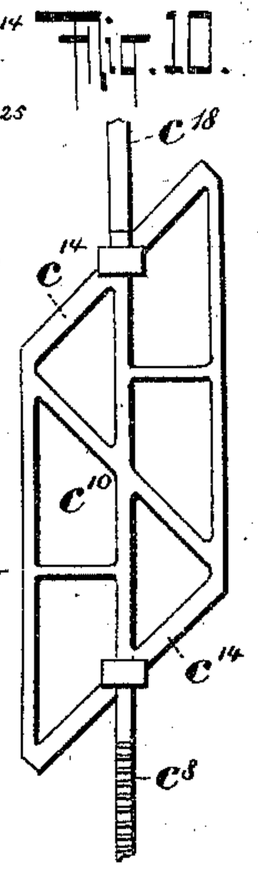
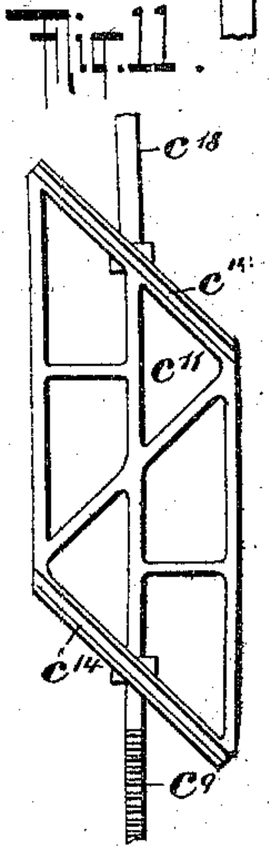


Fig. 11.



WITNESSES:

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ATTORNEYS

No. 627,256. Patented June 20, 1899.

J. A. GROEBLI.

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(Application filed June 9, 1898.)

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Fig. 5 a

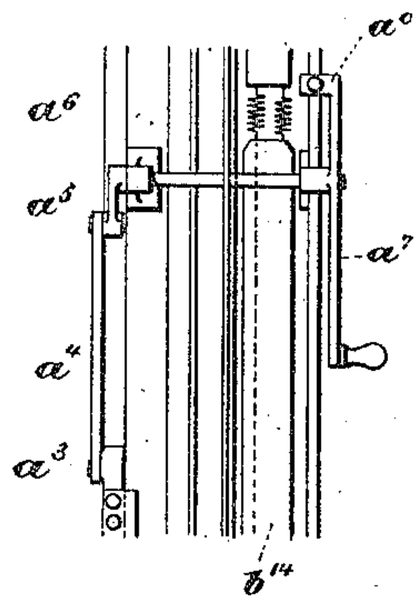
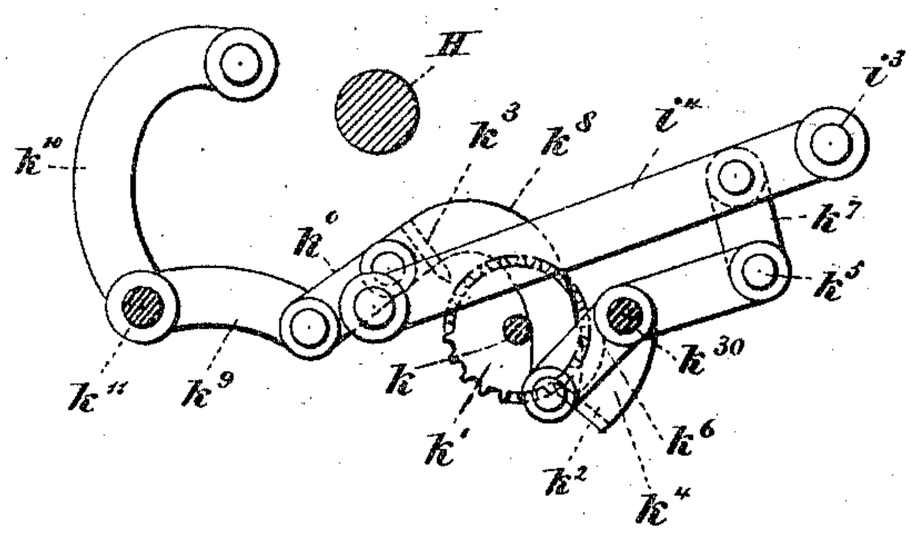


Fig. 6 b



WITNESSES:

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No. 627,256. Patented June 20, 1899.

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JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

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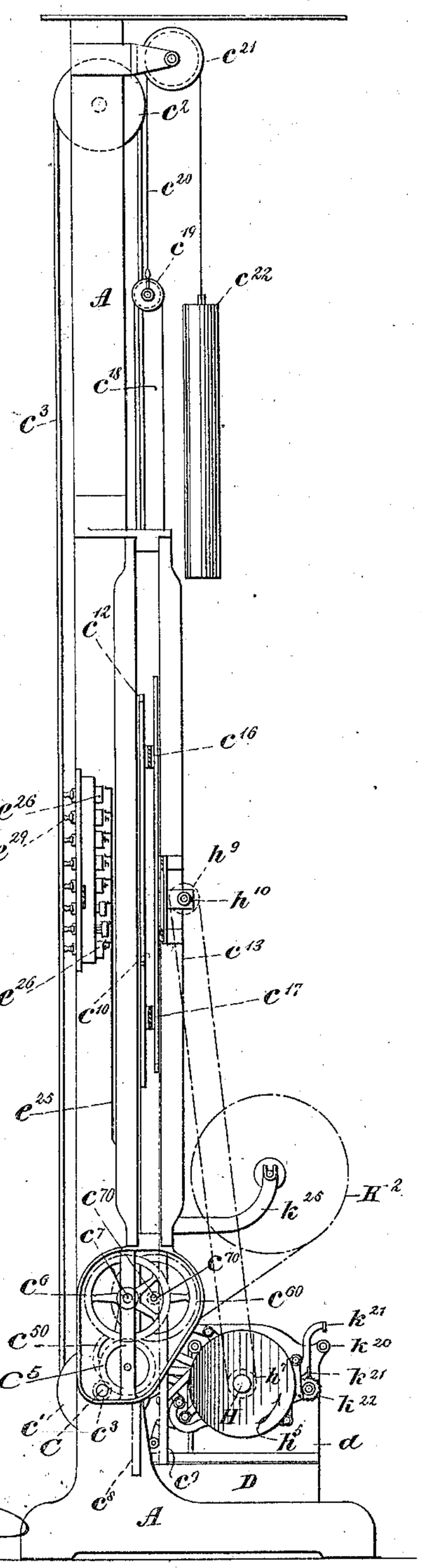
Fig. 2.



WITNESSES:

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No. 627,256. Patented June 20, 1899.

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JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

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Fig. 3.

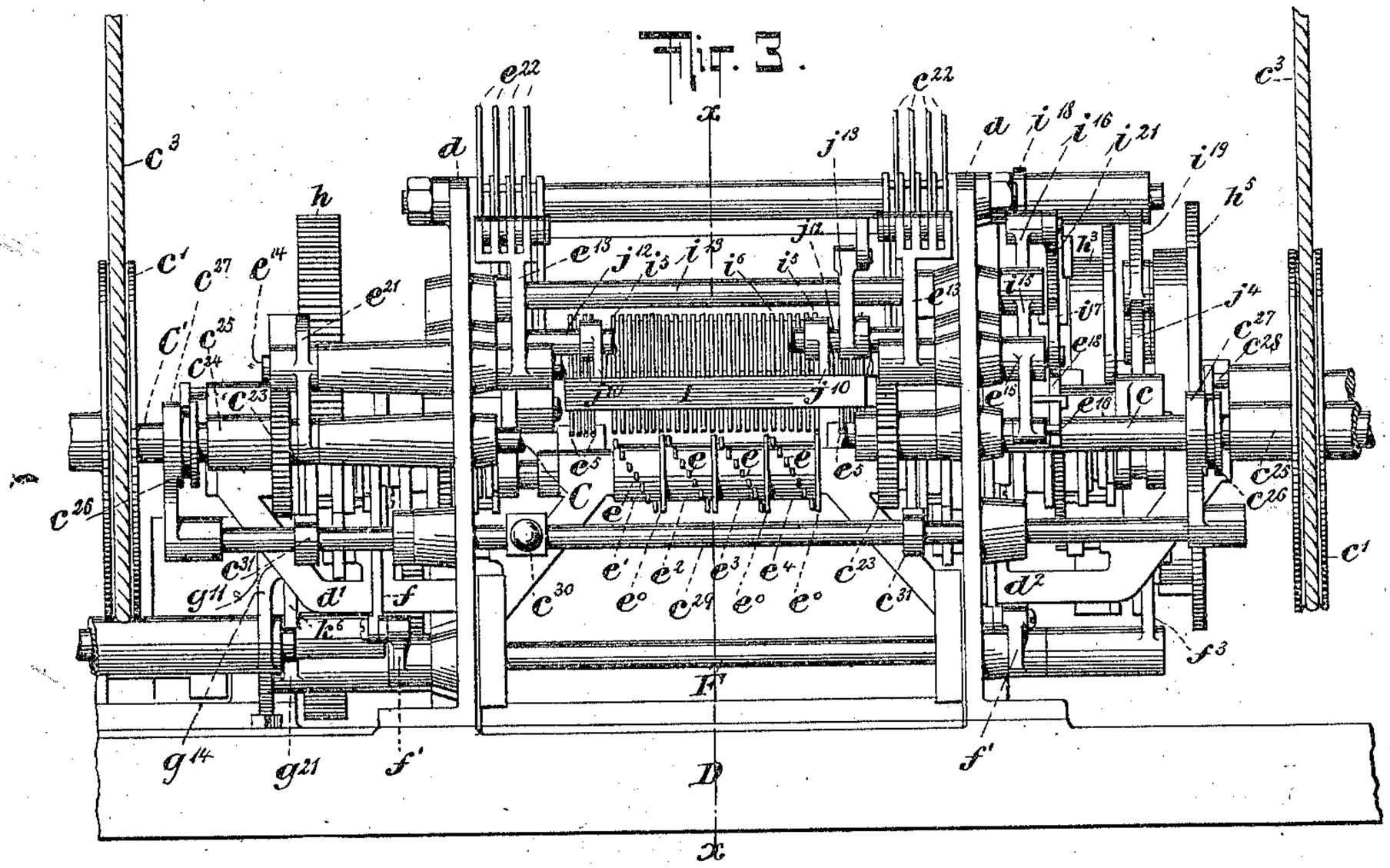
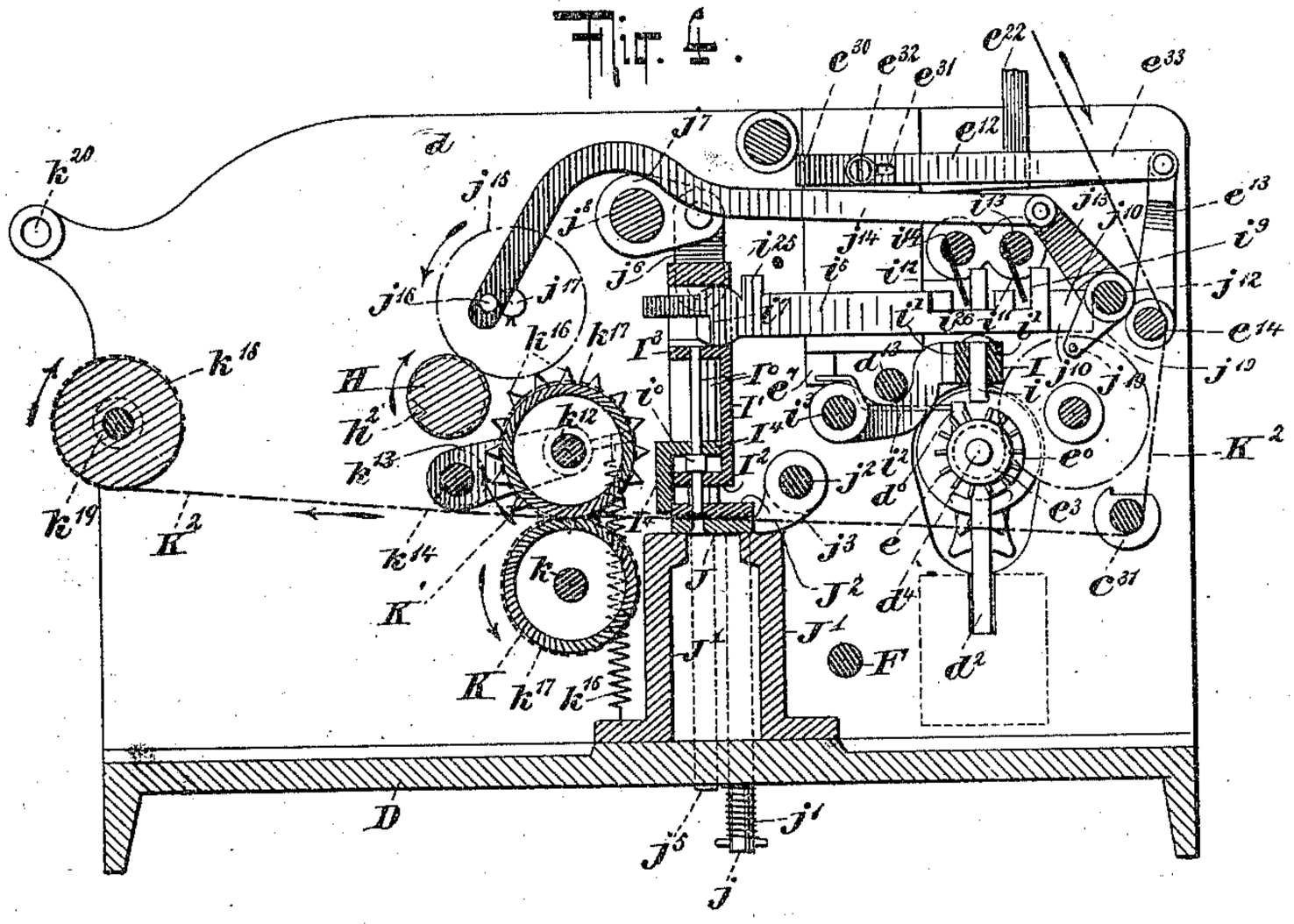


Fig. 4.



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No. 627,256. Patented June 20, 1899.

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JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

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Fig. 3ª.

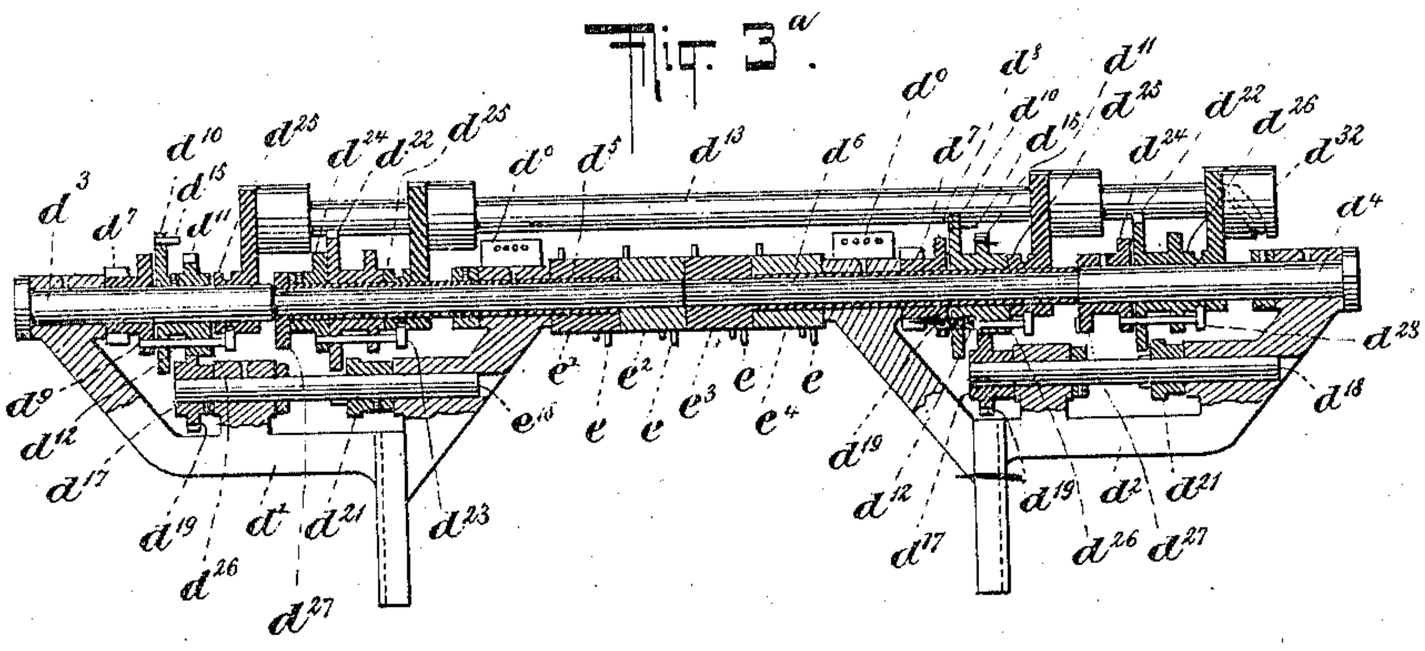
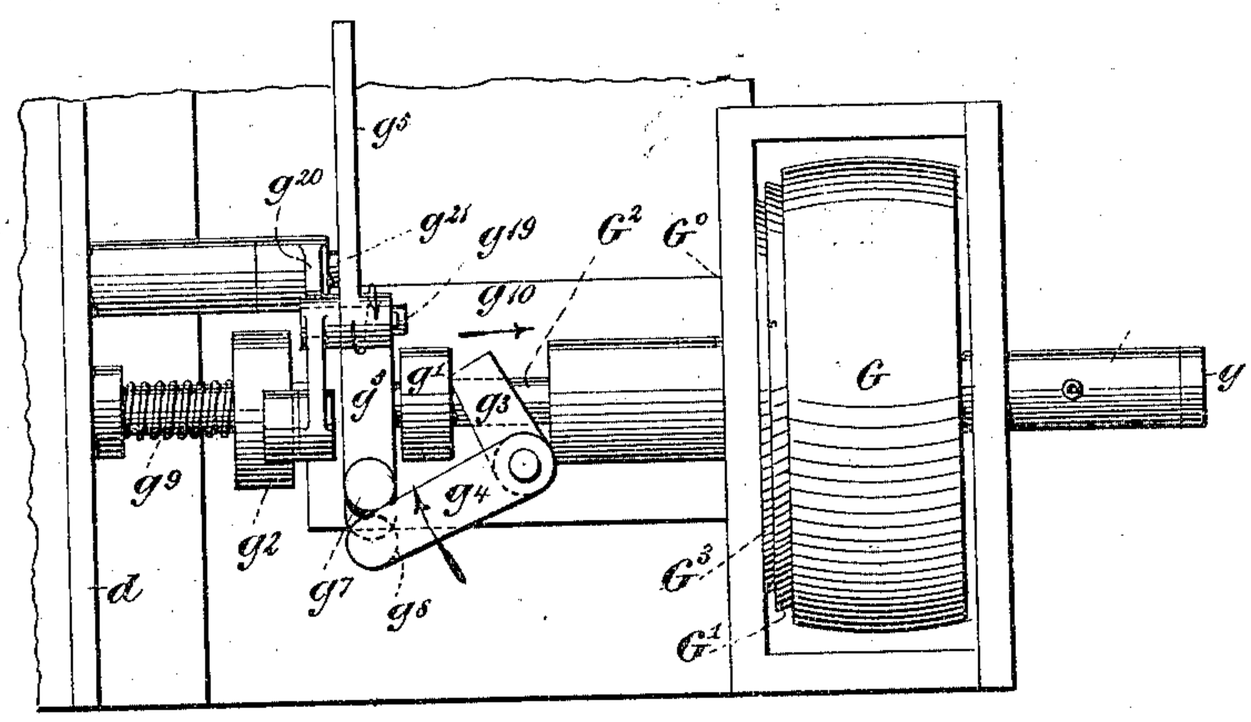


Fig. 6ª.



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No. 627,256. Patented June 20, 1899.

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JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

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Fig. 5.

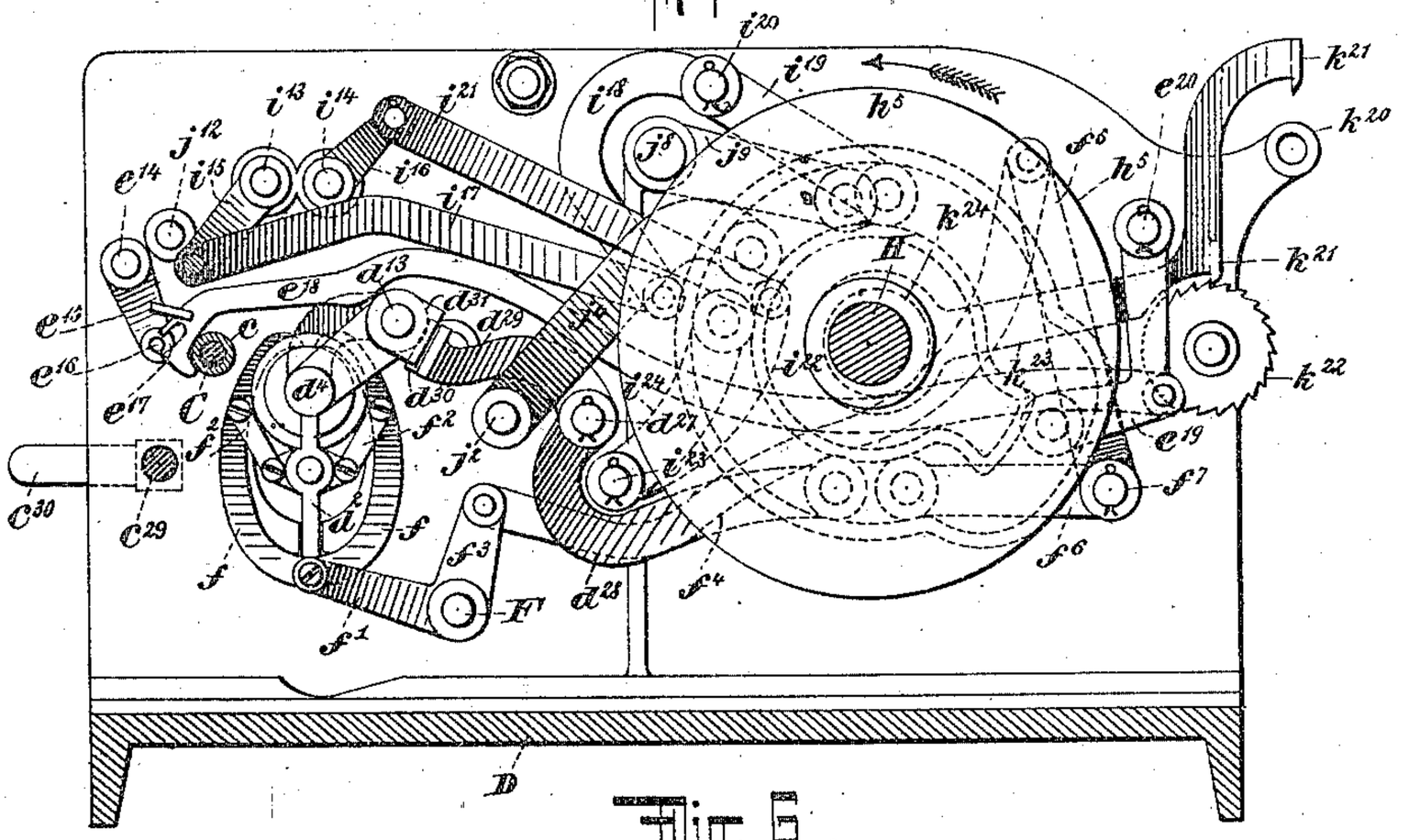


Fig. 6.

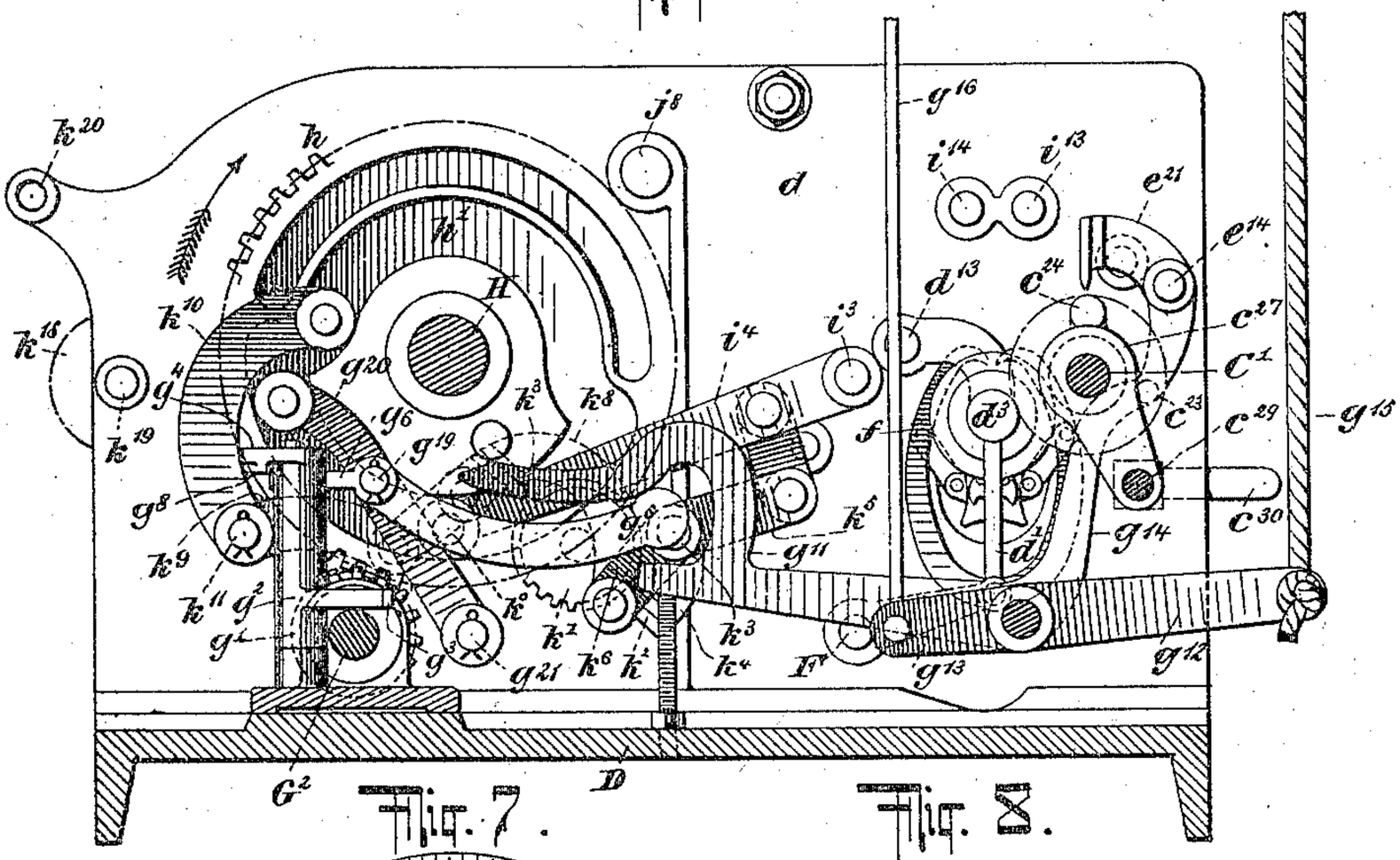
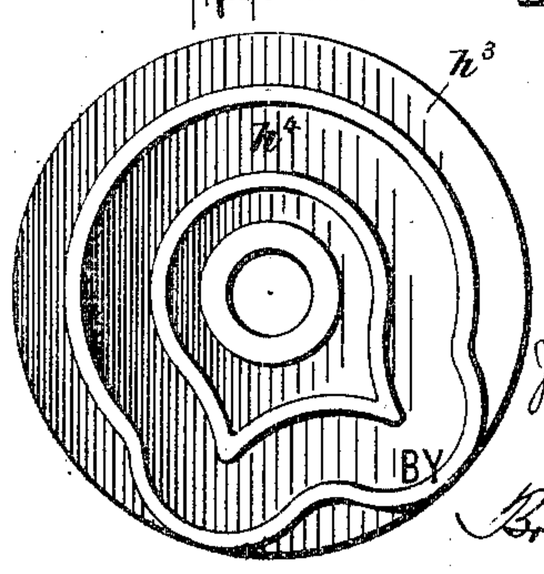


Fig. 7.

Fig. 8.



WITNESSES

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No. 627,256.

Patented June 20, 1899.

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JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

(No Model.)

10 Sheets—Sheet 7.

Fig. 9.

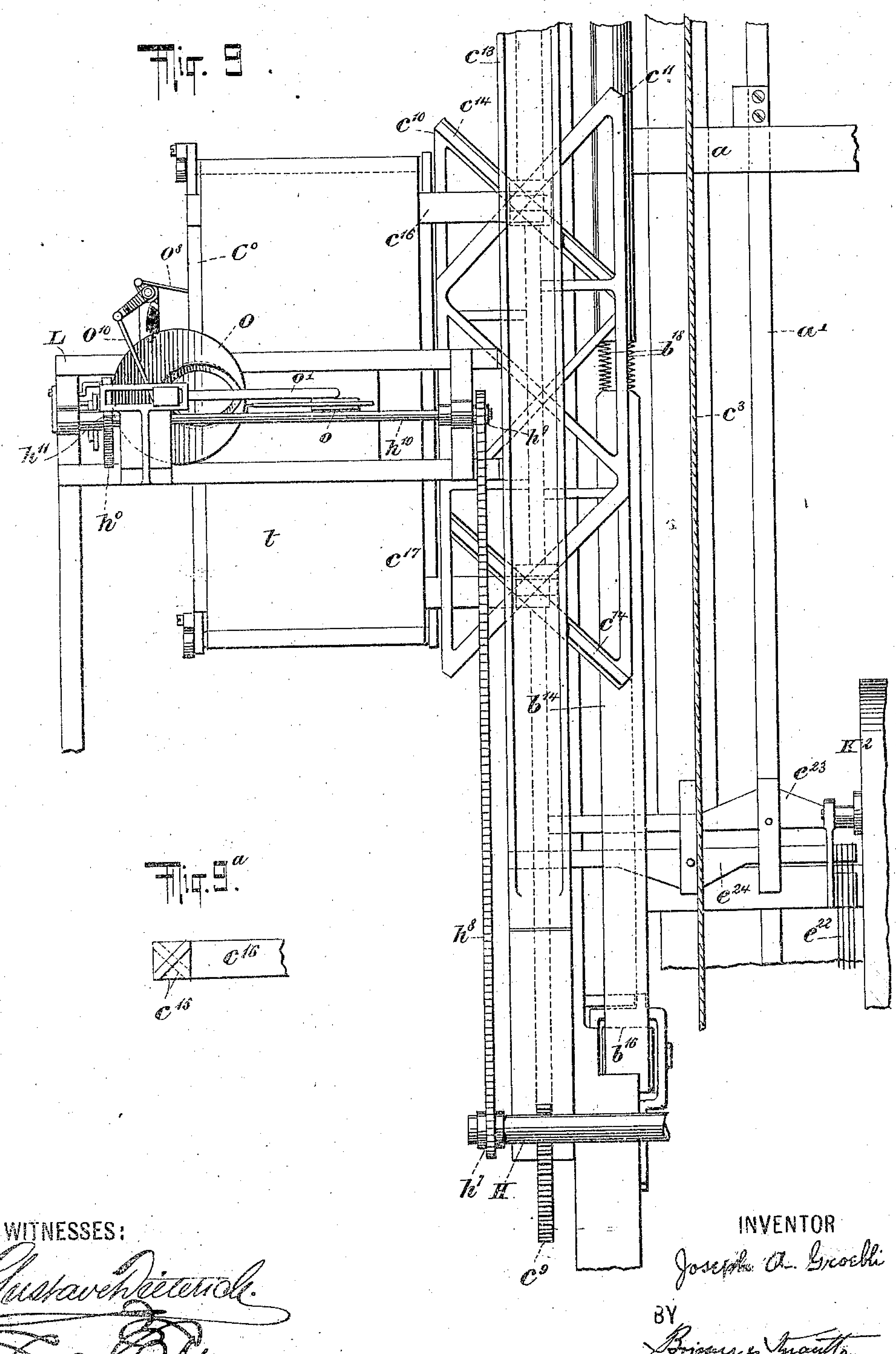

Fig. 9a.

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No. 627,256. Patented June 20, 1899.

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JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

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Fig. 12.

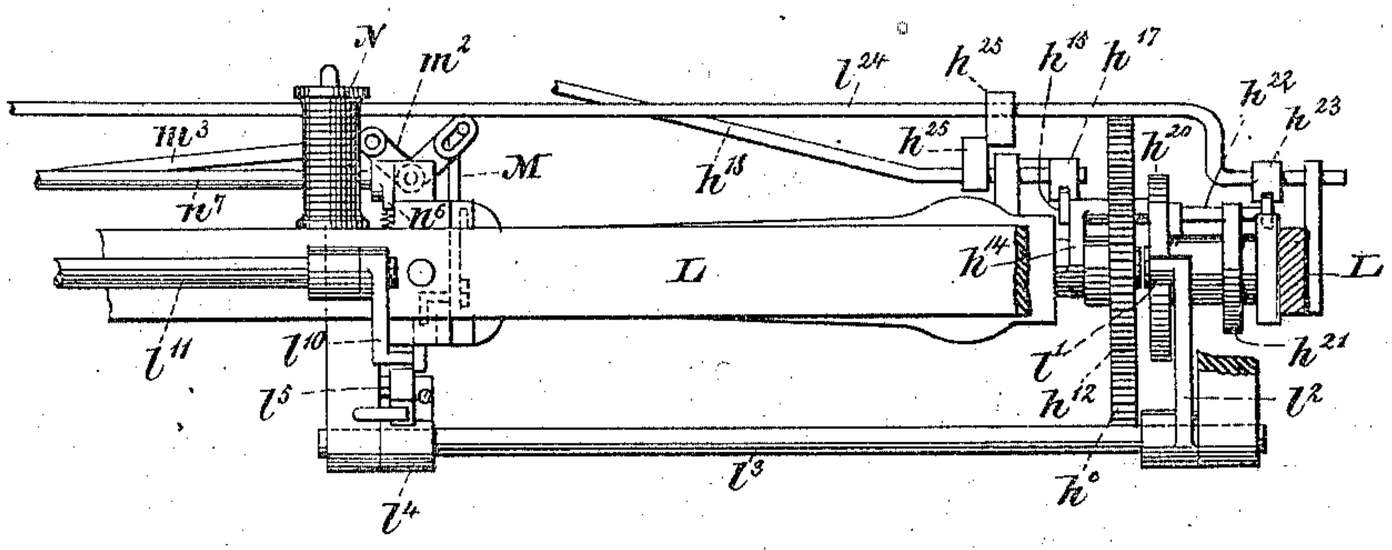


Fig. 13.

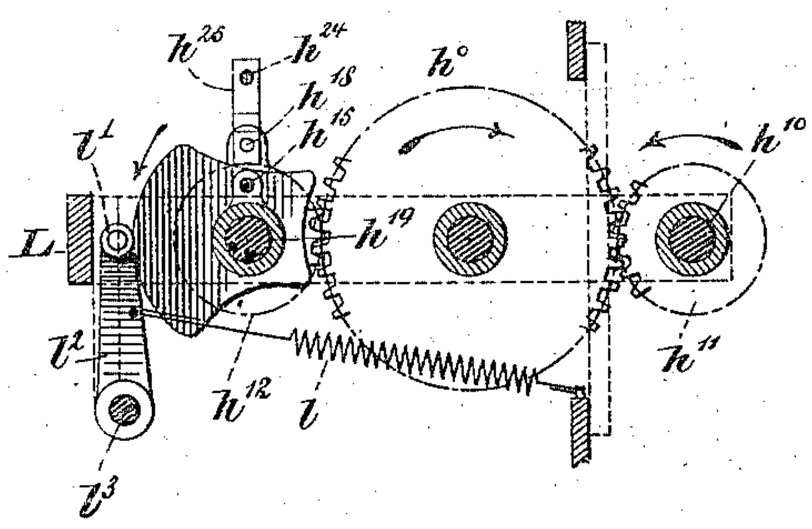


Fig. 14.

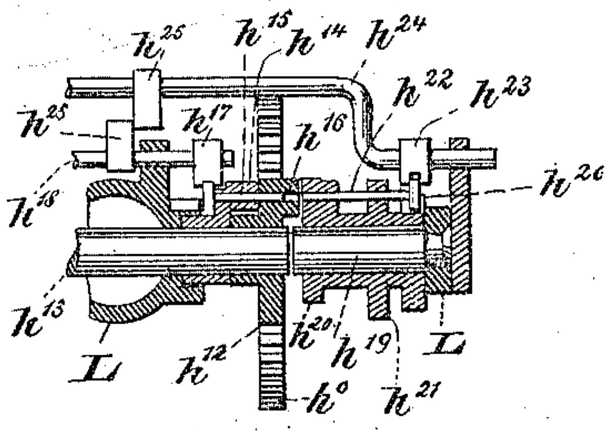


Fig. 15.

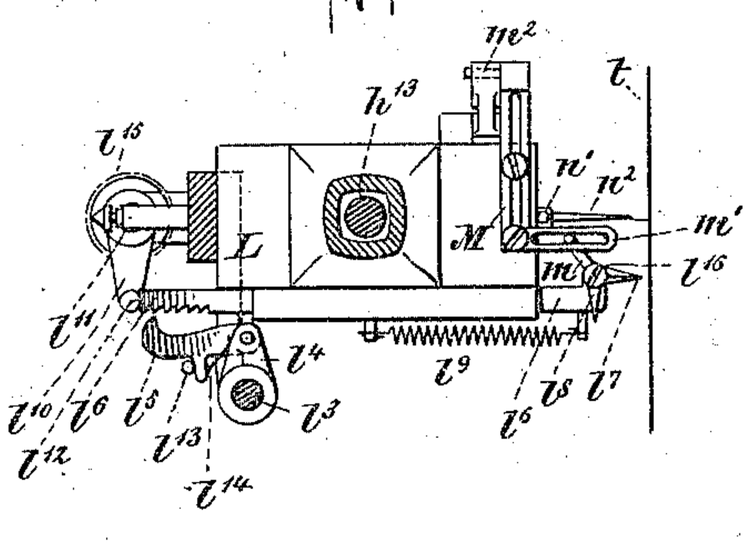
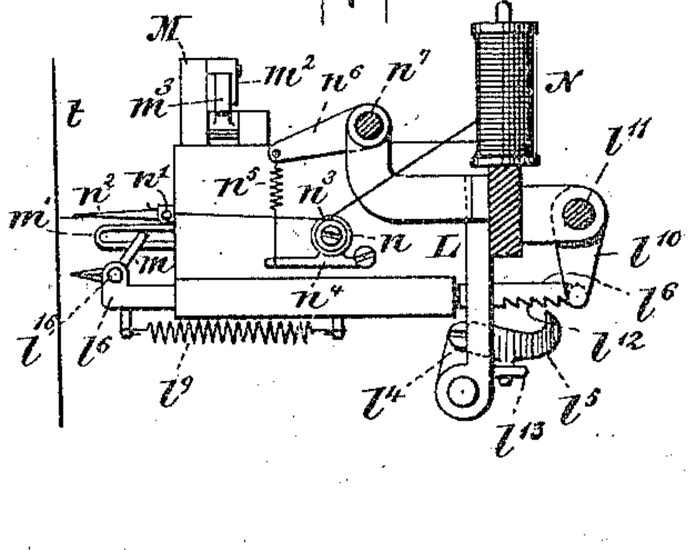


Fig. 16.



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No. 627,256. Patented June 20, 1899.

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JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

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Fig. 22.

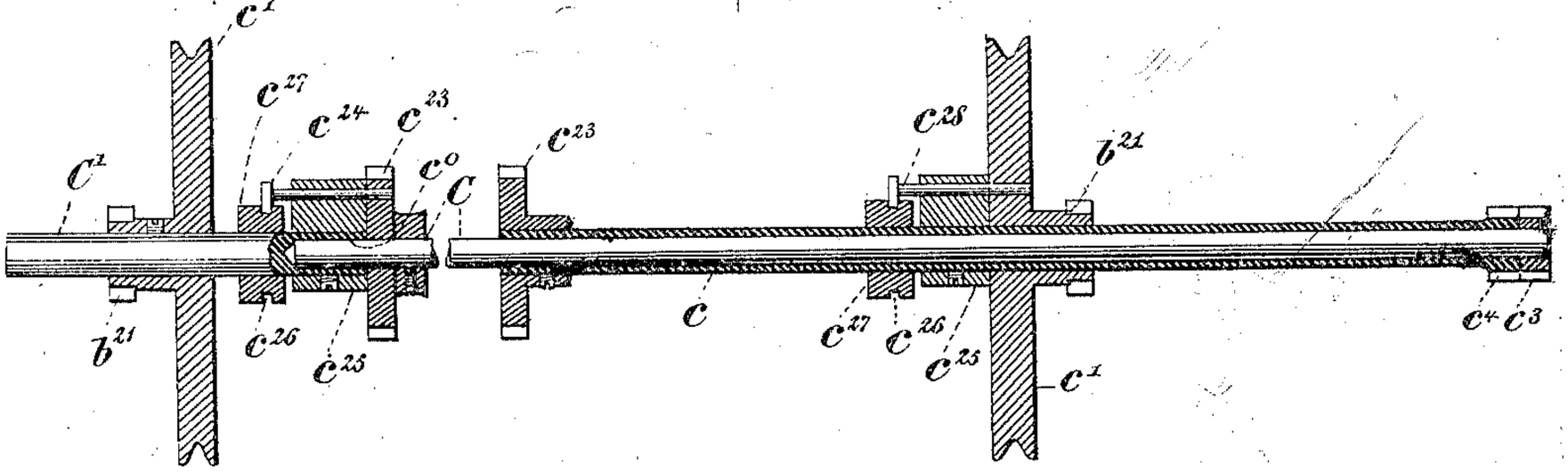


Fig. 23.

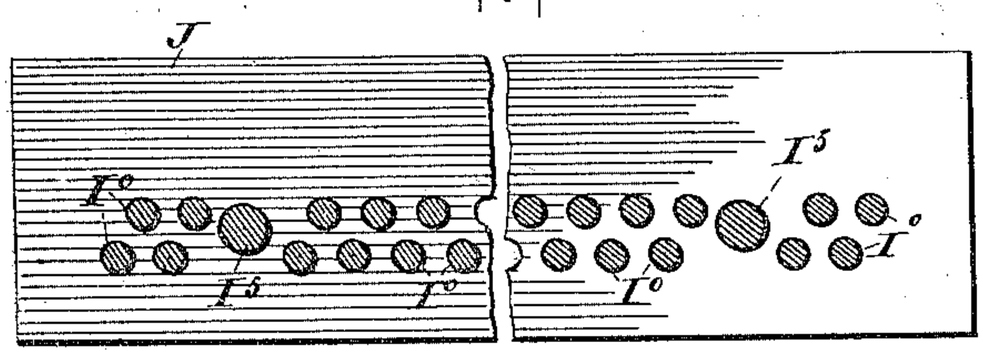


Fig. 19.

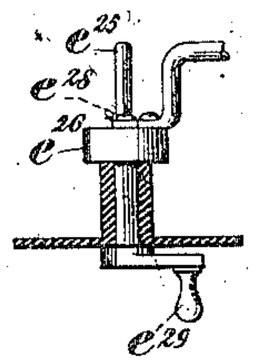


Fig. 20.

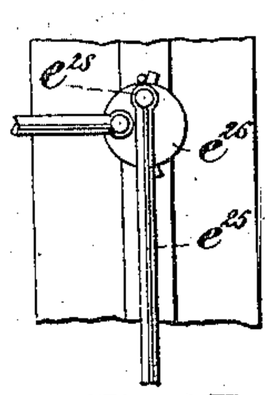


Fig. 21.

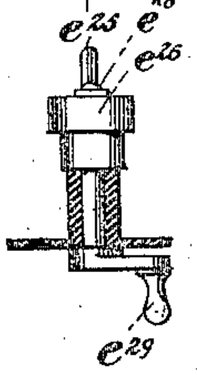


Fig. 17.

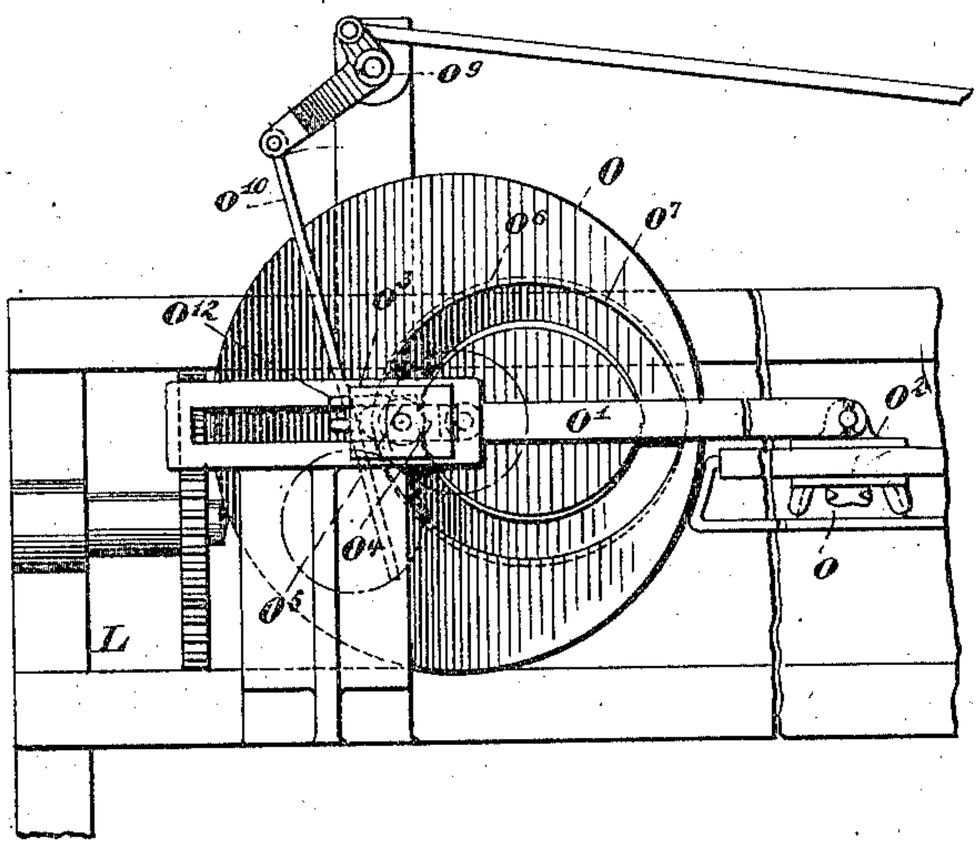
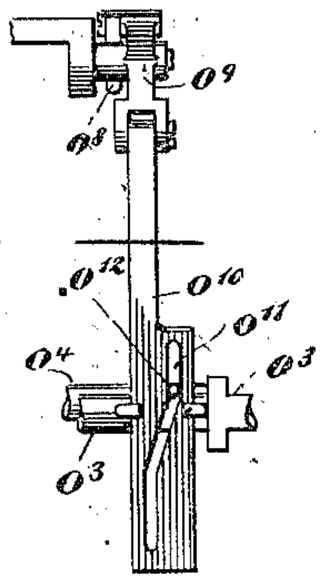


Fig. 18.



WITNESSES:

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No. 627,256. Patented June 20, 1899.

J. A. GROEBLI.

JACQUARD CARD PUNCHING MACHINE.

(Application filed June 9, 1898.)

(No Model.) 10 Sheets—Sheet 10.

Fig. 24.

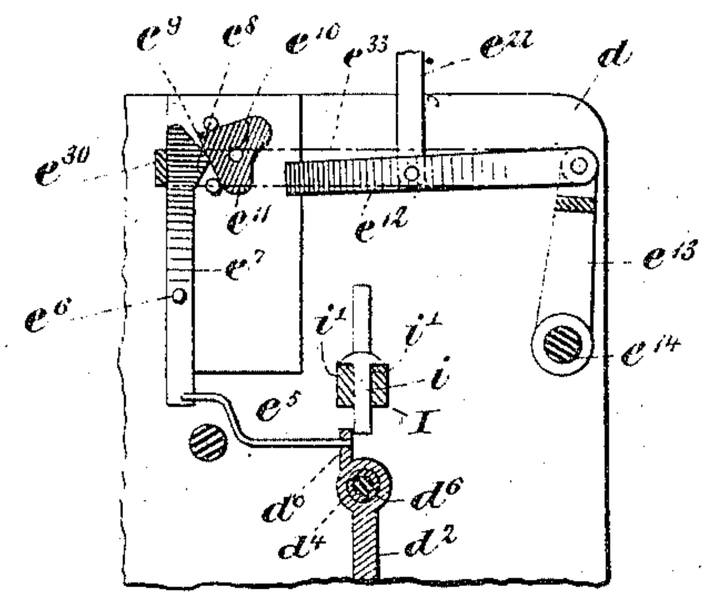


Fig. 25.

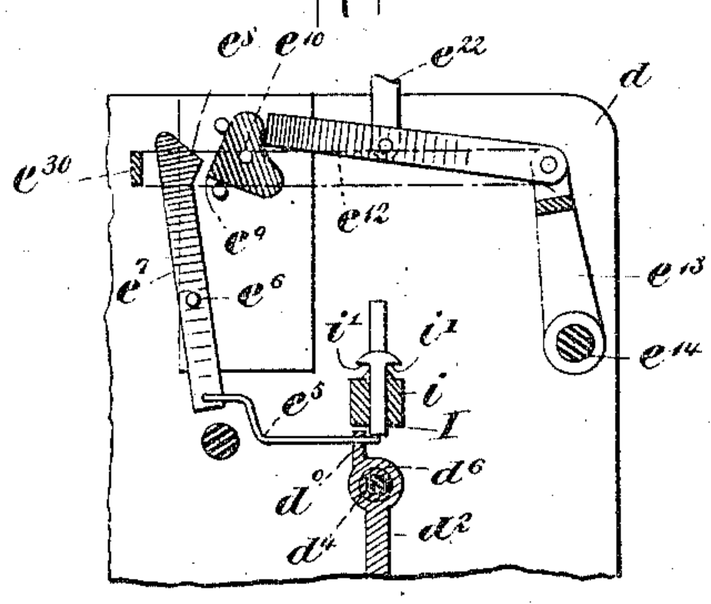


Fig. 26.

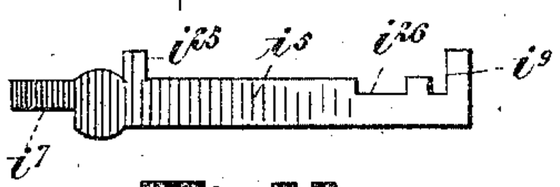


Fig. 27.

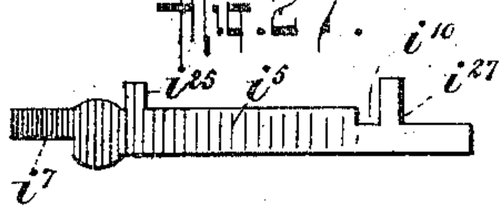
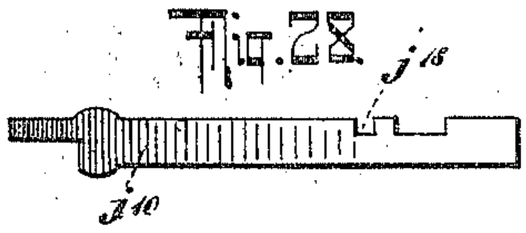


Fig. 28.



WITNESSES:

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ATTORNEYS

UNITED STATES PATENT OFFICE.

JOSEPH A. GROEBLI, OF NEW YORK, N. Y., ASSIGNOR TO THE KURSHEEDT MANUFACTURING COMPANY, OF SAME PLACE.

JACQUARD-CARD-PUNCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 627,256, dated June 20, 1899.

Application filed June 9, 1898. Serial No. 683,033. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. GROEBLI, of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Jacquard-Card-Punching Machines, of which the following is a specification.

My invention relates to jacquard-card-punching machines, and has special reference to the character of machine set forth and described in United States Letters Patent No. 551,544, granted to the Kursheedt Manufacturing Company on December 17, 1895, which machine, as therein set forth, is employed primarily to punch cards designed for use in jacquard mechanism disclosed in United States Letters Patent No. 528,632, also granted to the Kursheedt Manufacturing Company on November 6, 1894.

This invention has for its special object to improve the construction of the punching-machine set forth in the punching-machine patent mentioned; and it consists, primarily, in combining a control embroidering-machine with mechanism for punching or otherwise marking jacquard cards or patterns, so that the control embroidering-machine will at all times show that the proper punches are being set to impart the desired motions to the embroidering-machine fabric-frame and for performing other functions in embroidering.

In the present instance I have shown a punching-machine for punching jacquard patterns or cards provided with a plurality of measuring mechanisms for measuring extents of motion on a drawing or pattern and a fabric-frame executing on a small scale the resultant of the motions of the measuring mechanisms and a control embroidering-machine, of which the fabric-frame forms a part, operating upon the fabric stretched upon the fabric-frame and provided with certain extra or special function devices or mechanisms—to wit, tension mechanism, shuttle mechanism, boring mechanism, &c.—all the parts being so combined that the punching-machine in addition to punching the card for imparting to the fabric-frame of the embroidering-machine various extents of motion will likewise punch the card with holes for actuating mechanisms in the jacquard for effecting functions and operations in the embroidering-machine other than moving the fabric-frame—to wit, for instance, shuttle-changing mechanism, tension-changing mechanism, boring mechanism, &c. These extra or special function punches are in the present instance operated by mechanism intervening between the appropriate functional mechanisms on the control embroidering-machine and the said extra-function punches.

In order that my invention may be understood, I will refer to the accompanying drawings, which show a machine embodying my invention, some of the details of which will be more readily understood by carefully perusing the punching-machine patent, No. 551,544, before referred to.

In the drawings, Figure 1 is a broken-away front elevation of a punching-machine embodying my invention. Fig. 1^a is a fragmentary detail view of the device for moving the pattern-board independently of the movement of the measuring mechanisms, the view being taken from the rear of the extreme left side of Fig. 1. Fig. 2 is a side view thereof with the control embroidering-machine omitted for the sake of clearness of illustration. Fig. 3 is an enlarged detail front view of the main operating parts. Fig. 3^a is a sectional detail view of the selectors and their actuating mechanism. Fig. 4 is a transverse section, the section being taken on line $x\,x$ of Fig. 3. Fig. 5 is a side elevation, with the shaft in section, of the mechanism illustrated in Fig. 3. Fig. 6 is a side view from the opposite side of Fig. 3, the said view showing the shafts in section. Fig. 6^a is a plan view of the clutch-mechanism. Fig. 6^b is a detail view of the arms and pawls for actuating the pattern-feed cylinder. Fig. 7 is a detail view of the cam h^5, hereinafter referred to and shown more particularly in Fig. 5, which cam operates various parts, as will be hereinafter described. Fig. 8 is a side view of a cam h^3, hereinafter referred to, which cam is effective to effect the punching. Fig. 9 is an enlarged detail rear view of the control embroidering-machine and its correlated parts. Fig. 9^a is a detail view of a portion of the fabric-frame of the control embroidering-machine which extends between the guides shown in

Figs. 9, 10, and 11. Figs. 10 and 11 show the guides for moving the fabric-frame of the control embroidering-machine. Fig. 12 is a side elevation of the control embroidering-machine, the said figure being partly broken away to show the operating parts. Fig. 13 is a detail view of the driving parts of the machine and the bore-point-operating cam. Fig. 14 is a vertical sectional view taken through the clutches of the control embroidering-machine. Fig. 15 is a detail sectional view of the bore-point mechanism and the mechanism for shifting the bore-points. Fig. 16 is a view of the same mechanism shown in Fig. 15, the view being taken from the opposite side of the said mechanism, so as to clearly show the tension-regulating mechanism. Fig. 17 is a detail view of the shuttle mechanism of the control embroidering-machine. Fig. 18 is a detail view of a device for shifting the bowl hereinafter referred to to engage it with either of the cams of the shuttle mechanism. Figs. 19, 20, and 21 represent sectional and side views of manually-operated apparatus for setting the special-function mechanisms of the control embroidering-machine in action and likewise sets the mechanism for selecting or effecting the actuation of the extra-function punches. Fig. 22 is a section through the shaft of the machine and surrounding sleeve, which shaft and sleeve are operative to transmit motion from the measuring mechanisms to the guides which propel the fabric-frame of the control embroidering-machine. Fig. 23 is a plan view, partly broken away, showing opposite ends of the punching-block and the arrangement of the punches therein. Fig. 24 is a side elevation of the mechanism for setting or effecting the actuation of the extra-function punches. Fig. 25 is a similar view of the same structure, showing the parts in the position which they assume when the extra-function punches are to be thrown into action; and Figs. 26, 27, and 28 represent slides which are selected by the selectors and operate to set the appropriate punches into action.

Before proceeding to a detailed description of my invention I would have it understood that the general plan of operation of the machine is as follows: I provide a pattern or drawing and a plurality of measuring mechanisms for measuring extents of motion on the said pattern or drawing. These measuring mechanisms are moved to measure distances on the pattern and communicate their motion to selecting mechanisms which select the proper punches corresponding to the extent of movement of the measuring mechanism. The movement of the measuring mechanism is likewise imparted to the fabric-frame of the control embroidering-machine, so that the motion of the fabric-frame of the control embroidering-machine is the resultant or component of the motions of the measuring mechanisms, so that the motion of the fabric-frame of the control embroidering-machine will serve as an indication of the motion which will be imparted to the fabric-frame of the embroidering-machine by the jacquard card or pattern which is being punched, and consequently the control-embroidering machine will execute the same pattern on its fabric-frame as will be executed by the embroidering-machine in which the pattern is to be used. In addition, however, to these functions it is desirable that the jacquard-card be punched to effect the adjustment of the tension of the embroidering-machine, the regulation of the shuttle motion, and also other functions—such, for instance, as determining when and to what extent the bore-points are to be used. In order to bring about this result, I have provided the control embroidering-machine with various "extra" or "special" function mechanisms, as I call them, and have coupled up these extra-function mechanisms by intermediate mechanism or operating connections with extra-function punches, which will be brought into action by manually setting the said extra-function mechanism of the control embroidering-machine for operation, which connections are set into action at the appropriate time by the operator who is punching the card or pattern. It will be obvious, therefore, that the control embroidering-machine will simultaneously with the punching execute the movements and perform the functions which are represented by the holes being punched at that instant, and consequently the control embroidering-machine will at all times indicate to the operator precisely what the punching-machine is doing to the pattern and what may be expected from the pattern being punched.

It will be understood that the card punched may be of any desired form. I contemplate employing a continuous band or strip of paper for this purpose.

A board a^2 is guided and adjusted in a perpendicular direction between the uprights A of the frame of the machine. A design can be secured to the front surface of the board, as shown, from which a jacquard-pattern is to be punched. This board a^2 is shown in its lowest position in Fig. 1. To the back of this board, near its lower end, (see Fig. 1^a,) is secured a stud a^3, which is connected by means of a link a^4 with a crank a^5. The latter is secured to the end of a rotatable shaft a^6, to the other end of which is secured a hand-lever a^7. (See also Fig. 1.) The one arm of this lever is provided with a handle, while the other arm is provided with an adjusting-screw a^9. By means of this lever a^7 the shaft a^6 can be rotated about one hundred and eighty degrees, and thereby the board a^3 can be raised. The adjusting-screw on the hand-lever a^7 by abutting against the upright A limits the rotation. In front of the board a^2 are two rectangles B and B', which are arranged to slide perpendicularly and are guided in ways on the uprights A. The rectangle B is provided with a diagonal bar b^5 from the upper

left-hand corner to the lower right-hand corner, while the rectangle B′ is provided with a diagonal bar b^6 from the upper right-hand corner to the lower left-hand corner. These diagonal bars are arranged to cross at an angle of ninety degrees. On the upper edges of these two diagonal bars rests a slide b^7, the lower end of which rests by means of a button b^{10} (shown dotted) on the surface of the diagonal bar b^6. The slide b^7 is provided with a sight b^{11}. Movement of one or the other, or both, of the rectangles B and B′ will displace the slide b^7 and bring the sight b^{11} to any desired point on the surface of the design. These rectangles serve by their movement to measure distances on the pattern on the board and may be termed "measuring" mechanism.

To the guides b and b' of the rectangles B and B′ are fastened steel bands b^{14} b^{14}, which are carried over pulleys to the rear of the machine, as in my Patent No. 551,544, and are there secured to suitable weights, which balance the rectangles. Secured to the shafts of the lower pulleys b^{16} are gear-wheels b^{19}. The pinions b^{21} drive the gears b^{19} by means of intermediate gears b^{20}. Each pinion b^{21} is secured to a disk c'. Similar disks c^2 are mounted loosely on studs secured to the upper end of the machine, and endless cords c^3 are carried over the upper and lower disks. By means of these cords the disks c', and by means of the gearing above described the corresponding gears b^{19}, can be turned by hand in the one or the other direction. In this manner each of the rectangles B or B′ can be moved along its ways up or down. One of the disks c', with its pinion b^{21}, is screwed to a shaft C′, (see Fig. 22,) one end c^0 of which is made tubular and receives the end of the shaft C. A sleeve c is loose on the shaft C, and the other disk c', with its pinion, is loose on the sleeve. The ends of the shaft C and the sleeve c extend outside of the upright A and are provided at their ends with the pinions c^3 and c^4, respectively. The pinion c^3 by means of intermediate gears and pinions c^5, c^6, and c^7 transmits motion to the vertical rack c^8, (see Figs. 2, 10, and 11,) while the pinion c^4 by means of similar intermediate gears and pinions c^{50}, c^{60}, and c^{70} transmits motion to the second vertical rack c^9. The upper end of the rack c^8 is fastened to a frame c^{10}, while the upper end of the rack c^9 is fastened to a frame c^{11}. These frames are arranged to slide vertically in ways c^{12} and c^{13}, secured to the upright A, and each is provided with two inclined parallel grooves c^{14}. The frames c^{10} and c^{11} are arranged so that the inclined grooves are placed opposite each other and cross at an angle of ninety degrees. The ends of the upper and lower transverse bars c^{16} and c^{17} of the fabric-frame C^0 of the control embroidering-machine are provided with projections c^{15}, (see Fig. 9ª,) which enter the grooves of the frames c^{10} and c^{11}. Fastened to the upper ends of the frames c^{10} and c^{11} are the ends of a belt c^{18}, (see Fig. 2,) which passes over a pulley c^{19}, the latter being mounted loosely in a hanger attached to one end of a second belt c^{20}. The belt c^{20} is carried over a pulley c^{21}, which is mounted loosely near the upper end of the upright A. To the other end of this belt c^{20} is attached a weight c^{22}, which balances the weight of the frames c^{10} and c^{11} and of the fabric-frame C^0. When the rectangles are being moved up or down along their ways by means of the cords, the frames c^{10} and c^{11} move in harmony and by their combined action move the fabric-frame to the desired point. The gearing is so arranged that the displacement of the frames c^{10} and c^{11} is one-sixth of that of the rectangles—that is to say, the little frame executes the movements proposed to be given to the fabric-frame of the embroidering-machine.

The movement of the rectangles B and B′ is effected by means of the connections already described and by means of the gear-wheels c^{23} c^{23} on shaft C and sleeve c transmitted to the mechanism, which determines the required perforations in the jacquard-pattern. The gear-wheel c^{23} is secured to the shaft C and is by means of a bolt c^{24} connected to coupling c^{25} on the shaft C′. The head of the bolt c^{24} enters a groove c^{26} on collar c^{27}, so that by sliding this collar on the shaft C′ the gear-wheel c^{23} can be disconnected from or connected to the coupling c^{25}. The other gear-wheel c^{23} is secured to the sleeve c, and the corresponding disk c' is loose on the same sleeve. A bolt c^{28}, whose head fits into a groove c^{26} of another collar c^{27}, is in a coupling c^{25}, which is secured to the sleeve c. The two collars c^{27} are provided with arms and secured to a common rod c^{29}, (see Fig. 3,) which is provided with a handle c^{30}, by which means both collars can be shifted at the same time in the one or in the other direction.

To the foundation-plate D, which is held between the two uprights A, are secured side frames d d. (See Figs. 1 and 3.) To each of these side frames is secured a bearing d' d^2, and between these two bearings are placed four selectors, (see Figs. 3 and 3ª,) herein shown as pin wheels e' e^2 e^3 e^4. The circumference of these selectors or pin-wheels is divided into fifteen parts. Fourteen out of the fifteen divisions are provided each with a projection pin e, while one division remains vacant. The pins e are arranged in spirals running on one half of the circumference from one end to the other and on the other half of the circumference back again. One end (right) of each selector or pin-wheel is provided with a flange extending over seven divisions and which is of the same height as the pins.

The pin-wheels e^2 e^3 are secured to shafts d^3 and d^4, respectively, (see Fig. 3ª,) while the pin-wheels e' and e^4 are secured to sleeves d^5 and d^6, mounted loosely on the shafts d^3 and d^4. The shaft d^3 also carries loosely a pinion d^7, which is provided with a disk d^8. A similar pinion d^7, with disk d^8, is loosely

mounted on the sleeve d^6. Each of these pinions is in mesh with a corresponding gear-wheel c^{23} (see Fig. 22) and is rotated whenever the disks c' (by means of the cords) are turned in the one or the other direction. The disks d^8 of the pinions d^7 are provided near their circumference with fifteen holes at regular distances from one another. A bolt d^{12} in the double disks d^{10} d^{11}, which are secured to the shaft d^3 or to the sleeve d^6, is arranged to enter any one of these holes to lock the selector in place. The disks d^{10} are provided with a stud d^{15}, which at each revolution engages with one of the four slots d^{16} of a wheel d^{17} and rotates the latter one-quarter turn. Each of these wheels d^{17} is secured to a shaft d^{18}, which carries another wheel d^{19}. The circumference of the wheel d^{19} is made to fit after each quarter-turn on the circumference of disk d^8 and prevents any accidental rotation of the shaft d^{18}. The disk d^{11} has diametrically opposite the bolt d^{12} a notch, which permits the wheels d^{17} d^{19} on the shaft d^{15} to turn a quarter-turn after every rotation of the disks d^{10} and d^{11}. The rotation of the shafts d^{18} is transmitted to the sleeve d^5 or the shaft d^4 by means of the wheels d^{21}, which are provided with four studs, which latter are arranged to enter spaces in the wheels d^{22}. The wheels d^{22} are loose on the sleeve d^5 or on the shaft d^4 and are connected by means of bolts d^{23} with disks d^{24}, which are provided with corresponding holes to receive the bolts, Fig. 3ª, and are secured to the sleeve d^5 or to the shaft d^4. The heads of the bolts d^{12} d^{23} enter grooves in four collars d^{25} and d^{26}, which are provided with arms and secured to a rod d^{13}, which can be shifted in the direction of its axis. By shifting this rod d^{13} the bolts d^{12} and d^{23} can be withdrawn from the holes in the disks d^8 and d^{24}, so that the pin-wheels e', e^2, e^3, and e^4 can be returned to their normal positions. For this purpose the disks d^{11} and d^{24} are provided with noses d^{27}, Fig. 3ª, and tongs f f are provided adapted to engage with the two oppositely-placed noses, Fig. 6. The lower ends of the tongs are pivoted to a lever f', (see Figs. 3 and 5,) secured to a rock-shaft F. The tongs by means of the links f^2 are also pivoted to the brackets d' d^2. The upper ends of these tongs are fork-shaped and are normally at rest above the noses d^{27}. During the downward motion one or the other side of the tongs f f engages with the noses and brings them back to their normal positions, so that the vacant division of the pin-wheels is brought to the top.

The shaft F is provided at its end with an arm f^3, which by means of a link f^4, Fig. 5, is connected to an arm f^5 of a bell-crank lever f^5 f^6. The latter is mounted loosely on a stud f^7, and its arm f^6 is provided with a bowl which engages with the cam h^5. By these means the tongs f f, during the rotation of the cam h^5, receive a downward and an upward movement.

It will be understood from the above description that the pin-wheels are set to their proper position by hand, motion being communicated thereto from the cords which move the measuring mechanism, while the punching of the holes in the jacquard-pattern is effected by mechanical means.

I will now describe the punching mechanism.

A driving-pulley G is secured on a shaft G^2. To the shaft G^2 are secured a collar g' and a pinion g^2. The drawing Fig. 6ª shows the shaft in position when the machine is at rest, and in this position the arm of a bell-crank lever g^3 g^4 bears against the collar g' and forces a friction-clutch G^3 away from the driving-pulley G and against the brake-ring G^3, so that the driving-pulley will rotate idly. The bell-crank lever g^3 g^4 is held in this position by a shoulder g^7 on the two-armed lever g^5 g^6, (see Figs. 6 and 6ª,) bearing against a shoulder g^8 of the arm g^4. When the lever g^5 g^6 is moved so as to disengage its shoulder g^7 from the shoulder g^8 of the lever g^4, then under the action of a spring g^9 the shaft G^2 is pushed in the direction of the arrow g^{10}, Fig. 6ª, so that the friction-clutch G' leaves the brake-ring G^3 and engages with the driving-pulley G, whereby the shaft G^2 is rotated. This movement of the lever g^5 g^6 is caused by hand by a pull downward of the cord g^{15}, which connects a pivoted lever g^{12} to another lever at the top of the machine, which is not shown. The arm g^{13} of lever g^{12} is connected by a rod g^{16} to the rear end of the lever at the top of the machine. The lever g^{12} g^{13} is provided with two other arms g^{14} g^{11}, Figs. 3 and 6. The end of the arm g^{11} is forked, and the end of the arm g^5 of the lever g^5 g^6 engages with this fork. A pull downward on the rope g^{15} will cause the arm g^{11} to be lifted. The lower prong of the fork lifts the arm g^5 and lowers the arm g^6 and disengages its shoulder g^7 from the shoulder g^8. The pinion g^2 transmits the rotation of the shaft G^2 by means of the gear-wheel h to the shaft H. The shaft H is rotatably mounted in the side frames d d and is provided with teeth h^2 and further carries the two cams h^3 h^5 and a sprocket-gear h^7. The latter transmits the rotation of the shaft by means of a sprocket h^8 and another chain-gear h^9 to the shaft h^{10} of a control embroidering-machine.

Above the selectors e' to e^4 are arranged a series of small slides i, Fig. 4, one of the latter for each of the pins e in the pin-wheels. These slides i are placed loosely in slots of a bar I, and their heads i' rest upon the upper surface of the bar. The bar I is secured to two arms i^2 on a shaft i^3. The latter is rotatively mounted in the side frames d d and is provided at its end with an arm i^4, which carries a bowl which engages in the groove h' of the gear-wheel h, Fig. 6, so that the rotation of the gear-wheel h will cause the bar I and its slides i to be first lowered and then raised again. Upon each slide i rests the front end of a bolt i^5 i^6, Figs. 4, 26, and 27. The res-

e^{11} on a stud e^{10}. By rocking the triangular piece e^{11} the lever e^{7} and its pin e^{5} can be brought to the position shown in Fig. 25.

The triangular piece e^{11} receives its movement from a link e^{12}, having a yoke e^{30} e^{33}, slotted at e^{31} for the passage of stud e^{32}. The links on each side of the machine are jointed to a common arm e^{13}. The two arms e^{13} are secured to a rock-shaft e^{14}, which is further provided with an arm e^{15}, which carries a stud e^{16}. A bar e^{18} is pivoted to a bell-crank lever e^{19}, while the front forked end of it engages with the stud e^{16} on the arm e^{15}. The bell-crank lever e^{19} is hung on a stud e^{20}, and its other arm carries a bowl which engages with the cam h^{5}. On the rock-shaft e^{14} are also two pawls e^{21}, (only one of which can be seen in Figs. 3 and 6.) The function of the pawls e^{21} is to engage with the gear-wheels c^{23} and to prevent any rotation of the selectors while the punching is taking place. They also prevent the punching mechanism from being set in action when the pin-wheels are not in the proper position. In that case they would strike on the point of a tooth of wheel c^{23} instead of entering into a space between two teeth. When the punching mechanism is not in action, the downwardly-extending arm of one of these pawls rests on the end of the arm g^{14} of the lever g^{11} g^{13}, (see Fig. 3,) and the arms e^{18} are thereby maintained in the position shown in Figs. 3 and 24.

Each link e^{12} is by means of a rod e^{22} connected to the end of a lever e^{23} e^{24}. (See Figs. 1, 9, 19, 20, and 21.) The other ends of these levers e^{23} e^{24} are connected to the lower end of a rod e^{25}, the upper end of which is pivoted to a crank-pin e^{28} on a disk e^{26}, Figs. 2, 19, 20, and 21. A half-turn of this disk swings the corresponding lever e^{23} and brings the link e^{12} into the one or the other of the two positions shown in Figs. 24 and 25. The disks e^{26} are rotated by means of small hand-cranks e^{29}. When by rotation of the hand-crank the end of the link e^{12}, Fig. 24, is raised, then by the next rocking of the shaft e^{14} the link e^{12} strikes against the upper corner of the triangular piece e^{11} and rocks the latter into position shown in Fig. 25. The nose e^{9} of the piece e^{11} in passing the nose e^{8} of the lever e^{7} swings the latter and moves the pin e^{5}, pivoted to its lower end, to the position shown in Fig. 25, so that the corresponding slide i at the next downward movement of the bar I strikes against the pin e^{5} and is thereby maintained in its high position, and the corresponding punch will then be locked by the bolt. When the link e^{12} returns again to its normal position, an arm or yoke e^{30} e^{33} on the lever e^{13} brings the lever e^{7} and its pin back to the normal position, wherein the nose e^{8} rests against the triangular piece e^{11}. As long as the end of the link e^{12} remains in its raised position the triangular piece will remain stationary; but when by means of the hand-crank e^{29} the end of the link e^{12} is lowered then in its next movement it would strike against the lower corner of the triangular piece e^{11} and will move the nose e^{9} upward, and thereby bring the lever e^{7} and its pin e^{5} again in a position shown in Fig. 25. The perforations made on the margins of the jacquard-pattern by the punches just mentioned are for the purpose of initiating on the embroidering-machines certain special or extra functions in the operation thereof other than moving the fabric-frame—for example, stopping of the embroidering-machine, connecting and disconnecting bore attachments, change of shuttle motion, regulation of the tension, &c. In order to show that the proper punching of the card or pattern by these punches is being done, I interpose a connection between each punch and the corresponding functional mechanism of the control embroidering-machine, so that at the same time that the corresponding perforation in the pattern is produced the intervening mechanism will initiate the movement of the special function of the control embroidering-machine.

On a stud d^{27} of the side frame d is a two-armed lever d^{28} d^{29}, Fig. 5. Its object is to shift the rod d^{13} in the direction of its axis. The arm d^{28} is provided with a bowl which engages in the cam h^{5}. The end of its other arm d^{29} is spiral-shaped and engages in or with the corresponding groove d^{31} of the collar d^{26} on the rod d^{13}, so that by the rotation of the cam the lever d^{28} d^{29} oscillates and shifts the rod d^{13} axially.

K and K′ (see Fig. 4) are two feed-cylinders for the perforated jacquard-pattern. The shaft k of the lower cylinder is rotatably mounted in the side frames d d. To the one end of the shaft is secured a ratchet-gear k', (see Figs. 6 and 6ª,) which is acted upon by two pawls k^{2} k^{3}. The pawl k^{2} serves to retain the ratchet-wheel in its position and is secured to the arm k^{4} of a three-armed lever k^{4} k^{5} k^{6}, which is loosely mounted on a stud k^{30} of the side frame d. The arm k^{5} of this lever is connected by means of a link k^{7} with the lever i^{4}. The pawl k^{3}, which serves to rotate the ratchet-wheel, is secured to a link k^{8}. This link at its one end is connected to the arm k^{6} and at its other end by means of another link k^{9} with the arm k^{9} of the bell-crank lever k^{9} k^{10}, which is mounted loosely on the stud k^{11}. The end of the arm k^{10} carries a bowl which engages with the cam h'. The arm i^{4} serves to alternately engage the pawls k^{2} k^{3} with the ratchet-wheel, and the bell-crank lever k^{9} k^{10} serves to move the pawl k^{3} so as to rotate the ratchet-wheel.

The shaft k^{12} of the upper cylinder K′ is rotatably mounted in two arms k^{13}. These arms are secured to a shaft k^{14}. Springs k^{15} draw the arms k^{13} downward and force the cylinder K′ against the cylinder K. The cylinder K′ is provided with spurs which engage with the large perforations of the jacquard-pattern. The cylinder K has corresponding holes, into

ends i^7 of the bolts are partly cut away. They are guided in slots of the punching-block I', a bolt being placed over each one of the punches I^0. When the bar I is moved downward, the slides i, meeting pins on the pin-wheels, will be prevented from going down with the bar, while all the others will follow the bar in its downward movement. The front end of the bolts i^5 i^6, resting on the heads of the slides i, will be in the high or the low position, according to the position of the corresponding slide i. The bolts i^5 i^6 are provided near their front ends with notches i^9 i^{10}, Figs. 26 and 27, and the lower edges of two vibrating bars i^{11} i^{12} enter these notches when the bolts are in their high position. The bars i^{11} i^{12} are secured to shafts i^{13} i^{14}. The latter are rotatably mounted and at their ends are provided with arms i^{15} i^{16}. The arm i^{15} by means of the link i^{17} is connected to the arm i^{18} of the two-armed lever i^{18} i^{19}, mounted loosely on a stud i^{20} of the side frame d. (See Fig. 5.) The other arm i^{19} carries a bowl which engages with a cam h^5. The arm i^{16} by means of the link i^{21} is connected with the arm i^{22} of the two-armed lever i^{22} i^{24}, Fig. 5, which is loosely mounted on a stud i^{23}. The other arm i^{24} carries a bowl which engages with a cam h^5. At each rotation of the cam the bars i^{11} i^{12} are made to oscillate, but not at the same time. By means of these oscillations the bolts i^5 i^6, which could not follow the downward movement of the bar I, are pushed toward the rear and afterward toward the front again. The bolts i^5 are acted upon by the bar i^{11} and the bolts i^6 by the bar i^{12}. The bolts i^5 i^6 are further provided with a nose i^{25}, which limits their backward movement. The notches i^{26} i^{27} of the bolt i^5 i^6 admit of the free oscillation of that bar i^{11} or i^{12} which is not intended to act on the corresponding bolts i^6 or i^5. When the bolts i^5 i^6 are pushed toward the rear, then the broad portion thereof reaches over the punches I^0 and locks the same. The punches I^0 are placed loosely in corresponding holes of the flanges I^2 I^3 of the punch-block I'. To each punch is fastened a collar i^0, which ordinarily rests on the flange I^2. A transverse bar I^4 is provided with holes, through which the punches pass loosely, and is arranged above the collars i^0 and limits the upward movement of the same. In punching one row of holes in the jacquard-pattern both rows of punches coöperate. The object of this construction is to punch the perforations nearer together than they could otherwise be.

J is the die-plate, which is secured to the block J' on the foundation-plate.

J^2 is the presser-plate, provided with openings allowing the punches to pass through, and serves to hold the paper firmly to the die-plate while the perforations are being punched or to prevent the paper from being lifted when the punches withdraw. It is secured to two rods j j, Fig. 4, which latter are guided in corresponding holes of the die-block J'. The lower ends of the rods project below the block J', and spiral springs j' are placed on the projecting ends for the purpose of pressing the rods downward. On a rock-shaft j^2 are arranged two arms j^3, which reach under the plate J^2 for the purpose of raising it at the proper time. To the end of the shaft j^2 is secured an arm j^4, carrying a bowl which engages with a cam h^5, Fig. 5. The punch-block I' is secured to two rods j^5, Fig. 4, passing through corresponding holes in the die-block J'. The punch-block I' is by means of two links j^6 connected to two arms j^7 on a rock-shaft j^8. An arm j^9, secured to the end of this rock-shaft, carries a bowl which engages with the cam h^3, (shown in Figs. 5 and 8,) so that the punch-block I' at each rotation of the cam is lowered and raised, preferably twice for each rotation of the cam. The punches which have been locked by their corresponding bolts are during the downward movement of the punch-block forced through the paper, while the punches whose bolts have not been pushed toward the rear will follow the downward movement of the punch-block until they reach the paper, but will not be forced through the paper.

In addition to the two rows of punches I^0 are two punches of larger size I^5, Fig. 23. The latter serve to make the perforations which are necessary for receiving spurs on the jacquard-cylinder of the jacquard-machine. Their bolts j^{10}, Figs. 3, 4, and 28, have a notch j^{18}. The bar i^{12} enters this notch when the front ends of the bolts are in their high position. The front ends of the bolts j^{10} can be raised by arms j^{19} on a rock-shaft j^{12}, which receives motion from a crank-pin j^{16} on a gear-wheel j^{15} by means of links j^{13} j^{14}. The gear-wheel j^{15} is mounted loosely on a stud j^{17} of the side frame d and meshes with the teeth h^2 of the shaft H. The bolts j^{10} are by this means raised and lowered periodically and the corresponding holes are produced in a jacquard-pattern at regular intervals. There are further provided four additional punches I^0 on each side of the machine, which are also arranged in two rows. They are also arranged to be locked by means of bolts i^5 i^6, whose front ends also rest on slides i of the bar I. These slides i are not acted upon by the selectors or pin-wheels e' to e^4, but by the pins e^5, which are guided in a flange d^0 of the bearing d' d^2, Figs. 24 and 25. These pins can be moved forward, and will then reach under the corresponding slides i and prevent the latter, as also the front ends of the bolts i^5 i^6, from being lowered, Fig. 25. When these punches are not to be actuated, the pins e^5 will be in the position shown in Fig. 24. The rear end of each of these pins e^5 is secured to the lower end of a two-armed lever e^7, pivoted to a stud e^6. The upper end of this lever is provided with a nose e^8, which engages with a corresponding nose e^9 of a triangular piece

which the spurs can enter. The cylinders K K' are provided with gear-wheels k^{17}, which are in mesh.

K^{18} is a cylinder which serves to receive the jacquard-pattern. It can be placed in one or the other of the bearings k^{19} k^{20} of the side frames *d*. The cylinder k^{18} is turned by means of one of the pawls k^{21}, which acts on the ratchet-wheel k^{22}, (see Figs. 2 and 5,) which is frictionally connected to the cylinder. These pawls k^{21} are on a common arm k^{23}, which receives a reciprocating motion from the eccentric k^{24} on the shaft II. The blank paper K^2 required to be punched for the jacquard-pattern is placed on a cylinder mounted in bearings k^{25}, Fig. 2. It is from there carried down toward the punch-block and is passed between the die-plate J and the presser-plate J^2, and from there passed between the cylinders K and K' to the cylinder k^{18}.

The stopping of the punching mechanism after each action is done automatically. For this purpose the lever g^5 g^6 is mounted loosely on a stud g^{19} on an arm g^{20}. (See Figs. 6 and 6^a.) The arm g^{20} is pivoted on a stud g^{21} of the side frame *d*. Its end is provided with a bowl which engages with the cam *h*, so that at a certain time the arm g^{20} moves toward the rear, whereby the bell-crank lever g^3 g^4 is turned oppositely to the arrow, Fig. 6^a. The friction-clutch G' is thereby disengaged from the driving-pulley G and engages with the brake-ring G^3.

The shaft h^{10} of the control embroidering-machine by means of the gear h^{11} and intermediate gear h^9, Figs. 12, 13, and 14, transmits its motion to a gear h^{12}, which is arranged to drive the embroidering mechanism or the bore attachment, only one of these functions being performed at any one time. The gear h^{12} is loose on the shaft h^{13}. The shaft h^{13} operates the needle as well as the shuttle. On the shaft h^{13} is an arm h^{14}, which carries a bolt h^{15}, which can engage with a corresponding hole h^{16} of the gear h^{12}. The head of the bolt h^{15} engages with a slotted block h^{17} on a rod h^{18}. The rod is linked to a crank-pin of one of the disks e^{26}, Figs. 19 and 20, so that by turning of the hand-crank e^{29} the embroidering mechanism may be connected to or disconnected from the driving-gears and at the same time the corresponding punch will be selected to make the proper perforation in the jacquard-pattern at the next action of the punching mechanism.

To the fraime of the control embridering-machine is secured a stud h^{19}, which is in line with the shaft h^{13}. On the stud is mounted loosely a cam h^{20}. To this is secured a disk h^{21}, and in a hole therein is carried loosely a bolt h^{22}. The head of the bolt fits into a slotted block h^{23} on a rod h^{24}, which is pivoted to a crank-pin on a disk e^{26}. By rotating the hand-crank e^{29} the bolt h^{22} can be shifted and by that means the cam h^{20} be engaged with or disengaged from the gear h^{12}. An interlocking mechanism is provided on rods h^{18} and h^{24}, consisting of blocks h^{25} h^{25}, which prevent the bore attachment from being set in action while the embroidering mechanism is operating, and vice versa. To prevent accidental rotation of the shaft h^{13} or of the cam h^{20} when disengaged, there are provided notches h^{26} in the frame L, into which the heads of the bolts are inserted when the parts are uncoupled.

Against the periphery of the cam h^{20} an arm l^2, carrying a bowl l', is pressed by a spring *l*. The arm l^2 is secured to a rock-shaft l^3, which also carries an arm l^4, Fig. 15. During each rotation of the cam h^{20} the shaft l^3 is rocked and by means of a pawl l^5 transmits motion to a boring-bar l^6. The bar l^6 is provided at its end with a double bore-point l^7 l^8. The other end of the bar in its normal position rests against an adjustable arm l^{10}, being drawn against the said arm by a spring l^9. The bar is at this end provided with a number of teeth l^{12}, with which the pawl l^5 can engage. In the position shown in Figs. 15 and 16 the pawl l^5 strikes against the stationary stud l^{13} on the frame L and is held disengaged from the teeth l^{12}; but when the arm l^4, with the pawl l^5, moves away from the stud l^{13} then the pawl l^5 is caused to engage with the teeth l^{12} by a spring l^{14} and pushes the bar l^6 forward, whereby one of the bore-points l^7 or l^8 penetrates into the fabric, at the same time distending the spring l^9. When the pawl l^5 returns to the position shown in the figure, the tooth l^{12} remains in contact with the pawl under the influence of the spring l^9 until the pawl, striking against the stud l^{13}, is disengaged from the tooth l^{12}, and then the bore will continue its movement until it rests against the arm l^{10}.

By adjusting the position of the arm l^{10} the relative position of the bore-point to the fabric can be adjusted, and thereby the depth of penetration of the bore-point into the fabric. When the position of the arm l^{10} is changed, then the pawl l^5 will engage with a different tooth. The arm l^{10} is secured to a shaft l^{11}, which by means of gearing l^{15} is connected to the axle of a disk e^{26}, so that every half-revolution of the corresponding hand-crank e^{29} adjusts the arm l^{10} to a different position. At the same time the corresponding punch is selected, which at the next action of the punching mechanism perforates the jacquard-pattern.

The bore-point l^7 is of square section, having four cutting edges, while the bore-point l^8 is round. They are placed at an angle to one another and are secured to a collar mounted loosely on a stud l^{16} on the boring-bar l^6. An arm *m* on the collar engages with a slot *m'* of the horizontal arm of an L-shaped slide M on the frame L. The slide M is connected by means of a bell-crank lever m^2 and a rod m^3 (see Figs. 12 and 16) with a crank-pin on a disk e^{26}, so that by turning the hand-crank e^{29} of the disk e^{26} the slide M can be moved perpendicularly, and by that means one or

the other of the bore-points l^7 l^8 can be brought into the active position. It must be understood that the embroidering-machine for which the jacquard-pattern is being punched is likewise provided with similar bore-points which need to be changed at predetermined times, so as to bring one or the other into operation on the fabric. The mechanism just described is the means whereby the control embroidering-machine may be operated to change its bore-points and the pattern punched at the same time by a punch corresponding to this function.

The thread for the control embroidering-machine is on a spool N and is carried around a tension n to the needle-bar n' and to the needle n^2. To regulate the tension, a brake n^4 is provided and bears against the disk n^3 by the action of a spring n^5. The other end of the spring n^5 is connected to an adjustable arm n^6, which is secured to a rock-shaft n^7, which is connected by a gearing to the axle of a disk e^{26}. By turning the corresponding hand-crank e^{29} half a revolution at a time the arm n^6 can be adjusted, and thereby the tension regulated. At the same time the corresponding punch is selected, so that during the next action of the punching mechanism the proper perforation is made.

The shuttle o in the rear of the control embroidering-machine, Figs. 9 and 17, receives its motion from a cam O. The shuttle-carrier o^2 is connected to a bar o'. The other end of this bar is connected to a sliding block o^3, which is provided with a bowl o^5, which engages with grooves o^6 o^7 on cam O. A rotation of the cam gives the shuttle a to-and-fro motion. According to the particular kind of stitches to be produced a different movement of the shuttle is required. For this purpose two cams are provided. The bowl can engage with one or the other of these cams by being shifted in the direction of its axis. This is accomplished by means of a bar o^{10}, having a cam o^{11} engaging a stud o^{12} on a slide carrying the bowl. The bar o^{10} is pivoted to a bell-crank lever o^9, the other arm of which by means of a rod o^8 (see Fig. 9) is pivoted to a crank-pin on a disk e^{26}, so that by turning the corresponding hand-crank e^{29} the bowl can be shifted from one cam to the other and at the same time the corresponding punch be selected, so that during the next action of the punching mechanism the proper perforation is made.

Having described the various parts of the machine, I will now describe its operation.

The design for which a jacquard-pattern is to be perforated is secured to the board a^2, and by moving the rectangles B and B' by means of the cords c^3 the sight b^{11} can be brought to the desired position opposite the design. In doing this the fabric-frame C^0 of the embroidering-machine is brought to its proper position by the guides c^{14}, and the selectors e' e^2 e^3 e^4 are moved from their normal position by the cords c^3 and their connections to the position corresponding to the distance which the two rectangles have been moved. The selectors e' e^3 are moved one step after the first half-revolution of the selectors e^2 e^4 and then one step after every whole revolution. The rectangles having been set, the cord g^{15} is pulled, whereby the friction-clutch engages with the driving-pulley, which then rotates the shaft H. At the same time the arm g^{14} causes the pawl e^2 to slightly enter spaces of the gears c^{23}. The movement of the pawls e^{21} is then completed by the action of the cam h^5 on the lever e^{19} and on the shaft e^{14}, and the pawls are thereby fully entered in said spaces of the gears, while at the same time the links e^{13} are pushed and one or more of the pins e^5, if any be selected, is brought in position shown in Fig. 25. The cam h' by means of the lever i^4 lowers the bar I, whereby the slides i which meet no pins on pin-wheels e' e^4 are lowered, while those which meet such pins remain in their raised position, together with the ends of the bolts i^5 i^6. Then the pawl k^2 is withdrawn from the gear k' and the pawl k^3 is entered. By means of the levers i^{19} i^{18} i^{15} the shaft i^{13} is rocked, and thereby the bolts i^5 which have remained in the raised position are pushed toward the rear and the corresponding punches i^9 are locked. The cam h^3 then acts on the arm J^9, whereby the punching-block i' is lowered. The punches in the front row which have been locked penetrate the pattern. The punching-block is raised again. The bolts i^5 are returned to their normal position. The cam h', acting on the arm g^{20}, moves the lever g^5 g^6 toward the front. By means of the levers i^{24}, i^{22}, and i^{16} and link i^{21} the cam h^5 rocks the shaft i^{14}, and thereby pushes the bolts i^6 which are in the high position toward the rear and locks the corresponding punches. At the same time the shaft j^2 is rocked and lifts the pressure-plate J^2, and then the cam, acting on the arm k^{10}, moves the pawl k^3, thereby turning the gear k' and the cylinders K K', thereby drawing the paper K^2 one step toward the rear, so that that part of the paper which had been under the front row of punches is now brought exactly under the second row of punches, so that any perforations made by the second row of punches are exactly in line with perforations made by the front row. Then the punch-block I' is again lowered. The punches which are locked perforate the paper. The pressure-plate in the meantime having again been lowered is forced on the paper by the spring f', the punching-block I' is again raised, and the bolts i^6 are drawn back to their normal position. The further rotation of the cam h^5, acting on the arm d^{28}, causes the spiral-shaped end d^{30} of the other arm d^{29} to act on the corresponding groove d^{31} of the block d^{32}, and thereby to shift the rod d^{13} laterally to the right, Fig. 3^a, causing the bolts d^{12} d^{23} to be withdrawn from the holes in the disks d^8 d^{24}. The pin-wheels e' e^2 e^3 e^4 are thereby disconnected from the gears c^{23}, so that the pin-wheels may be re-

turned to their normal position. The bar I will now be raised and the arm i^4 lowered, whereby the pawl k^3 is disengaged from and the pawl k^2 engaged with the gear k'. By means of the arms f^6 f^5 f^3 and the link f^4 the cam h^5 rocks the shaft F, moving the arms f' downward. The tongs f f, connected to said arms f', return the pin-wheels e' e^2 e^3 e^4 to their normal position by engaging the noses d^{27} on disks d^{11} d^{24}. The arm d^{29} now moving downward enters the bolts d^{12} d^{23} into the corresponding holes of the disks d^8 d^{24}, and then by rocking the shaft F the tongs f f are again returned to their normal position. By the return movement of the lever e^{18} the pawls e^{21} are withdrawn from the gear-wheels c^{23}. By the action of the cam on the lever g^{20} the lever g^5 g^6 is pushed toward the rear, whereby the shoulder g^7 of the arm g^9, acting against the shoulder g^8 of the arm g^4, brings the bell-crank lever g^4 g^3 into the position shown in Fig. 6ª, and thereby withdraws the friction-clutch from the driving-pulley and engages the same with the brake-ring, whereby the machine is stopped. The rectangles can now be moved to the position corresponding to the next stitch, &c.

During every action of the machine while the punching mechanism perforates the jacquard-pattern the complete embroidery corresponding to the design is produced on the control embroidery-machine, which stitches, bores, and performs the other functions that may be necessary, so that the operator can at all times verify the correctness of the work done.

When any of the special functions already referred to—such as stopping of the machine, disconnecting of the sewing mechanism, &c.—are required, the operator moves the appropriate handle e^{29} and a corresponding perforation in the pattern is made and the corresponding action on the control embroidering-machine performed.

On the control embroidering-machine the bore-point is some distance below the needle, and in changing from stitching to boring the fabric-frame is to be lowered that much. Then it becomes necessary to move the board the corresponding distance. The hand-crank a^7, Fig. 1ª, and its connections are provided for this purpose. After moving the board the rectangles B B′ are brought to the same point on the design where they were previous to the board being moved. The distance which the board a^2 is moved and the distance which the fabric-frame C^0 is moved correspond exactly to the distance between the bore-point and the needle. Changing back from the boring action to embroidering, the board a^2 will be again returned to the former position and the rectangles likewise.

Large designs—that is, designs of greater dimension than can be accommodated on the machine—will be put on in parts. When the rectangles B B′ have reached their limit, the pattern can be taken off and a new portion put in its place on the board. By shifting the handle c^{30} on the rod c^{29} to the left, Fig. 3, the disks c' and the rectangles B and B′ will be disconnected from the pin-wheels e' e^2 e^3 e^4 and the fabric-frame of the control embroidering-machine. The teeth on collars c^{31} engage with gears c^{23}, preventing the latter from accidental rotation. The rectangles may now be moved so as to bring them to the proper point on the new design, whereupon the disks c may again be connected with the other mechanism.

What I claim, and desire to secure by Letters Patent, is—

1. In a machine for producing jacquard-patterns for embroidering-machines, the combination of marking mechanism, for marking a jacquard-pattern, selecting mechanism therefor, and means for recording the movements of the selecting mechanism elsewhere than on the pattern.

2. In a punching organism, the combination of a punching-machine for punching jacquard-patterns for embroidering-machines, a control emboidering-machine, having embroidering devices, operating connections intervening between the elements of the punching-machine and the elements of the embroidering devices and operating upon the control emboidering-machine in such manner that at the same time that the pattern is perforated embroidery is produced on the control embroidering-machine by means of which the correctness and accuracy of the pattern may be verified.

3. In a punching mechanism for perforating jacquard-patterns for embroidering-machines, the combination of measuring mechanism, punching mechanism with operating connections for punching the pattern under the control of and operating in response to the movement of the measuring mechanism, and a control embroidering-machine with operating connections under the control of and operating in response to the movement of the punching mechanism, substantially as described.

4. In a punching-machine for punching jacquard-patterns for embroidering-machines, the combination of punching mechanism comprising a series of extent-punches and one or more extra-function punches, a control embroidering-machine with means for controlling the same from the punching mechanism, and provided with extra-function mechanism corresponding to the extra-function punches and operating connections intervening between the extra-function punches and the extra-function mechanism.

5. The combination of a punching-machine comprising extent-punches and one or more extra-function punches, a control embroidering-machine with operating connections under the control of the punching-machine and provided with extra-function mechanism and with manually-operated mechanism with connections for throwing the said extra-function

mechanism into operation upon the selection of a punch.

6. In a punching-machine for perforating jacquard-patterns for embroidering-machines the combination of the measuring mechanisms of the punching-machine, an embroidering-machine, having stitch-determining mechanism, and operating connections intervening between the measuring mechanisms and the stitch-determining mechanism, whereby the change in relative position of the measuring mechanisms to the design is in accord with the change in relative position of the fabric-frame to the needles of the embroidering-machine.

7. A punching-machine for perforating jacquard-cards provided with a plurality of measuring mechanisms, a control embroidering-machine provided with a fabric-frame and connections intervening between the measuring mechanisms and the fabric-frame, whereby the motion of the fabric-frame will be the resultant or component of the motions of the measuring mechanisms.

8. In a punching-machine for perforating jacquard-cards for embroidering-machines, the combination of a measuring mechanism, extent-punches set for operation thereby, a control embroidering-machine provided with a fabric-frame and connections intervening between the fabric-frame and the measuring mechanism whereby the movement of the fabric-frame is controlled from the measuring mechanism and power-actuated means for operating the punches set for operation by the measuring mechanism.

9. In a punching-machine for perforating jacquard-cards for embroidering-machines, the combination of a measuring mechanism, extent-punches set for operation by said measuring mechanism, extra-function punches, a control embroidering-machine embodying in its structure a fabric-frame and extra-function mechanism, and connections intervening between the fabric-frame and the measuring mechanisms whereby the movement of the fabric-frame is controlled from the measuring mechanisms, power-actuated means for operating the punches set for operation and manually-operated means for setting an extra-function mechanism of the control embroidering-machine for action and also setting an extra-function punch for operation.

10. In a punching-machine for perforating jacquard-patterns, a punch combined with a special-function mechanism of a control embroidering-machine, and intervening connections between the punch and the special-function mechanism whereby when any special function of the embroidering-machine is initiated the corresponding punch is caused to perforate the jacquard-card.

11. In a punching-machine for perforating jacquard-patterns, the combination of a series of punches, an embroidering-machine provided with mechanism for effecting functions other than moving the fabric-frame and intervening connections between the punches and the embroidering-machine for setting the corresponding punch for action by the initiation of the special function of the embroidering-machine corresponding to the said punch.

12. In a punching-machine for perforating jacquard-patterns, the combination of punches, a control embroidering-machine provided with functional mechanisms for effecting functions in the operation of the said embroidering-machine and interlocking means for interlocking the functional mechanisms so that one of the said functional mechanisms cannot be put in action unless another functional mechanism is out of action.

13. A punching mechanism combined with a control embroidering-machine having a needle-actuating mechanism and bore-point-actuating mechanism, an interlocking mechanism for preventing the needle mechanism and the bore-point mechanism from being operated simultaneously.

14. In a punching-machine for perforating jacquard-patterns, the combination of a plurality of punches arranged in two rows and with punching-block I′ combined with mechanism for reciprocating the said punching-block twice for every stitch and means for operating first the locked punches of one row and afterward the locked punches of the other row and means for moving the paper to be punched after the first punching movement a distance equal to the distance between two rows of punches so that the perforations made by the two rows of punches will form one row of perforations.

15. In a punching-machine, the combination of a plurality of rows of punches making two movements up and down for every set of holes, means for selecting and operating one row of punches, means for moving the paper up to the other row of punches and means for selecting and operating another row of punches whereby the paper may be punched on the same line successively by a plurality of rows of punches.

16. In a punching-machine for perforating jacquard-patterns, the combination of punch-selecting mechanism, a measuring mechanism, and a control embroidering-machine and means for disconnecting the measuring mechanism from the punch-selecting mechanism and from the control embroidering-machine, so that the measuring mechanism can be shifted to a different point on the pattern without affecting the punch-selecting mechanism or changing the relative position of the fabric-frame to the needles of the control embroidering-machine.

17. In a punching-machine for perforating jacquard-patterns having punches and punch-selecting mechanism and a control embroidering-machine having a fabric-frame combined therewith, a measuring mechanism and mechanism for disconnecting the measuring mechanism from the punch-selecting mechanism and from the fabric-frame of the con-

trol embroidering-machine so that the measuring mechanism can be shifted to a different point of the pattern without affecting the punching mechanism or moving the fabric-frame of the control embroidering-machine.

18. In a punching-machine for perforating jacquard-patterns, a mechanism for rotating the feed-cylinder K step by step, said mechanism consisting of a wheel k' on the feed-cylinder shaft, a holding-pawl k^2 and a feeding-pawl k^3 and automatic mechanism for alternately meshing them with the wheel k' and for moving the feeding-pawl k^3 to rotate said wheel, as set forth.

19. In a punching-machine for perforating jacquard-patterns, the pawl e^{21} adapted to engage with the gear-wheels C^{23} and mechanism for actuating said pawls to engage with said gear-wheels consisting of a hand-operated mechanism (cord g^{15}). which will enter said pawls and prevent the machine from being started if they cannot enter and a power-operated mechanism (link e^{18}) for holding same fully in mesh while the punching mechanism is in action.

20. In a punching-machine for perforating jacquard-patterns for embroidering-machines a slide b^7 supported on the inclined faces of two rectangles B B adapted to be moved perpendicularly in front of a pattern-board a^2, the slide resting by its own weight on the inclined faces and being provided with a sight b^{11}.

21. In a punching-machine for perforating jacquard-patterns for embroidering-machines, mechanism for locking the punches I^0 consisting of bolts i^5 i^6 respectively for each punch, said bolts being adapted to slide longitudinally, the rear ends being guided in the upper part of the punching-block I' and the front end being guided by a bar I over the pin-wheels e' e^2 e^3 e^4 which serve to select the proper punches, the bolts being provided with notches i^9 i^{10} with which the bars i^{11} i^{12} engage when the bolts are in their raised position, said bolts being arranged to be lowered when the bar I moves downward provided pins e on the pin-wheels do not support them whereby they are brought out of reach of the bars i^{11} i^{12}, while the bolts which are sustained in their high positions by pins on the pin-wheels are pushed toward the rear when the bars i^{11} i^{12} oscillate, whereby the rear ends of such bolts lock the corresponding punches.

22. In a punching-machine for perforating jacquard-patterns for embroidering-machines two frames c^{10} and c^{11} guided in bars c^{12} c^{13} and adapted to move perpendicularly, each one of said frames having two parallel inclined grooves, the grooves of the two frames crossing one another at an angle and engaging with corresponding projections on the fabric-frame C of the control embroidering-machine; the frames c^{10} c^{11} being connected to racks c^8 c^9 which by means of intermediate gears are in mesh with pinions c^3 c^4 on shaft C and sleeve c respectively, which shaft and sleeve are connected to the rectangles B and B' and with the disks c', so that by rotating the disks c' the rectangles as well as the fabric-frame of the control embroidering-machine can be moved.

23. A punching-machine for perforating jacquard-patterns for embroidering-machines in which the one disk c' is secured to the shaft C', the one end of which is bored to receive the end of a shaft C, to the shaft C' being secured a coupling c^{25} which carries a bolt c^{24} whose head enters a groove in a collar c^{27} which is attached to a rod c^{29} which rod is provided with a handle, the bolt c^{24} being adapted to enter into a hole of the gear c^{23} which is secured to the shaft C and serves to transmit the rotation of the disk C' to the pin-wheels e' e^2, while the second disk c' is loose on a sleeve c, to which is secured a second gear c^{23}, which serves to transmit the rotation of the second disk c' to the pin-wheels e^3 e^4 and also a coupling c^{25} which latter carries a bolt c^{28} whose head enters a groove of a collar c^{27} on the rod c^{29}, the bolt being adapted to enter a hole in the disk c', so that by shifting the rod c^{29} the bolts c^{24} and c^{28} may be pushed into the holes of the gear c^{23} and the disk c' or be withdrawn from them, whereby the pin-wheels e' e^2 e^3 e^4 and also the frames c^{10} c^{11} which guide the fabric-frame of the control embroidering-machine may be connected to or disconnected from the disks c'.

24. In a punching-machine, the combination of a punching mechanism and means for carrying the pattern to be punched and a measuring mechanism for measuring distances on the pattern, combined with means for shifting the pattern independently of the measuring mechanism.

25. In a punching-machine for perforating jacquard-patterns for embroidering-machines the board a^2 for receiving the design which is attached to the frame of the punching-machine in such a manner that it can be adjusted up or down and which is provided with a stud a^4 connected to a crank a^5 on a shaft a^6 which is rotatably mounted on the frame of the punching-machine, which shaft is provided with a two-armed lever a^7, so that the board may be raised by means of the lever a^7 a certain distance when changing from embroidering to boring so that by the corresponding movement of the rectangles B and B' and of the sight b^{11} the fabric-frame of the control embroidering-machine is lowered a distance equal to the distance from the needle to the bore-point and vice versa when changing from boring to embroidering.

26. In a punching-machine structure, the combination of a punching-machine provided with a measuring mechanism for setting the punches, power-actuated mechanism for operating the punches and a control embroidering-machine, combined with the punching-machine by intervening connections, whereby the fabric-frame of the said embroidering-

machine will be moved in response to the movements of the measuring mechanism when the punches are being set.

27. In a punching-machine structure, the combination of extent and special-function punches, hand-operated punch-selecting mechanism, a control embroidering-machine and fabric-frame moving connections intervening between the control embroidering-machine and the punch-selecting mechanism, whereby the fabric-frame of the control embroidering-machine will be moved by the hand-operated selecting mechanism, and operating connections intervening between the functional mechanisms on the control embroidering-machine and the corresponding extra-function punches of the punching-machine, whereby the pattern may be punched and the results which will be produced in a jacquard-machine by the said punches will be indicated upon the control embroidering-machine which will execute the said functions.

28. In a punching-machine structure, the combination of punches and a selecting mechanism, a control embroidering-machine and its fabric-frame and a connection between the selecting mechanism and the fabric-frame of the embroidering-machine, whereby the fabric-fraime will execute the motions corresponding to the punches selected.

29. In a punching-machine, the combination of extent-punches and extra-function punches, selectors for selecting the extent-punches means for automatically operating the selectors from a pattern-measuring device and means under the control of the operator for selecting individual extra-function punches.

30. In a punching-machine, the combination of a plurality of sets of punches, a plurality of sets of slides for actuating the said punches and automatic means for bringing the two sets of slides into and out of action successively, whereby first one set of punches may be actuated and then the other set of punches be actuated, substantially as and for the purposes set forth.

31. In a punching mechanism, the combination of a punching-machine provided with extent-punches and extra-function punches, a measuring mechanism and a selector actuated therefrom for selecting the extent-punches, a control embroidering-machine having a fabric-frame moving in response to the setting of the punches and provided with extra-function mechanism and mechanical means for throwing the extra-function mechanism of the control embroidering-machine into action and selecting the corresponding punch for operation.

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Witnesses:
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