(No Model.)

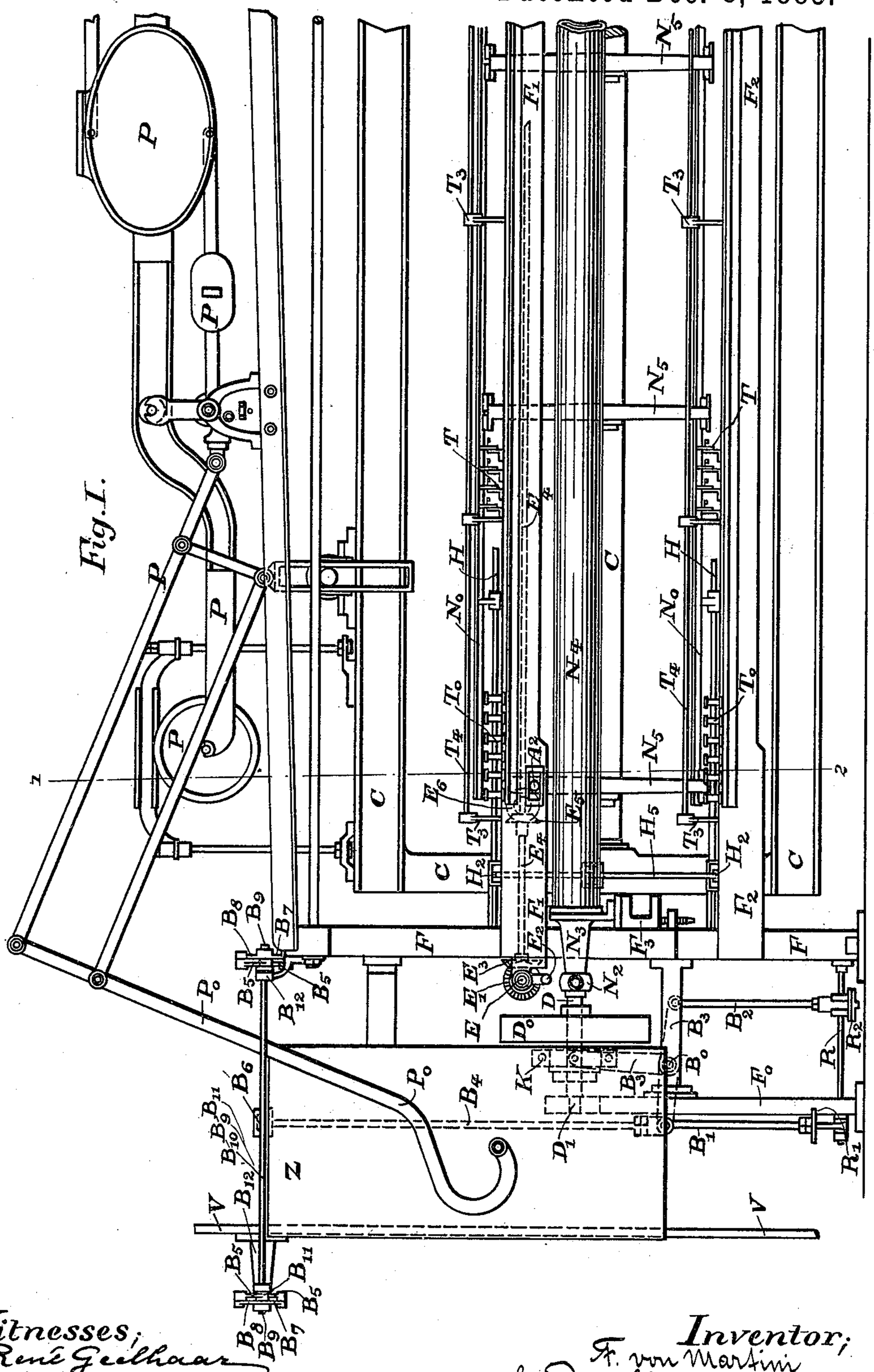
9 Sheets—Sheet 1.

F. VON MARTINI.

EMBROIDERING MACHINE.

No. 332,024. Patented Dec. 8, 1885.

Fig. I.



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Inventor;
F. von Martini
by Brustlein Burg & Co. Attys

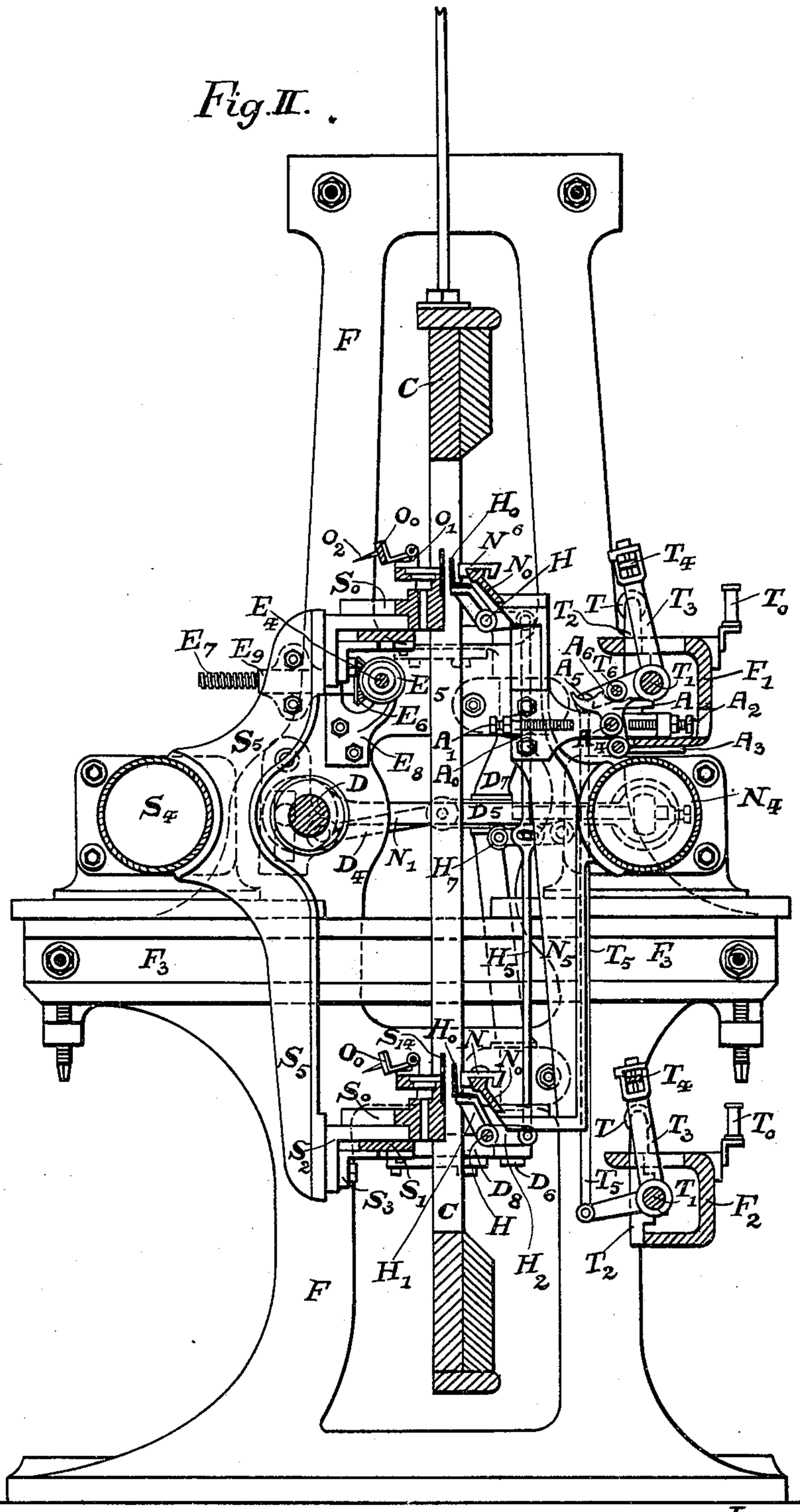
(No Model.) 9 Sheets—Sheet 2.

F. VON MARTINI.

EMBROIDERING MACHINE.

No. 332,024. Patented Dec. 8, 1885.

Fig. II.



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(No Model.) 9 Sheets—Sheet 3.

F. VON MARTINI.

EMBROIDERING MACHINE.

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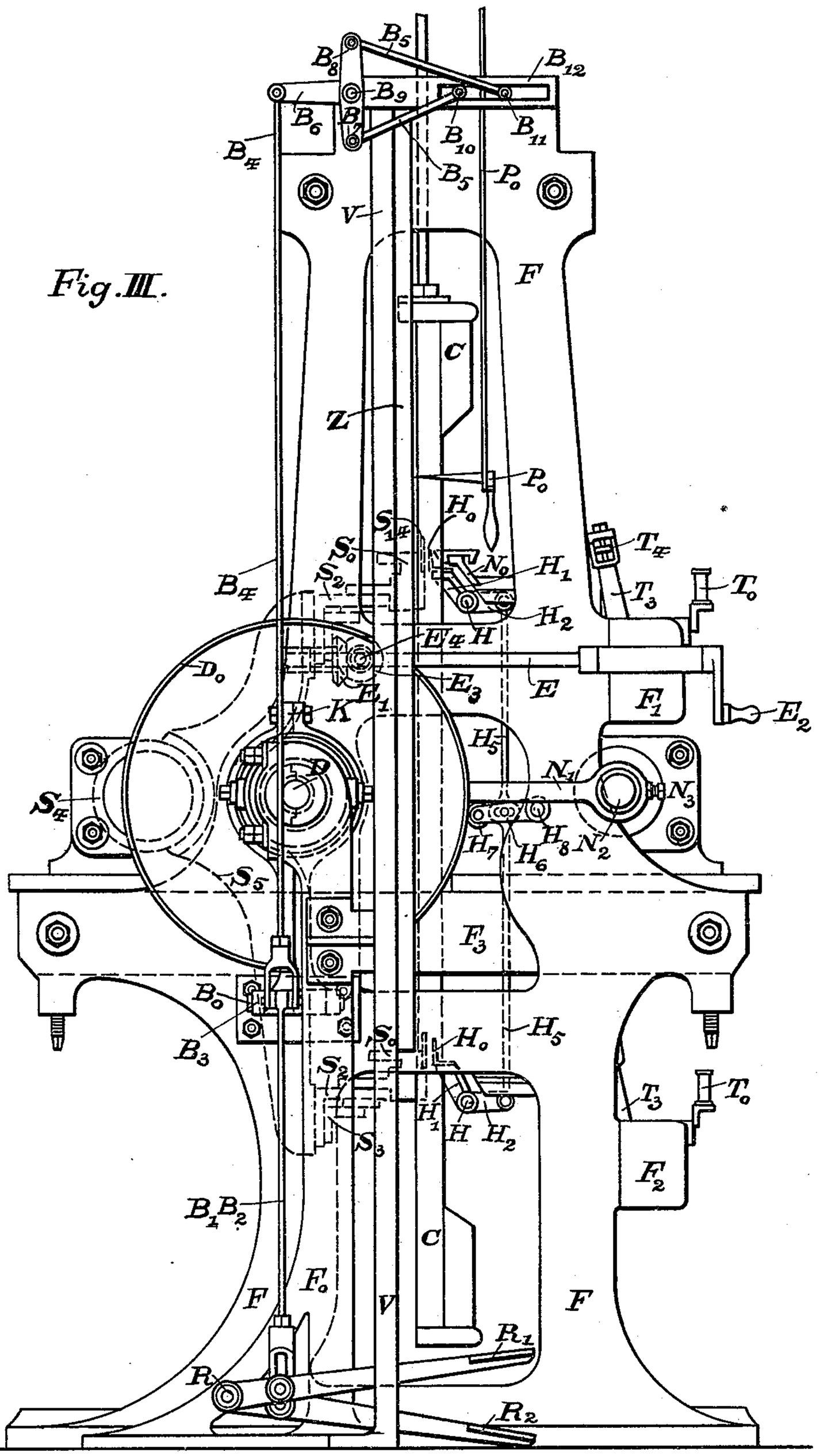
Fig. III.



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F. VON MARTINI.

EMBROIDERING MACHINE.

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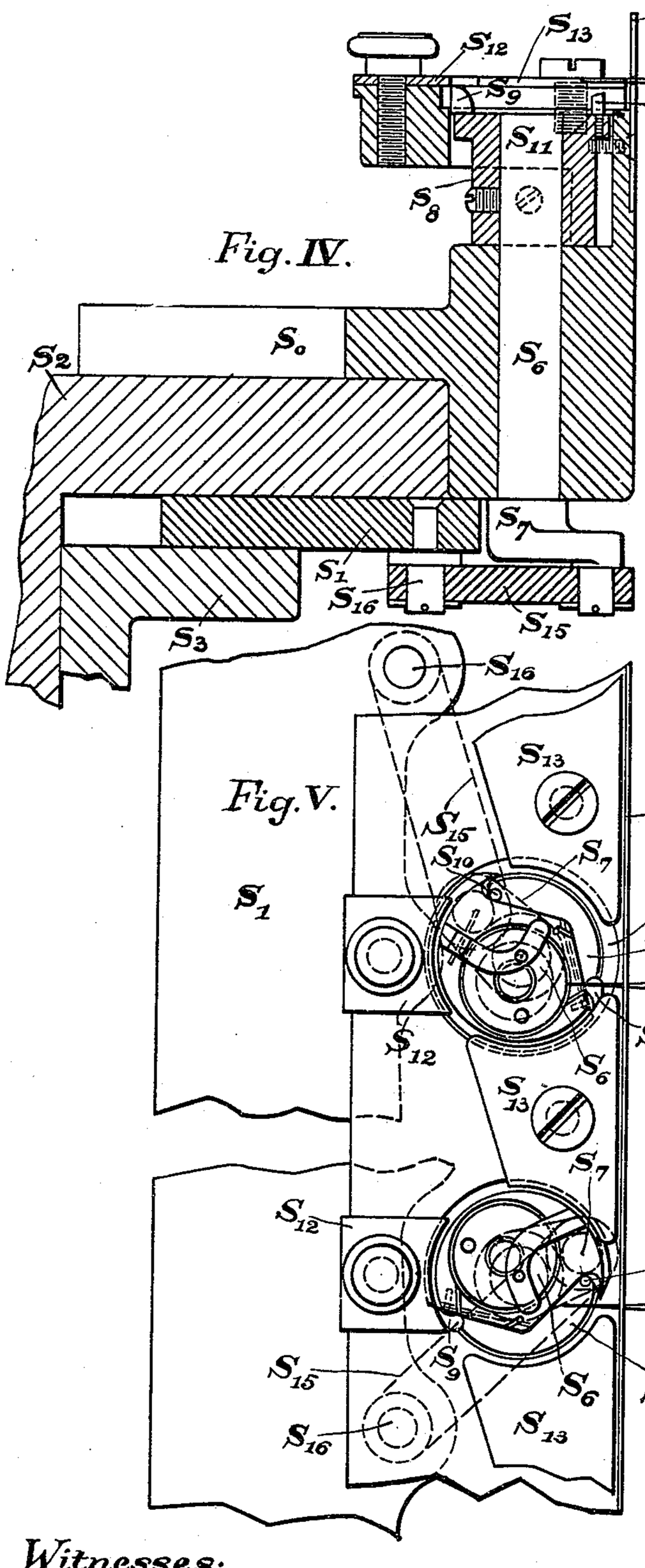
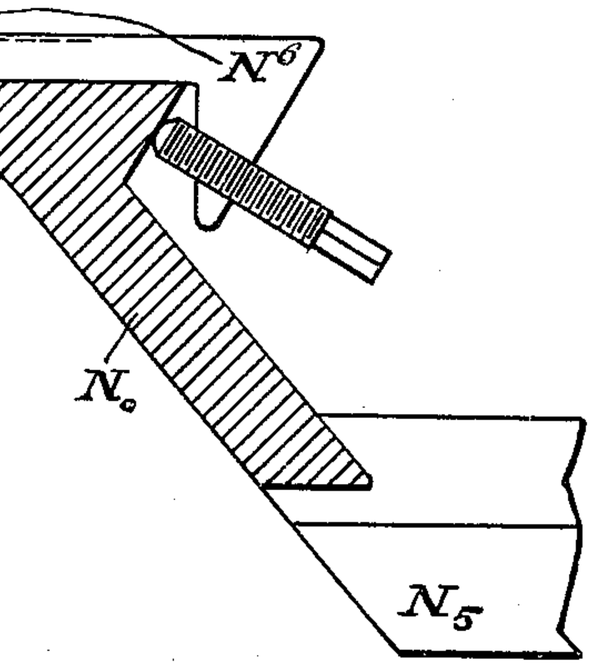


Fig. IV.

Fig. V.



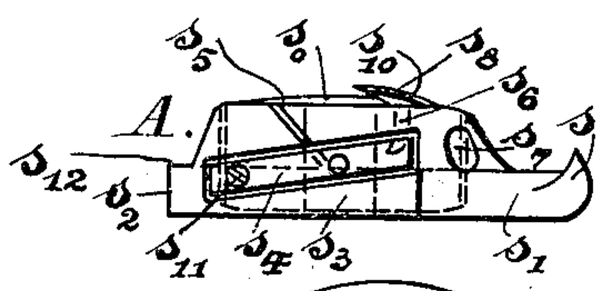
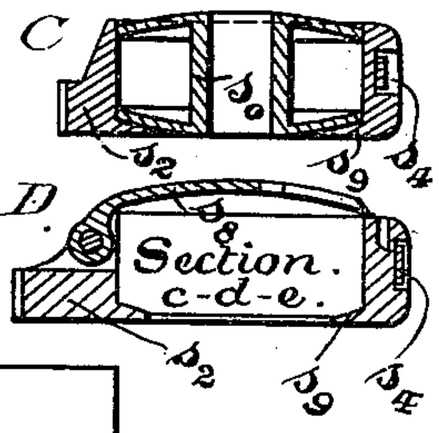


Fig. VI.

Section.a-b.



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(No Model.) 9 Sheets—Sheet 5.

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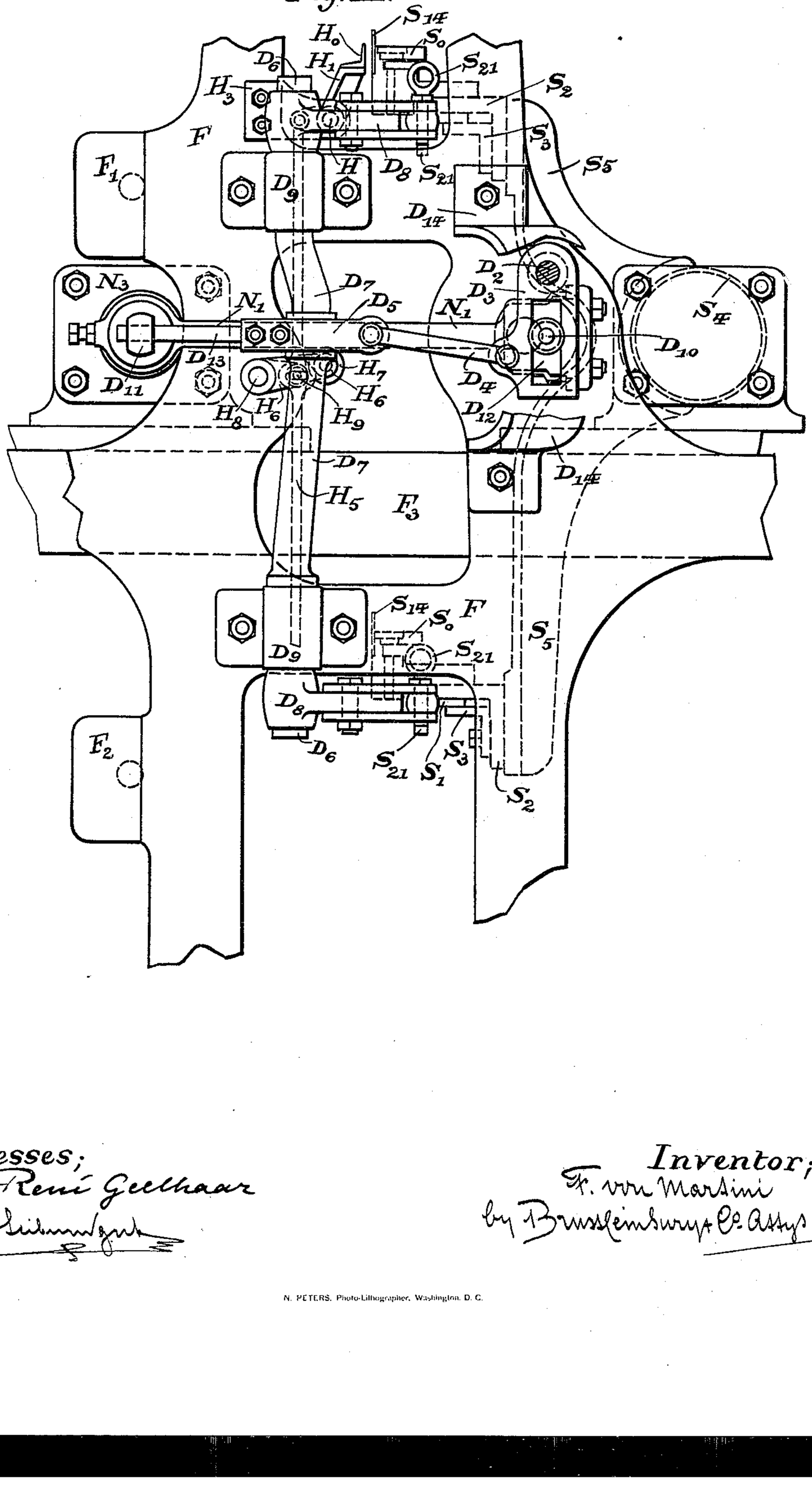
EMBROIDERING MACHINE.

No. 332,024. Patented Dec. 8, 1885.

Fig. VII.



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EMBROIDERING MACHINE.

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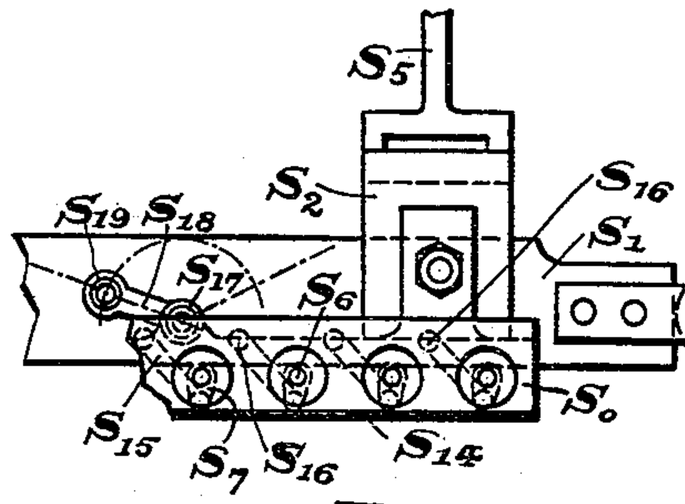
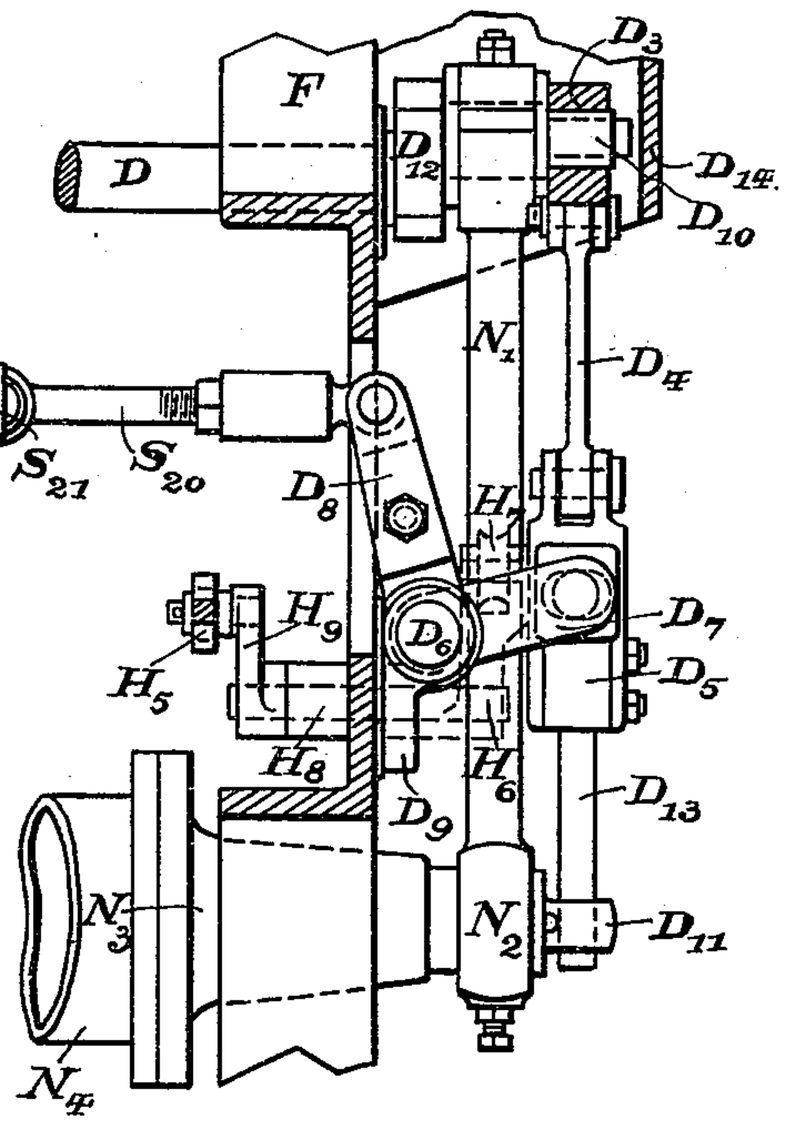


Fig. VIII.



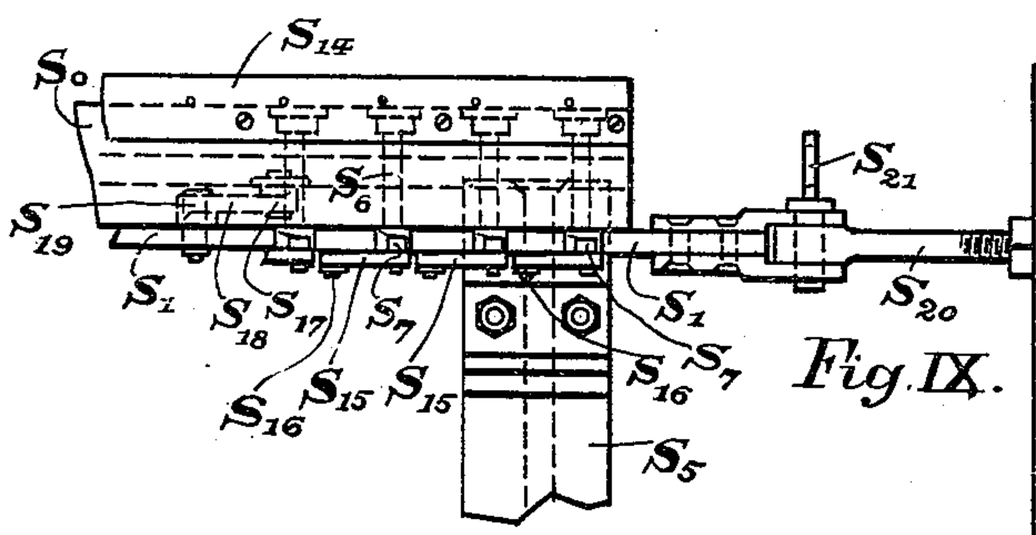


Fig. IX.

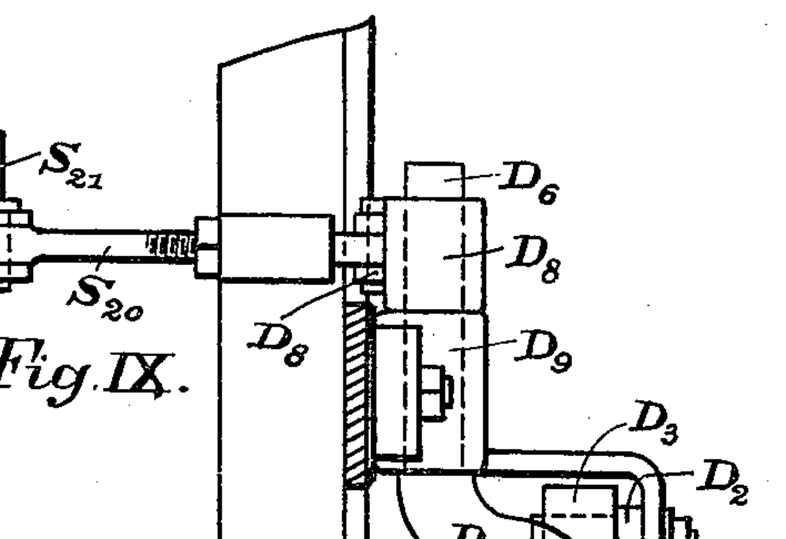
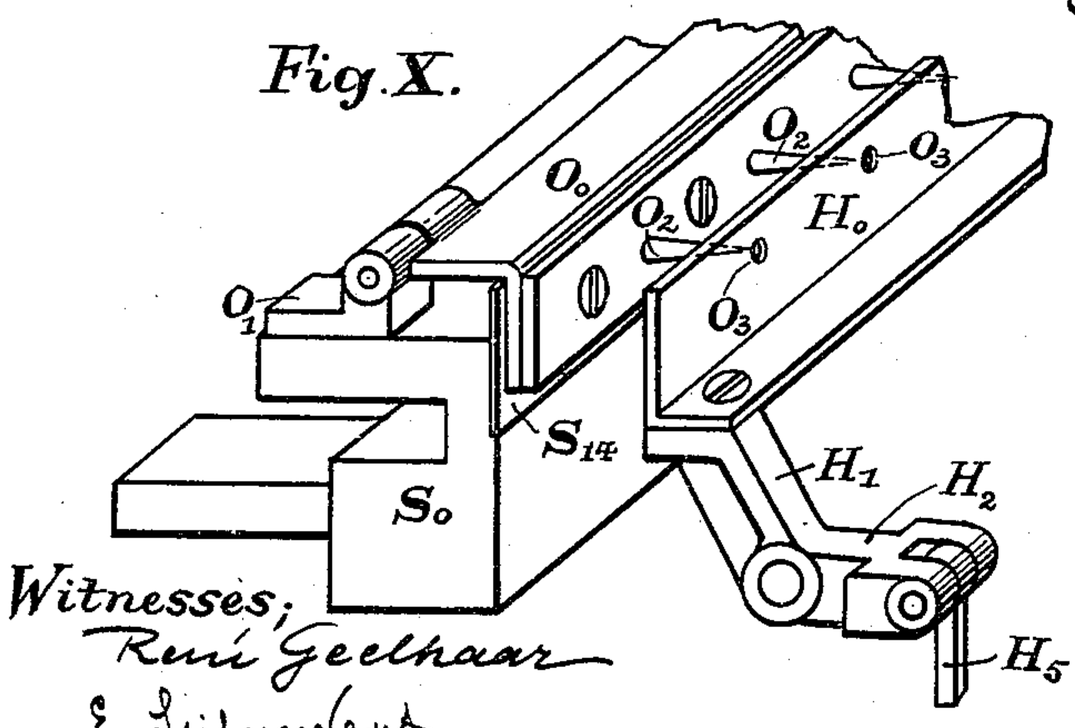


Fig. X.



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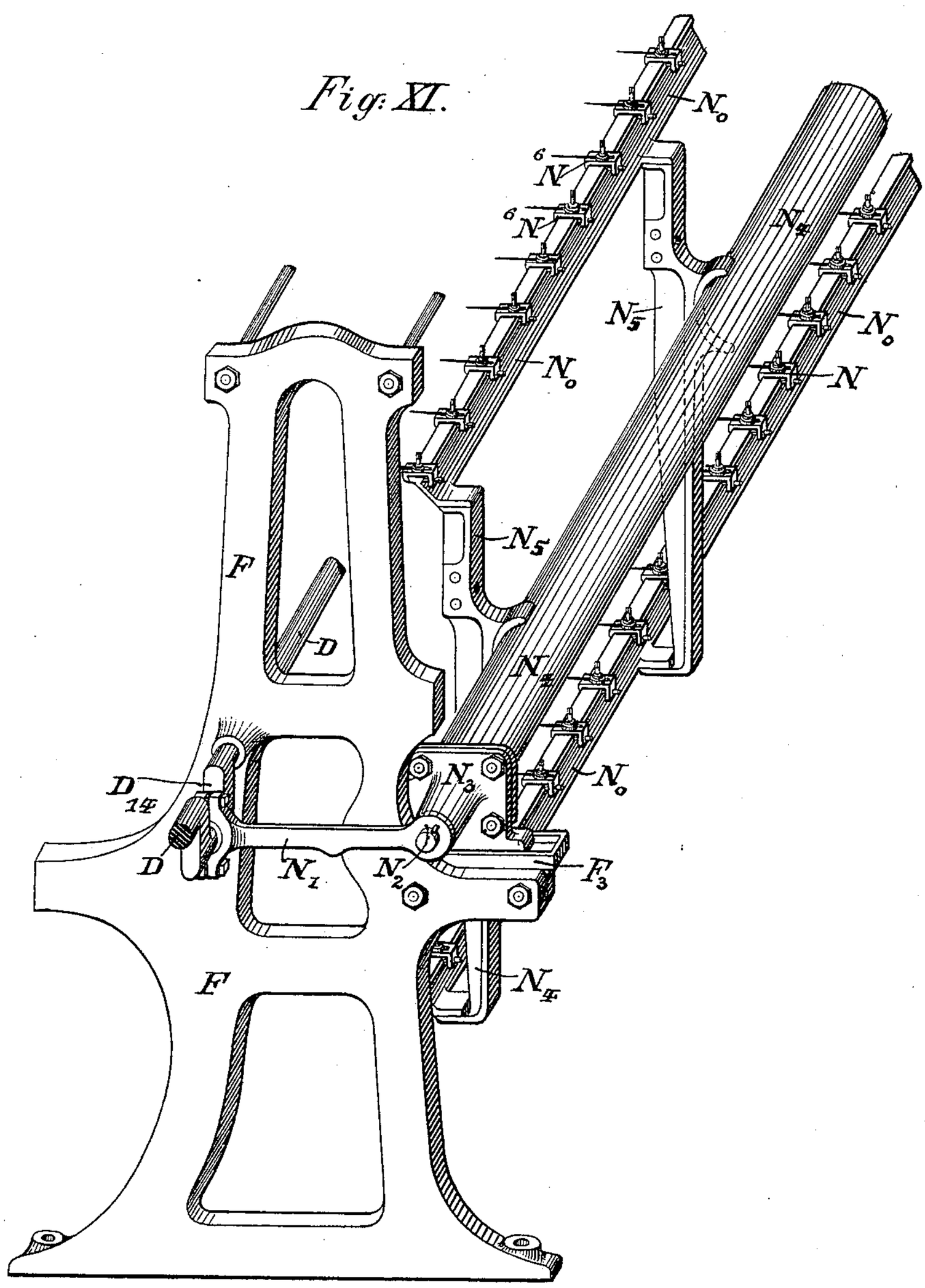
EMBROIDERING MACHINE.

No. 332,024. Patented Dec. 8, 1885.

Fig: XI.



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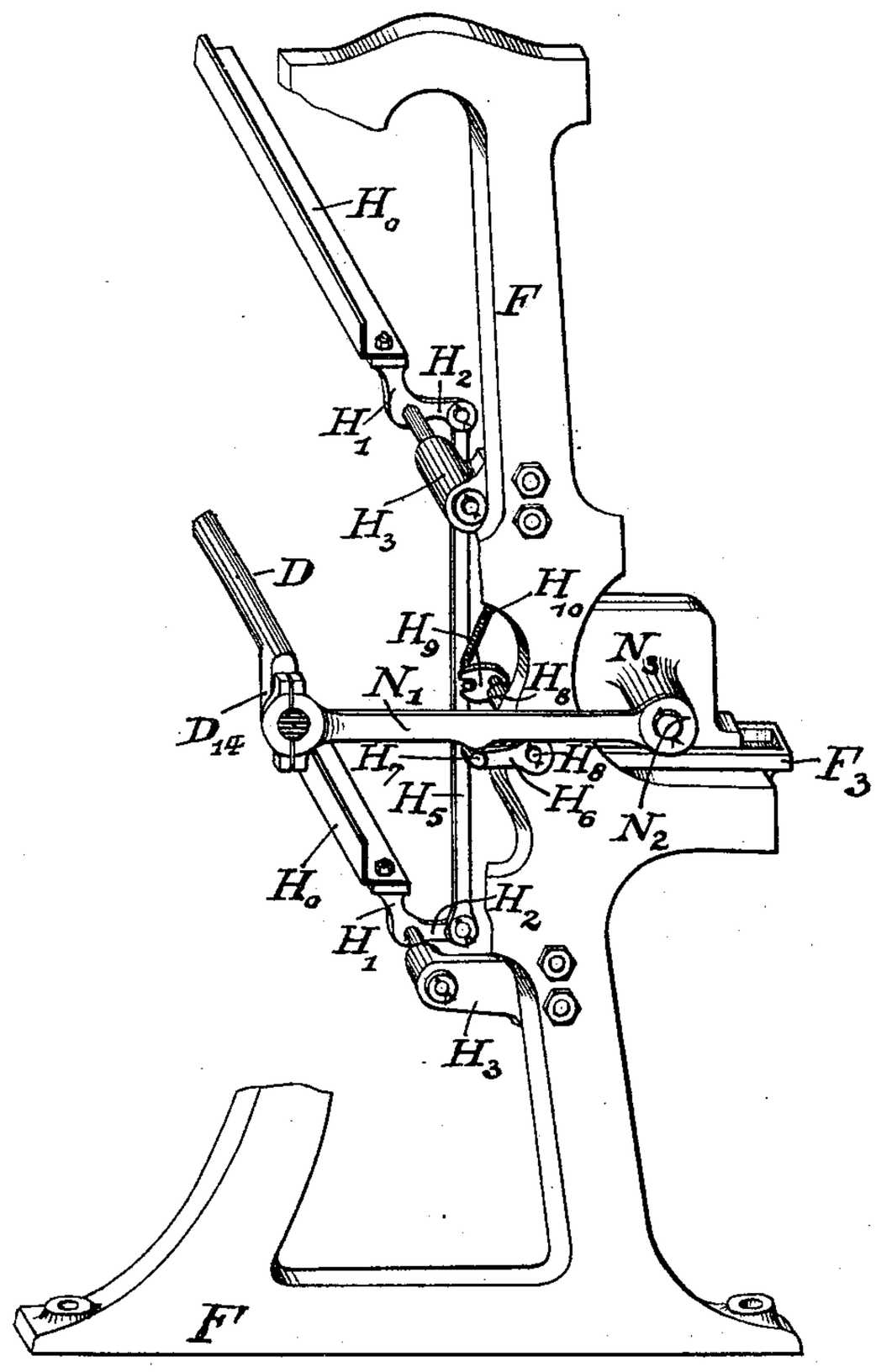
EMBROIDERING MACHINE.

No. 332,024. Patented Dec. 8, 1885.

Fig. XII.



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(No Model.) 9 Sheets—Sheet 9.

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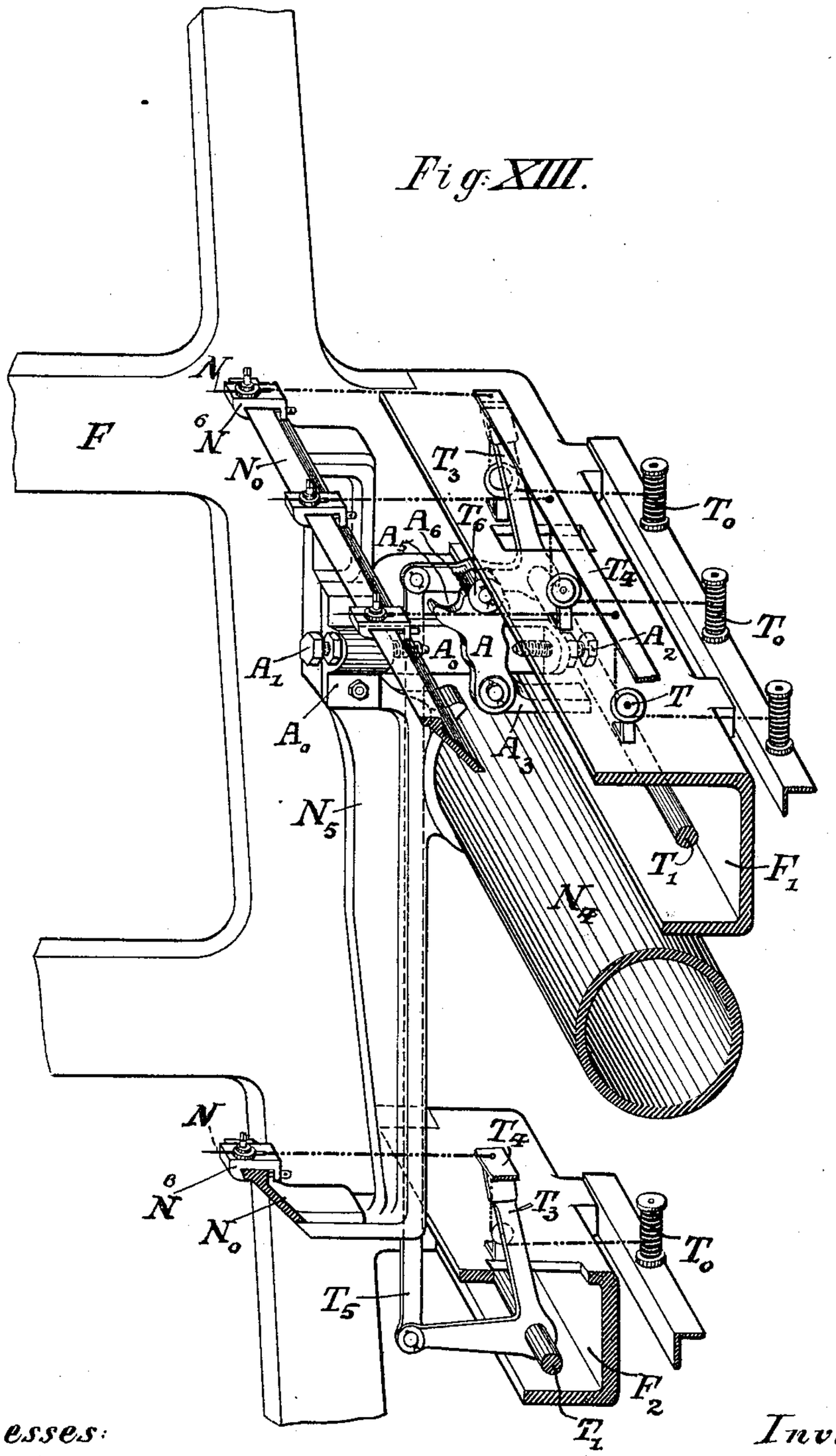
EMBROIDERING MACHINE.

No. 332,024. Patented Dec. 8, 1885.

Fig: XIII.



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Inventor:
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by Brosseinburg & Co. Attys

UNITED STATES PATENT OFFICE.

FRIEDRICH VON MARTINI, OF FRAUENFELD, SWITZERLAND.

EMBROIDERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 332,024, dated December 8, 1885.

Application filed July 10, 1883. Serial No. 100,397. (No model.) Patented in England May 21, 1883, No. 2,530; in France August 23, 1883, No. 155,238; in Germany April 9, 1884, No. 27,347, and in Austria-Hungary September 17, 1884, No. 6,743 and No. 42,324.

To all whom it may concern:

Be it known that I, FRIEDRICH VON MARTINI, a citizen of the Republic of Switzerland, residing at Frauenfeld, Switzerland, have invented a certain new and useful Embroidering-Machine, of which the following is a specification.

My invention has been patented to me in France on August 23, 1883, No. 155,238; Germany on April 9, 1884, No. 27,347; England, May 21, 1883, No. 2,530, and Austria-Hungary on September 17, 1884, No. 6,743 and No. 42,324.

These improvements are represented in the drawings accompanying this specification as applied to a machine in which the embroidering is produced by means of a series of needles and shuttles, each needle and shuttle acting to make embroidering-stitches by interlocking threads, in a similar way as the needle and shuttle act in an ordinary sewing-machine.

My invention consists of means for regulating and governing the pantograph, also the constructions composing the cloth-presser, take-up, oscillating shuttles, the hole-punching device, and the mechanism for controlling and operating such parts, all of which are hereinafter described in the specification, and illustrated in the drawings, and specifically pointed out in the claims.

It will be understood that while the improvement in the construction of the shuttle mechanism can only be applied on embroidering-machines using needles and shuttles, the other improvements covered by the claims may be applied to all embroidering-machines, and as there are many operating parts of my machine to which I lay no claim, said parts being incidental to my improvements, I shall not describe these parts with more minuteness than is necessary to illustrate my improvements.

In the accompanying drawings, Figure I represents a front elevation of the left-hand side of the machine. Fig. II represents a vertical section through the machine on line 1 2, seen from the left-hand side; Fig. III, the left-hand vertical end elevation; Fig. IV, a vertical cross-section through the shuttle-bar; Fig. V, a part plan thereof. Fig. VI (A, B, C, and D) represents, on enlarged scale, the shuttle, A the front elevation and B the plan thereof, C a section of the same, and D a section through the shuttle-casing. Fig. VII represents a part end elevation of the right-hand portion of the machine, illustrating part of the driving mechanism and the cloth-presser. Fig. VIII is part of a sectional front elevation thereof, and Fig. IX part of a sectional plan of the same. Fig. X is an isometric view of the hole-punching device. Figs. XI, XII, and XIII represent part views in parallel perspective of the mechanism for operating the cloth-presser and the take-up by means of the to-and-fro movement of the needle-carriage. Fig. XI shows the mechanism for the transmission of motion from the driving shaft to the needle-carriage; Fig. XII, mechanism for the transmission of motion from the driving-shaft and from the connecting-rod of the needle-carriage to the cloth-presser; and Fig. XIII gives the mechanism for the transmission of motion from the to-and-fro movement of the needle-carriage to the take-up, showing also the position of the pulley-guides T for the needle-thread and of the needle-thread bobbins, the thread being marked thus –. – . – . – . –.

Similar letters of reference in different figures indicate corresponding parts.

I give first the description of all parts in front of the fabric-carrying frame. There are to be found the needle-carriage, the needle-thread bobbins, the pulley-guides for the needle-thread, the take-ups, and the cloth-pressers. The needle-carriage (see Figs. I, II, III, VII, and IX) having to perform the embroidering proper by introducing the thread passed through the eyes of the needles into the fabric and to the back side of said fabric, where the thread is engaged by the shuttle of the shuttle-carriage, is constructed, as is generally done now, with two horizontal rows of eye-pointed needles, N, (see Figs. IV and V,) pointing toward the fabric, and one row above the other being rigidly fast to clamps N^6, which are secured to horizontal straight bars N^0 N^0, (see Figs. III, IV, XI, and XIII,) said bars being bolted

to the top and bottom ends of vertical brackets N^5 N^5, the middle part of said brackets being secured to the pipe N^4, which pipe is provided at both ends and inside of the side frames, F F, of the machine with the slide-blocks N^3 N^3, and which pipe is further provided with the cross-heads N^2 N^2. This needle-carriage slides on the guide-bars F^3 F^3 forward and backward, said guide-bars being bolted to the frames F F of the machine. The to-and-fro movement of the needle-carriage, as may be more plainly seen in Fig. XI, is effected from the driving-shaft D by means of connecting-rods, one at each end of the carriage.

On the left-hand side of the machine, where the pattern-board is located, and between the main frame F and the frame F^0, the driving-shaft is double crooked, so as to form a crank, D^{14}, which is shown in the drawings. (See Fig. XI.) The connecting-rod N′ connects said crooked portion of shaft D with the left-hand end of the needle-carriage by means of the cross-head N^2 in Fig. I, converting thus the revolving movement of the crank D^{14} and the driving-shaft D into the to-and-fro movement of the needle-carriage. On the right-hand side of the machine, however, the driving-shaft D is provided with an eccentric-disk, D^{12}, as may be seen in end elevation in Fig. VII, and in plan, Fig. IX. Said eccentric-disk D^{12} is provided with a pin, D^{10}, which is secured to said disk eccentrically with regard to shaft D, and unto this pin the connecting-rod N′ is sleeved, connecting the same with the right-hand side of the needle-carriage by means of cross-head N^2. (See Fig. III.)

At about the same height with the straight bars N^0 N^0, and carried by the hollow length-beams F′ F^2, of U-shaped cross-section, (see Figs. I and II,) are the needle-thread bobbins T^0, placed vertically, on which bobbins the needle or embroidery thread is wound, said thread running through the pulley-guides for the needle-thread T T, and through the take-up to the eyes of the needles. It must be observed that because there are two rows of five needles there must also exist for each row a corresponding row of bobbins, pulley-guides for the needle-thread, and take ups, and thus two systems will be formed almost perfectly alike—an upper one and a lower one—which two systems perform each the same work.

The parts marked with T T in Figs. I, II, and XIII are pulley-guides for guiding the thread from the bobbin N^0 to the take-up.

The take-up or thread-tightener consists of a shaft, T′, mounted in bearings T^2 T^2. (See Figs. II and XIII.) These bearings are cast in one piece with the brackets for the pulley-guides T for the needle-thread, and are screwed rigidly fast onto the hollow beams F′ and F^2, because there are two series or rows of needles in the machine illustrated; also, two such beams, F′ F^2, and two such shafts, T′, are to be found. Each shaft carries a suitable number of levers, T^3 T^3, keyed thereon, said levers supporting a flat straight bar or blade, T^4. This blade is provided with small holes drilled therein, one hole for each thread. In each series of needles, therefore, the needle-thread which is wound onto the bobbins T^0 passes through the pulley-guides T for the needle-thread, and through the holes in the bar T^4 to the needles. (See Figs. II, V, and XIII.) The levers T^3, at each end of the shafts T′, are made angular—that is to say, to each a horizontal arm is cast on—and the horizontal arms of the two angular levers T^3 on the upper shaft T′ are connected by means of the connecting-rods T^5 with the ends of the horizontal arms of the two angular levers T^3, which are mounted on the lower shaft T′. These shafts are located inside of the hollow beams F′ and F^2, respectively, and the vertical arms of the levers T^3 are reaching through slots in the top walls of said beams to the outside of the same. Any oscillating movement of one shaft T′ must necessarily be shared in by the other shaft T′. The upper angular levers, T^3, receive an oscillating motion by means of a contrivance to be described hereinafter, said movement derived from and corresponding with the to-and-fro motion of the needle-carriage. Said contrivance for oscillating the angular levers T^3 exists in double, one for each side of the machine, and it is partly attached to the upper beam, F′, and to the brackets N^5 at each end of pipe N^4.

The contrivance shown in Figs. XIII and II consists of a bracket, A^0, bolted to the vertical bracket N^5. Said bracket carries two adjustable screws, A′ A^2, set opposite each other and screwed into two suitable lugs cast onto bracket A^0. Between these screws A′ A^2 an eccentrical segment, A, is thrown hither and thither, according to the forward or backward position of the needle-carriage. The eccentrical segment A swings on a fulcrum, which is a pin rigidly fast to a bracket, A^3, said bracket being secured to beam F. The segment A carries pin A^4, (see Fig. II,) against which, owing to the reciprocating motion of the needle-carriage, screws A′ and A^2 are pushing, and at the top of said eccentrical segment A two hollows, A^5 and A^6, are provided, receiving alternately the friction-roller T^6 of levers T^3 T^3, raising the cam-roller T^6, and thereby the horizontal arm of lever T^3, whenever said roller snaps into hollow A^5, and lowering it whenever said roller T^6 snaps into A^6. Cam-roller T^6 will snap into said hollows A^5 or A^6, because the weight of the horizontal arms of levers T^3 and of the connecting-rod T^5 is sufficient to cause said roller T^6 to rest on and bear against the periphery of the eccentrical segment A. The horizontal arms of levers T^3 will swing downward whenever the needle-carriage approaches the fabric-carrying frame, and will swing upward whenever the needle-carriage moves off, or when the needles are withdrawn out of the fabric. By this change of position of said levers T^3 blade T^4 will also change position and the thread will be more or less stretched or

slackened. It will be slackened when the perforated blade T^4 of the take-up swings toward the needles, which occurs when the needles enter the fabric, and the thread will be tightened, when the blade T^4 of the take-up swings off from the needles, which will occur when the needles are withdrawn from the fabric in the moment when the loops of the needle-thread have been engaged by the shuttles, and when the stitches have to be tightened up. In this moment it will be necessary to hold down the fabric, said fabric being merely stretched within the frame C, and offering, therefore, not enough resistance to the pull of the needles and thread, and this is accomplished by the cloth-pressers. The cloth-presser being required for both rows of needles, in order to prevent any distortion of the fabric and of the embroidery thereon during the tightening up of the stitches, is similarly constructed, as it has been done heretofore; but it derives its motion in a different way from the usual manner. A rail of angle-iron, H^0, which exists in each of the two series of needles running all along the fabric beneath the line of the needles, (see Figs. II and X,) and being provided with holes for the hole-punching awls, which will be described hereinafter, is supported by the extremities of the upper arms, H′, of angular levers which are swinging on pins H, said pins H being rigidly secured on brackets H^3, (see Fig. VII,) which brackets are bolted to the side frames, F, of the machine. The horizontal arms H^2 H^2 of these angular levers are connected together by connecting-rods H^5 H^5, and said connecting-rods, which occur on each side of the machine, are engaged by pins secured at the ends of the short levers H^9, (see Figs. VII and IX,) said pins engagging suitably-slotted parts provided on the rods H^5. Levers H^6 and H^9 are secured rigidly fast to the small shafts H^8, said small shafts H^8 occurring on each side of the machine once, and being journaled in bearings cast onto both side frames, F. Levers H^6 carry at their extremities the journaled rollers H^7 H^7, and are set in such a way on the small shafts H^8 that said rollers are pressed downward by contact with the oscillating connecting-rod N′. In order to secure fully that rollers H^7 follow the rods N′ when the same oscillate upward, helical contracting-springs H^{10}, as shown in Fig. XII, may be attached onto frames F, and to the pins at the ends of levers H^6, which pins are engaging the slotted parts on the connecting-rods H^5. These helical springs have been omitted in Figs. VII and IX, as not being absolutely necessary, and in order not to obstruct unnecessarily the drawings. The weight of the rails H^0 is sufficient to act in such a way through the angular levers H′ H^2 and rods H^5 and levers H^6 and H^9, that rollers H^7 are bearing upward and against the connecting-rods N′. When said connecting-rod N′ is in its upper position, the rails H^0 will be pressing against the fabric, owing to their own gravity. When, however, said connecting-rod oscillates downward, the rails H^0 will be swung off from the fabric, because rollers H^7 are pressed downward by said rods N′, and thus the fabric which was held down by rail H^0 during the tightening of the stitches will be relieved again from the contact with rail H^0, and therefore said fabric may follow the movement imparted to the fabric-carrying frame by the pantograph P and handle-rod P^0 during the change of the stitches.

In the rear of the fabric-carrying frame and facing it the shuttle-carriage is located, resting on the same slides with the needle-carriage, but stationary while the machine is at work, said shuttle-carriage being made to slide back from the fabric-carrying frame only for convenience' sake whenever a cloth is stretched on said frame. The arrangement for sliding back the shuttle-carriage consists in shaft E (see Fig. III) and crank with handle E^2, said shaft being journaled in bearings provided on the outside of frame F, (see Fig. III,) and carrying miter-wheel E′, imparting motion therewith to miter-wheel E^3 on shaft E^4, said shaft being journaled in bearings and brackets E^8, (see Fig. II,) secured to frames F, and carrying miter-wheels E^5, imparting motion thereby to miter-wheels E^6, said wheels E^6 being keyed to screw-spindles E^7, said spindles being supported by brackets E^8, and engaging with their threads to nuts E^9, said nuts being bolted to each of the two end brackets, S^5, of the shuttle-carriage. The turning of crank E^2, therefore, will turn shaft E^4 and spindles E^7, and will wind the shuttle-carriage forward or backward.

The shuttle-carriage is constructed, like the needle-carriage, with a pipe, (see Fig. II,) supporting a convenient number of vertical brackets, S^5, said brackets at their top and their bottom, and carrying cast-iron straight bars S^0 S^0, one for each row of needles, said bars serving as support for the shuttles S and the shuttle-slides S′. (See Figs. IV and V.) The straight bars S^0 S^0, of which in this case there are two, are not directly bolted to the vertical brackets S^5 S^5, but there are intermediate angle-pieces, S^2 S^3, bolted between said angle-pieces S^2 and the further angle-pieces S^3, which latter are bolted on S^2, forming the two guide-plates, between which the shuttle-slide S′ is guided just underneath the straight bar S^0. (See Fig. IV.) Through this bar S^0, and corresponding to each needle of the needle-carriage, vertical holes are drilled, recessed at the top, and fitted therein are small crank-shafts S^6, said shafts S^6 provided at their bottom end with a small crank, S^7, and at their top with a ring-shaped head-piece or collar, S^8, at the horizontal top face of which, and on the periphery thereof, are rigidly fixed the pin S^9 and the projection S^{10}, almost diametrically opposite each other, said pin and projection having for their object to work the shuttles S whenever crank-shaft S^6 with collars S^8 are oscillated.

The shuttles are constructed as follows: A

small flat bobbin, s^0, (see Fig. VI,) is placed horizontally in and encircled by an irregularly-shaped annular casing, s^2, said annular casing at its bottom opening supporting the bobbin by means of a narrow rim, s^9, and being provided at its top rim with a suitable curved hinged spring, s^8, which hinged spring can be swung up or down, being fulcrumed in hinges, said hinges fast to the annular casing, said hinged spring s^8, when it is swung down on the surface of the bobbin s^0, lying close over the upper opening of casing s^2, thereby holding down bobbin s^0, and preventing it from jumping out; when it is raised, however, allowing said bobbin to be taken out and to be filled with new thread. The outer periphery of the shuttle or of the annular casing is of irregular shape, and, roughly spoken, of half-circular and half-rhomb shape. The curved part ends on one side in a horn or hook, s, and on the other in the acute angle of the rhomb. The straight sides of the shuttle-periphery are intended to be acted upon by the pin S^{10} and by the projection S^9, said pin and projection being provided on the collars S^8 of crank-shafts S^6. Pin S^{10} is located at the cavity s' of the shuttle, said cavity being formed by the hook s and one of the straight sides of said shuttle. Projection S^9, however, is located on and butts against the straight side s^3. On this latter face s^3 a flat so-called "tension-spring," s^4, is provided, which clamps the thread against the face s^3, in order to act as a brake on the thread; and in order to bring said spring s^4 to bear upon the thread a fine saw cut or slot, s^5, is made above said spring into the upper rim of the shuttle-casing s^2, into which the thread is drawn from the bobbin s^0, and by means of a slot and loop-hole, s^6, very much like through the arrangement in sewing-machine shuttles, the thread is brought under the spring s^4, and by the pressure thereof, which may be regulated by the screw s^{11}, a continuous and constant drag or tension is put on the thread, said thread passing from loop-hole s^6 through a hole, s^{10}, drilled into spring-lever s^8. This hole being coincident with the center of oscillation of the shuttle, in order to have the thread constantly and evenly stretched when the shuttle vibrates, acts as a guide for the thread, and the whole arrangement prevents the lever s^8 from raising while the machine is at work.

In order to prevent any damage to the needles by striking the shuttle-casing, the needles having to approach the shuttles close enough in order to cause the loop of thread to be engaged by horn s of the shuttles, a hole, s^7, is drilled into the casing s^2, near the horn or hook s, at the very place where the point of the needle enters, the shuttles being at rest in this moment. The needles then begin to retire, the loop forms on the thread, and the shuttle, beginning to swing around, engages said loop at once with its horn or hook, said horn or hook being slightly curved upward, and, like the whole shuttle, finished bright and polished up. These shuttles, of which there are as many as there are needles, are placed into the recesses at S^{11}, resting therein freely, and being prevented from jumping out of the recesses solely by the plates S^{12} and S^{13}, which are screwed on top of the straight bar S^0, and which are overlapping a narrow rim, s^{12}, provided on the curved part of the periphery of the shuttle. These shuttles, therefore, being placed into the recessed top part, S^{11}, of the vertical holes wherein the crank-shafts S^6 are fitted, will rest with the middle portion of their bottom face, and simply by their own gravity, over the top of collars S^8, which are fitted to the top ends of shafts S^6, and held thereon by means of set-screws. (See Figs. IV and V.) The recessed parts S^{11} have only the object to keep the shuttles always on the collars S^8, and to prevent said shuttles from being thrown off laterally, or in horizontal direction. The plates S^{12} and S^{13}, however, prevent any vertical displacement of said shuttles. Projection S^9 will come to bear against the straight face s^3 on the periphery of the shuttle-pin S^{10}, however, into the cavity s', formed by the other straight face of the periphery of the shuttle, and by hook or horn s. Shuttles S, therefore, are forced to follow any oscillating motion imparted to shafts S^6 and to the collars S^8. Close to holes wherein the shuttles are resting a vertical strip of sheet-iron, S^{14}, is screwed up against cast-iron bar S^0, facing the fabric-carrying frame, the shuttle-carriage being so close up against the fabric-frame that the plane of the fabric nearly touches sheet-iron S^{14}. In this sheet, called the "needle-sheet," and opposite each needle of the needle-carriage, holes are provided, (see Fig. IV,) into which holes the needles, together with the thread drawn through their eye-points, will enter while piercing the fabric, and will advance until about half the length of the needle N has entered said holes in sheet S^{14}, and until the extreme point of the needle has entered the hole s^7, provided in the shuttle-casing. The relative height of the needles N and of the point of the hook s of the shuttle is now thus devised that said point of hook s strikes close underneath needle N at a point very close to sheet S^{14}. The shuttles before beginning their oscillatory movement are in such a position relatively to the needle-thread that their hooks are close to the loops which are formed by the same underneath the needles, owing to the friction of the thread in the comparatively narrow holes of sheet S^{14}, while the needle-carriage is retreating from the fabric. The shuttles, therefore, when oscillating for about two hundred and twenty degrees, will engage said loops at once, and, having engaged the same, will slip through, which process is greatly facilitated by the rounded shape and smoothness of the polished shuttles; but by slipping through said loops the shuttles will also draw the thread wound on the bobbin s^0 of the shuttle and passed through hole S^{10} of lever s^8 through the loop formed by

the needle-thread. Thereby the stitch made by the needle is locked up. It is important that the projection S^9 and the pins S^{10} on the upper faces of the collars or head pieces S^8 for each shuttle be rounded off at their tops and polished up, first, in order to permit the thread of the needle to slip between shuttle and the parts whereon said shuttle rests, and, second, in order to secure the slipping back of the shuttles into their regular and original position whenever they might have been displaced by the friction and pull exerted by the contracting loop of the needle-thread. It has been found as most convenient to swing or oscillate the shuttles for each lock-stitch at an angle of about two hundred and twenty degrees, which will be sufficient to engage the loop and to slip the shuttle through said loop and tighten up the shuttle-thread. The shuttles, after having slipped through said loops by their oscillation of two hundred and twenty degrees, swing back again for the same two hundred and twenty degrees, and are ready for a new stitch. The relative movement of needle and shuttle is thus arranged that a continuous pull on the shuttle-thread is produced, which otherwise is necessary to give even and clean work. This oscillation of two hundred and twenty degrees of the shuttles is produced by the crank-shafts S^6, said crank-shafts carrying at their bottom end cranks, S^7, which are connected by means of connecting-links S^{15} to pins S^{16}, which are rigidly fixed in the shuttle-slide S'. This slide S', of which there is one for each row or series of shuttles, has a rocking and at the same time a circular swinging motion, moving, however, always parallel to itself, which parallel motion is accomplished by the parallel link-motion. Two pins, S^{17}, are fast, one near to each end of the stationary bar S^0, and said pins S^{17} are linked each by a link, S^{18}, to a pin, S^{19}, secured to each end of the slide S'. In order to secure now a parallel and circular swinging motion of the slide-bar S', the distance at which the pins S^{19} are set from each other is made equal to the distance between pins S^{17}, and both links S^{18} are made of equal length. The links S^{18} will therefore be always parallel to each other. In Fig. IX only one of the links S^{18} is shown—the one at the right end of the slide S'. The rocking motion is derived for each slide-bar S' by means of an adjustable rod or link S^{20}, which is linked to the right hand end of slide S'. As there are two rows or series of needles and shuttles, there are also two bars, S^0, and two slide-bars, S'. At each right-hand end of the latter such an adjustable rod or link, S^{20}, is provided, and said links S^{20} are easily disconnected from slides S', by taking out pins S^{21}. This disconnecting becomes necessary when the shuttle-carriage has to be slid backward off from its normal—that is, its working—position, either for hole-punching, or when a new cloth has to be stretched on the fabric-carrying frame. Links S^{20} are linked to the two levers D^8, said levers keyed one to the top and the other to the bottom end of the vertical shaft D^6. Said shaft D^6 is provided on the right-hand frame F, and is mounted in bearings D^9 D^9, said bearings being secured to said frame F, and shaft D^6 is crooked twice between said bearings, so as to form a double crank, D^7. A slotted cross-head, D^5, engaging said crank D^7, is also connected by link D^4 to a slotted crank-lever, D^3, said crank D^3 being fulcrumed on pin D^2, pin D^2 being screwed rigidly fast on a bracket which is fast to the machine-frame F. This shaft D^6 is occurring only once in the machine—to wit, on the right-hand side frame of the same, as illustrated in Figs. VII, VIII, and IX. The slotted crank-lever D^3 is swung to and fro by pin D^{10}, moving in the slot of crank D^3, said pin D^{10} being arranged eccentrically to the driving-shaft D on the eccentric-disk D^{12}, which is connected with the right-hand-side connecting-rod. Said connecting-rod, therefore, as well as link D^4, will have an oscillating rocking motion, the first rocking, by means of cross-head N^2, the needle-carriage, and the second rocking, by means of cross-head D^5, the crank D^7 of shaft D^6. In order to guide the cross-head D^5 properly, the guide-head D^{11} is provided on cross-head N^2 of the needle-carriage, the guide-rod D^{13} sliding in said sleeve D^{11} and being secured to cross-head D^5. It must be stated here that, as has been shown, the mechanism for rocking the shuttle-slides occurs only on the right-hand side of the machine.

It remains now to fully explain that the combination of the rocking motion of the shuttle-slide bar S' with the circular swinging motion of the same produces the desired oscillation of the shuttles for about two hundred and twenty degrees. As will be understood from Figs. IV and V, and from the matter described in the above, the shuttles rest freely by their own gravity on top of the collars S^8 and crank-shafts S^6, and are forced to take part in any horizontal oscillating movement which may be imparted to said shafts, because the pins or projections S^{10} and S^9 prevent any displacement or rotary movement of the shuttles independently from the collars S^8 and crank-shafts S^6. In Fig. V the two extreme positions of the crank-shafts S^6 with shuttles are given in one representation. The position of said parts is shown after the shuttle has slipped through the loop of the needle-thread, and in the other representation the same parts are shown ready to begin the oscillation of two hundred and twenty degrees. In Figs. IV and V part of the shuttle-slide bar S' is shown connected to the cranks S^7 of crank-shafts S^6, and said slide S' is also in its extreme position. The slide will execute a circular swinging movement to the left, describing nearly half a circle, said half-circle having a radius equal to the lengths of the links S^{18}, one of which is shown in Fig. IX. At the beginning of this movement in a half-circle the slide S' will be moving at first almost rectangularly off from the bar S^0, and owing

to this fact, and by means of the links S^{15}, will turn the cranks F^7 of the crank-shafts in the same direction as the hand of a watch. Owing, however, to the fact that cranks S^7 and links S^{15} are at a very sharp angle to each other at the beginning of the movement, said movement will be very quick at the beginning, and will be slower afterward, which arrangement will have such an effect on the shuttles that the same slip rapidly through the loop of the needle-thread at the beginning of oscillation of the crank-shafts S^6, whereupon the shuttles, together with the crank-shafts, will slacken the speed again until the oscillation at an angle of two hundred and twenty degrees has been accomplished, as shown *sub a* in Fig. V. Slide-bar S′ reversing now its circular oscillatory movement, will oscillate the crank-shaft S^6 back again, together with the shuttles, and will bring the same again into the position shown *sub b*, Fig. V. Thus it will be seen that the revolutions of shaft D will rock the needle-carriage, as well as produce the desired movement of the shuttle, and besides that it will, by moving the needle-carriage, operate also the take-up and cloth-pressers.

On the left-hand side of the machine, where the attendant is sitting, and where the handle P^0 (see Fig. I) of the pantograph P is located, the driving-pulley D^0 is keyed to the shaft D of the machine. An ordinary friction-clutch, K, is combined with said pulley D^0, said clutch being connected with levers and rods to the foot-rests of the machine, so that by the operating of said foot-rests the attendant is free to stop or start the machine. This stopping or starting arrangement by means of foot-rests and friction-clutch is not new in embroidering-machines, and it will not be necessary to describe it any further; but the brake of the pantograph connected therewith, forming part of my invention, is new, and I give herewith a detailed description. First, it may be observed that an additional frame, F^0, has been set up on the left-hand side of the machine, supporting the friction-clutch K as well as the shaft R, whereon the levers of the foot-rests are keyed, and carrying also a bearing, D′, for the end of shaft D. The brake of the pantograph has for its object to secure the respective position of handle-rod P^0 while the machine is stopped, thus facilitating greatly the work of the attendant and preventing any injury done to the pattern-drawing by the pointer or pencil secured on the handle-rod of the pantograph. Said brake has to operate simultaneously with the downward movement of one of the foot-rests, and will clamp handle-rod P^0 of the pantograph between two horizontal rods whenever this operation is performed. Foot-rests R′ and R^2 are provided at the ends of two levers, the other ends of said levers fulcrumed on a shaft, R, said shaft supported between frames F and F^0. The vertical rods B′ and B^2 (see Figs. I and III) are linked to the levers of the foot-rests at points between the fulcrums and the treadles of the foot-rests, said rods being linked to two ends of a T-shaped lever, B^3, said lever fulcrumed in pin B^0 and operating with its third and vertical end the friction-clutch K. Pin B^0 is rigidly fast to a frame connecting the frames F^0 and the left-hand frame F. By pressing down foot-rest R^2 rod B^2 will move lever B^3 and release the clutch from the pulley; R^2, therefore, is the starting foot-rest. R″, by means of rod B′ and lever B^3, will cause the clutch to stop the pulley, and may be called the "stopping foot-rest." At the very point where rod B′ links to lever B^3 a vertical rod, B^4, is linked on said lever B^3, rod B^4 being linked with its upper end to a horizontal lever, B^6, said lever keyed to a horizontal shaft, B^9. This shaft B^9, running along the pattern-board Z, carries at each end a vertical lever, the ends B^7 and B^8 of said levers being linked by rods B^5 B^5 to two slides, B^{10} B^{11}, sliding in a horizontal slot provided within brackets B^{12}, said brackets secured rigidly one to the frame F of the machine and the other to an auxiliary column or rod, V. The slides are thus connected that by the oscillating of shaft B^9 the slides B^{10} B^{11} will either approach each other or slide apart, and the slides on both sides of the drawing-boards Z are connected by two parallel rods, so as to bring said rods together or apart, corresponding to the movement of the slides. The handle-rod P^0, hanging down in front of the pattern-board, is arranged between the parallel slide clamp rods B^{10} B^{10} and B^{11} B^{11}, so as to be clamped by said rods whenever they approach each other sufficiently, and to be released again when said rods part from each other. Pressing down now the foot-rests R′, (see Fig. III,) rod B^4 will pull lever B^6 down, and by means of shaft B^9 and levers B^7 B^8 and the connecting-links will cause the slides and rods B^{10} B^{11} to approach each other and to clamp rod P^0 of the pantograph between them. It will therefore be observed that the handle-rod P^0 is clamped when the machine is stopped and let free when the machine is started.

The hole-punching apparatus (see Figs. II and X) is of similar construction in almost all embroidering-machines producing open embroidering-patterns. In my machine, however, it is located on the shuttle-bar S^0. It consists in a number of small brackets, O′ O′, secured to the top of the cast-iron bar S^0 of the shuttle-carriage, and carrying in hinges a rail of angle-iron, O^0, said rail being provided with as many awls O^2 as there are needles in the needle-carriage. Said rail O^0 is located so that when it is swung down, ready for the hole-punching, the awls will correspond to holes O^3, provided for this very purpose in the rail H^0 of the cloth-presser, the rail H^0 serving here as support to the fabric for the punching process. When said bar O^0 is swung back, however, it will not obstruct in any way the working of the shuttles of the shuttle-carriage,

and will be held in each position—to wit, when being swung back or down, simply by its own gravity.

Whenever holes have to be punched into the fabric, the machine has to be stopped and the shuttle-carriage to be disconnected from links S^{20} by taking out pins S^{21}. This will allow to slide the shuttle-carriage back by crank E^2, whereupon rail O^0 will be swung down and the shuttle-carriage slid forward again against the fabric by crank E^2. The holes being punched, the shuttle-carriage is slid back and the rail O^0 swung up and the shuttle-carriage slid forward again, in order to bring it in its original position, and to connect it again with links S^{20} by putting in pins S^{21}, whereupon the embroidering may go on.

In order to make fully clear the manner of connection and transmission of motion between driving-shaft and needle-carriage, cloth-presser, and take-up, I shall describe said parts with reference to drawings XI, XII, and XIII. It must be stated, however, that for convenience' sake, and in order to make the drawings as clear as possible, several parts have been omitted and shown in more simplified shape, as will be particularly stated in its proper place.

In Fig. XI the left-hand end of the machine is shown, frame F^0 being omitted, and also all parts constituting the take-up, the cloth-presser, the shuttle-carriage, the pantograph, and the fabric-carrying frame. In said Fig. XI the doubled crooked part D^{14} of the driving-shaft D is shown, said shaft being journaled within eyes cast to each of the frames F', only one being shown. The crank D^{14} is linked by means of the connecting-rod N' and the cross-head N^2 to the slide-block N^3 at the left end of the pipe N^4 of the needle-carriage. In a similar way the eccentric-disk D^{12}, as has been explained already in the above, is connected to the block N^3 at the right end of pipe N^4, as is shown in Figs. VII and IX. The blocks N^3 are made to slide on the guide-bars F^3, which are secured one to the inside of each frame F. Brackets N^5, secured to pipe N^4, are supporting the needle-bars N^0, unto which the clamps N^6, holding the needles N, (see Fig. V,) are secured rigidly fast. When shaft D revolves, the needle-carriage, together with the needles, will receive a to and-fro movement.

In Fig. XII the same side of the machine is shown as in Fig. XI, F representing the side frame of a machine partly broken off, N^3 representing the slide-block of the needle-carriage, unto which the connecting-rod N' is sleeved by means of head N^2. Said connecting-rod is shown engaging the crank D^{14} of driving-shaft D and bearing unto the end H^7 of arm H^6, which arm is secured rigidly fast at the end of the small shaft or pin H^8. This shaft H^8, with accessory parts, occurs on each side of the machine.

As shown in Figs. VII and IX, it will be preferable to provide the end of lever H^6 with a journaled friction-roller, H^7, which, however, is omitted in Fig. XII, in order to make the drawings as plain as possible. The pin or shaft H^8 is journaled within an eye cast onto the frame F, and carries at its other end, secured rigidly fast, another short arm, H^9, the end of which engages, by means of a forked or slotted part, a pin secured within the vertical rod H^5. In Figs. VII and IX, however, the slotted part is provided on the rods H^5, and the end of arm H^9 is provided with a pin engaging said slotted part. As a matter of course, the construction shown in Figs. VII and IX and the one shown in Fig. XII are equivalent, and may be substituted for each other. The rod H^5, which, as indicated in the matter above, is duplicated—to wit, one rod for each side of the machine—connects the arms H^2 H^2 of the angular levers H' H^2 H' H^2, which are supporting the rails H^0 H^0 of the cloth-presser by means of their arms H' H'. The angular levers H' H^2 H' H^2 are provided with pins secured rigidly fast into the angle portion of the same, and are journaled by means of the same pin into brackets H^3 H^3, which are bolted unto frame F of the machine. It will now be understood, when rod H^5 is rocked downward and upward, that the rail H^0 of the cloth-presser will oscillate horizontally off from and toward the fabric-carrying frame, which may be seen in Fig. II, and which is suspended facing the horizontal rails H^0 of the cloth-presser. The rods H^5 are connected to the ends of arms H^9, as indicated, and said arms H^9 are keyed fast to small shafts H^8, which are journaled in the frames F, as shown also in Figs. VII and IX, and therefore when the arms H^6, which are also fast to the small shafts H^8, are oscillated by contact with the oscillating connecting-rods N' the rods H^5 and the rails H^0 will also be oscillated. The arms H^6 are made to bear constantly against the connecting-rods N' by the gravity of the rails H^0. This gravity would be sufficient in itself to secure the continuous contact between arms H^6, as shown in Fig. XII, or the journaled friction-rollers H^7 at the ends thereof, as shown in Figs. VII and IX, and between the connecting-rods N'. However, it has been thought advisable to secure this contact still better by providing helical contracting-springs H^{10}, attached to the frames F and to the ends H^7 of arms H^6, with a view also to increase the pressure of the rails H^0 on the cloth when the connecting-rods N' N' are in their most elevated position.

In Fig. XII, the left-hand side of the machine, with the parts of the cloth-presser just described, is shown, and it must be stated here that the right-hand side of the machine is similarly arranged. When the needle-carriage is moved off from the fabric, and when the connecting-rods N' are assuming their highest position, or, in other words, when the needles withdraw for tightening the stitches, the rails H^0 will swing against the fabric and keep the same back from following, and thus will prevent any distortion of or injury to the

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B^2, rod B^4, lever B^6, shaft B^9, levers B^7 B^8, connecting-rods B^5 B^5, brake-slides B^{10} B^{11}, bracket B^{12}, frame F and F^0, stand V, shaft D, pulley D^0, and the pantograph-handle P^0.

3. In an embroidering apparatus, the combination, with the stitch-forming mechanism, of a cloth-presser consisting of two or more horizontal rails of angle-iron mounted on angular levers fulcrumed on brackets forming a part of the machine, and connecting-rods connecting said angular levers and linked to fulcrumed levers having friction-rollers at the ends thereof working in contact with the connecting-rods, which transmit motion from the driving-shaft to the needle-carriage.

4. In an embroidering-machine, the combination, substantially as shown and described, with the stitch-forming mechanism, of the cloth-presser consisting of the horizontal angle-rails H^0, levers H' H^2, pins H, brackets H^3, connecting-rods H^5, connected with levers H^9, small shafts H^8, levers H^6, rollers H^7, and connecting-rods N', which transmit motion from the driving-shaft to the needle-carriage.

5. In an embroidering-machine, the combination, with the stitch-forming mechanism, of a take-up consisting of two or more horizontal shafts, angular levers which are suitably connected by rods, perforated blades secured to the ends of said levers, journaled friction-rollers attached to said levers, eccentric segments each with two hollows, and adjustable screw-bolts on brackets attached to the reciprocating needle-carriage, the whole to operate as set forth.

6. In an embroidering-machine, the combination, with the stitch-forming mechanism, substantially as shown and described, of a take-up consisting of the hollow beams F' F^2, pulley-guides T for the needle-thread, bobbins T^0, angular levers T^3, connecting-rods T^5, perforated blades T^4, shafts T', bearings T^2, cam-rollers T^6, eccentric segments A, hollows A^5 A^6, said segments fulcrumed on brackets A^3, and brackets A^0, with adjustable screw-bolts A' A^2, said brackets A^0 attached on brackets N^5 of needle-carriage.

7. In combination with a needle and shuttle carriage of an embroidering-machine, and a driving-shaft provided with crank and eccentric-disk and connecting-rods, mechanism forming the shuttle-movement, consisting of a slotted crank-lever fulcrumed to a pin fixed onto the machine-frame, a guide-rod in a guiding-sleeve with a slotted cross-head thereon, a connecting-link, a transverse double-crooked crank-shaft journaled near its ends, one or more levers mounted thereon, horizontal slide-bars connected to said levers by means of adjustable rods, shuttle-bars provided with recesses or holes, parallel links connecting the latter with said slide-bars, crank-shafts journaled within said recesses or holes, links connecting the cranks to said slide-bars, fixed collars, each with a projection and a pin at the top of said crank-shafts, and circular shuttles, such as described, the whole to operate as and for the purpose set forth.

8. The combination, substantially as shown and described, with the needle and shuttle carriage of an embroidering-machine, of the driving-shaft D, with crank part D^{14}, eccentric-disk D^{12}, and connecting-rods N', the mechanism forming the shuttle-movement consisting, substantially as shown and described, of pin D^{10}, slotted crank-lever D^3, pin D^2, connecting-link D^4, slotted cross-head D^5, guide-rod D^{13}, guide-head D^{11}, transverse crank-shaft D^6 D^7, journals D^9 D^9, levers D^8, rods S^{20}, pin S^{21}, slide-bars S', parallel links S^{18} S^{18}, pins S^{19} S^{17}, straight bars S^0, with recessed holes S^2, and plates S^{12} and S^{13}, needle-sheet S^{14}, angle-pieces S^2 S^3, brackets S^5, connecting-links S^{15}, cranks S^7, pins S^{16}, crank-shafts S^6, head-pieces S^8, with pin S^{10}, and projection S^9, and shuttles S, all to operate as and for the purpose set forth.

9. In an embroidering-machine, the combination consisting of the brackets O' O', angle-iron bars O^0, straight bars S^0, awls O^2, rail of angle-iron H^0, provided with holes O^3, supported by the upper arms of angular levers secured to the frame of the machine, and the shaft E', crank E^2, and connecting-gear mechanism, substantially as shown and described.

In testimony whereof I hereunto sign my name, in the presence of two subscribing witnesses, this 5th day of May, 1883.

FRIEDRICH VON MARTINI.

Witnesses:
EMIL BLUM,
MORITZ VEITH.