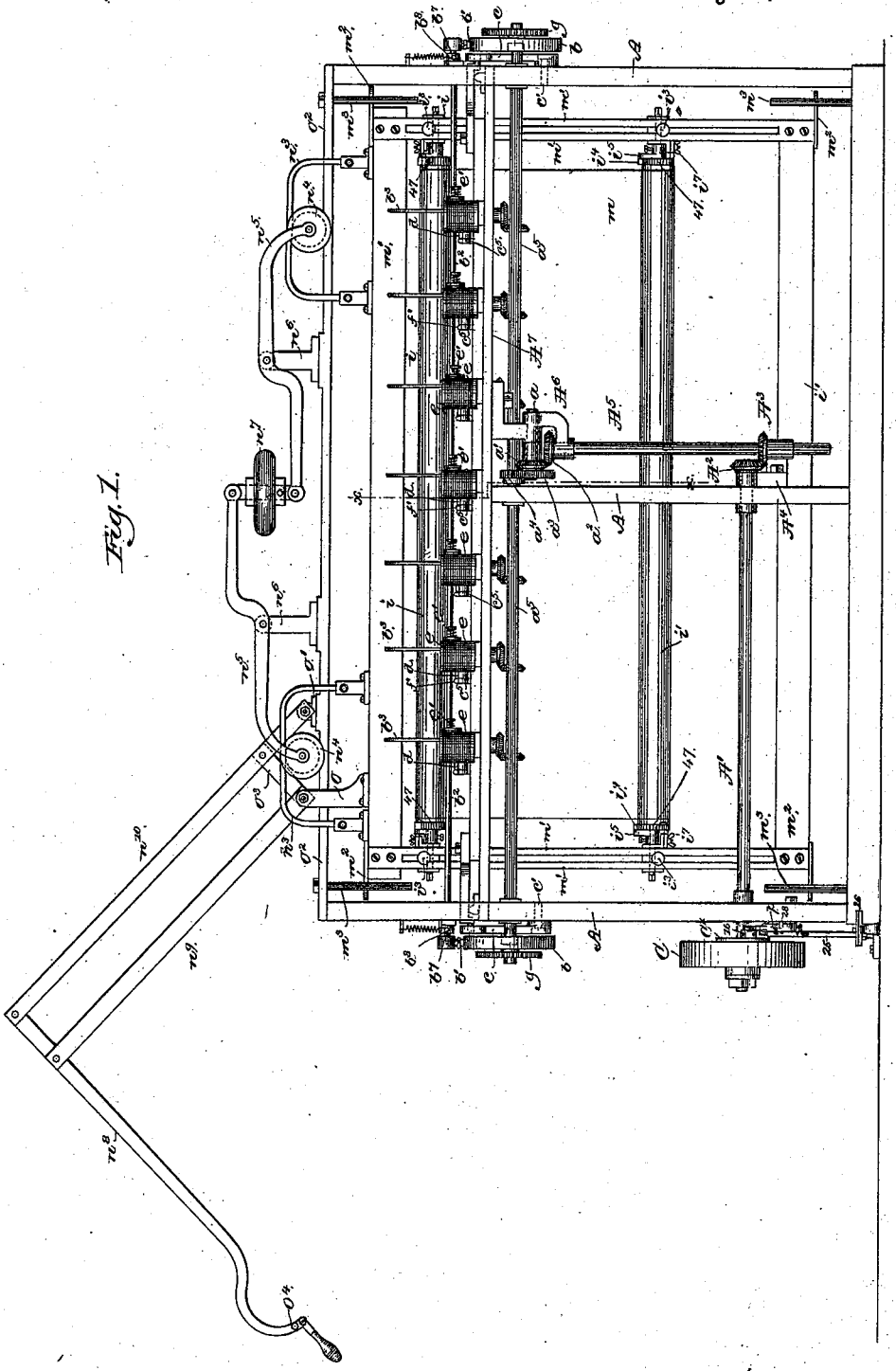
(No Model.) 4 Sheets—Sheet 1.

J. O. PHILLIPS.

EMBROIDERING MACHINE.

No. 382,619. Patented May 8, 1888.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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EMBROIDERING MACHINE.

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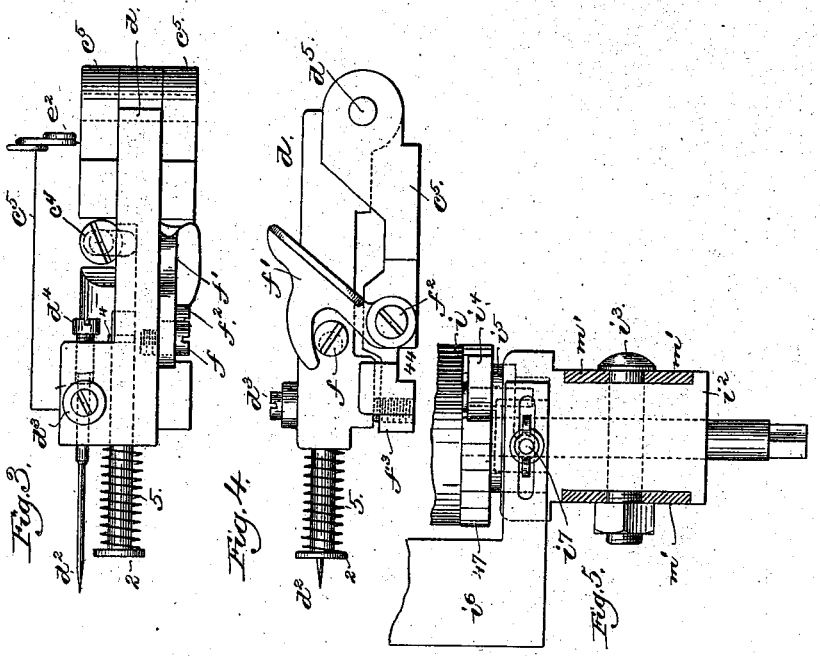

Fig. 3.

Fig. 4.

Fig. 5.

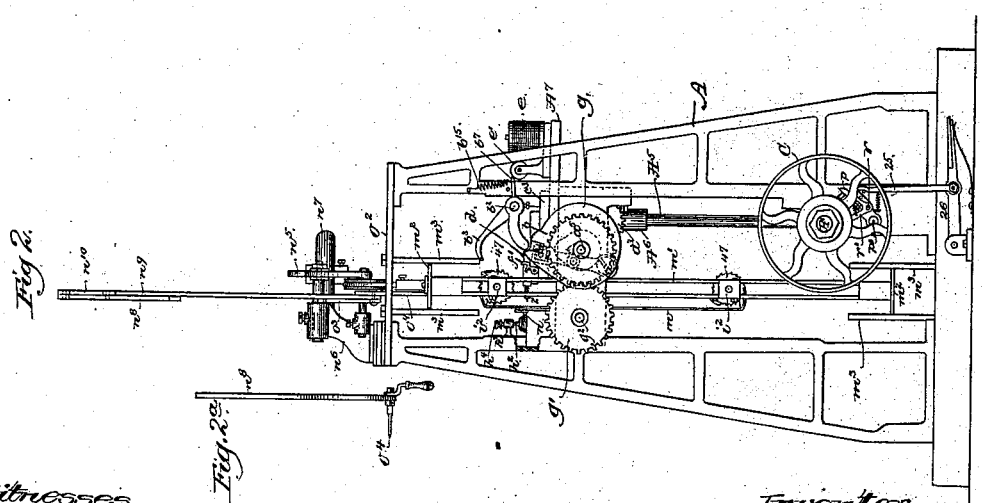

Fig. 2.

Witnesses.

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(No Model.) 4 Sheets—Sheet 3.

J. O. PHILLIPS.

EMBROIDERING MACHINE.

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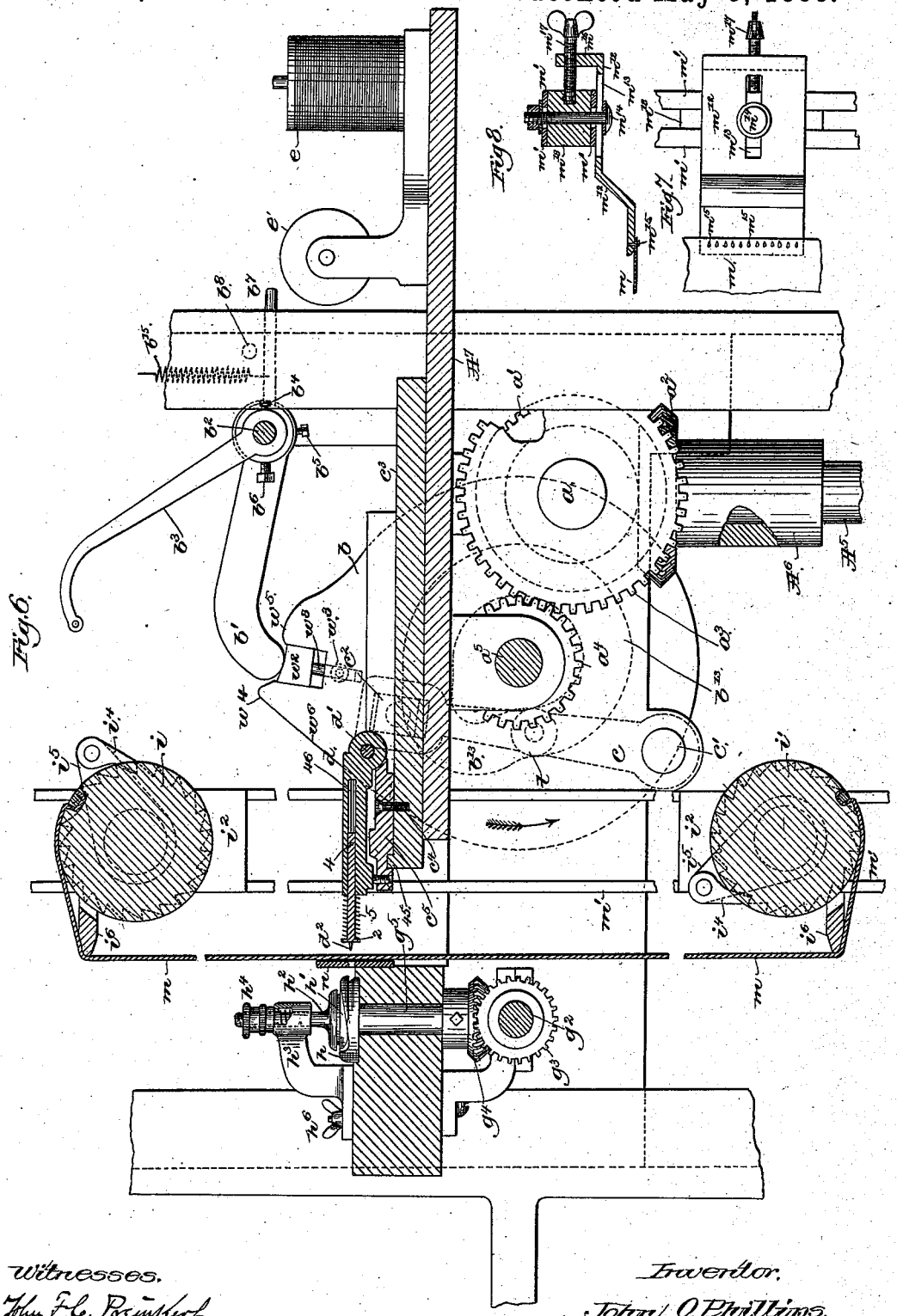

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EMBROIDERING MACHINE.

No. 382,619. Patented May 8, 1888.

Fig. 10.

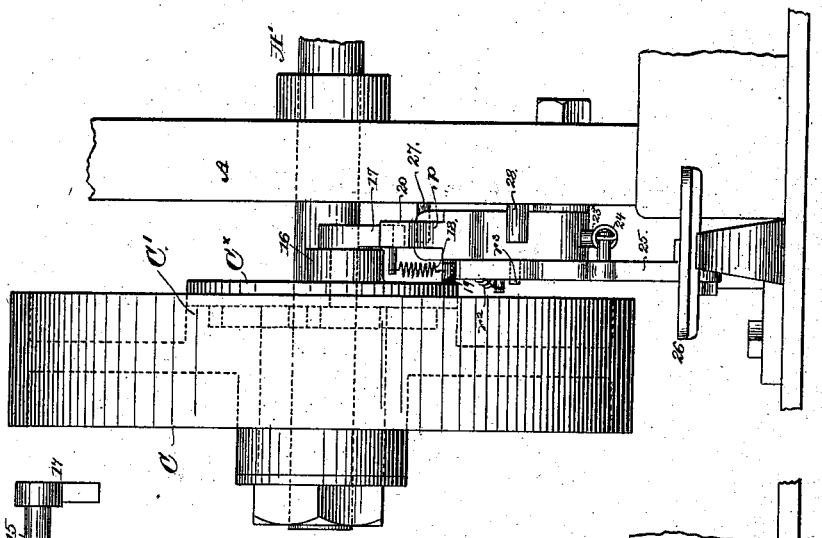


Fig. 11.

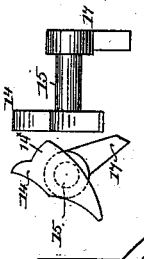
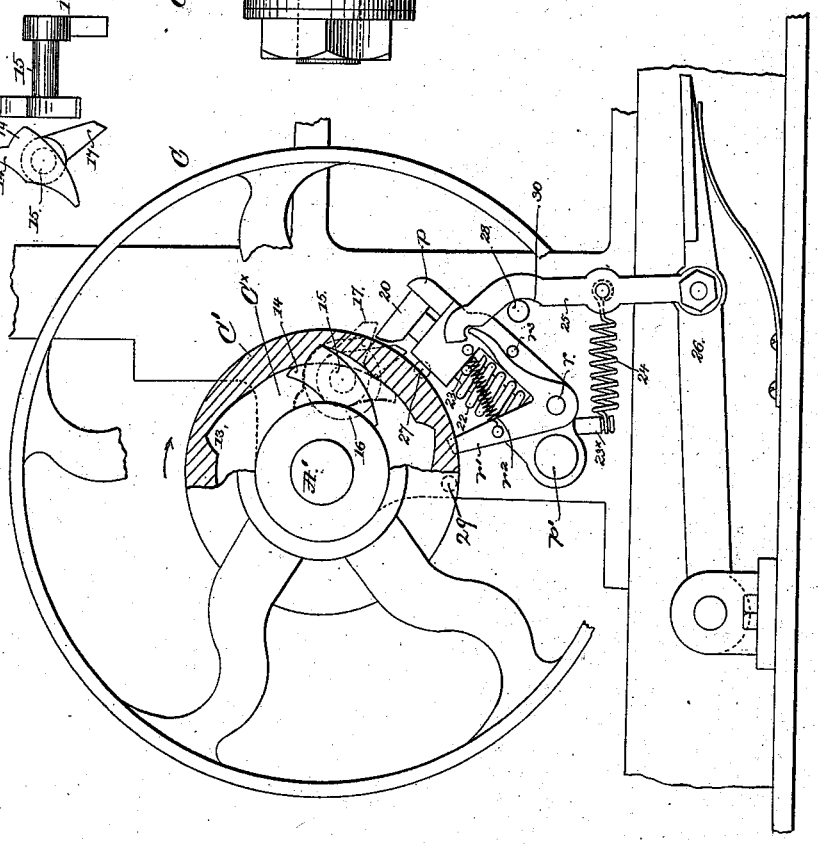


Fig. 9.



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UNITED STATES PATENT OFFICE.

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EMBROIDERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 382,619, dated May 8, 1888.

Application filed July 28, 1886. Serial No. 209,296. (No model.)

To all whom it may concern:

Be it known that I, JOHN O. PHILLIPS, of Lynn, county of Essex, and State of Massachusetts, have invented an Improvement in Multiple-Sewing and Embroidering Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object the production of a novel machine for sewing a plurality of seams in straight or curved lines, or for embroidery, the material being sewed being stretched over rollers carried by a frame, the movement of which is controlled by a pantograph of usual construction.

In my improved machine the material to be sewed is stretched between rollers made adjustable on a stretcher-frame, the movement of which is controlled by the operator through a pantograph mechanism, the rollers being adjustable with relation to each other to enable pieces of fabric of different sizes to be properly stretched between them.

The needles, any desired number of which may be employed, are attached to adjustable carriers shown as pivoted upon blocks adjustably attached to a cross-head, which, as herein shown, is reciprocated horizontally, the material being held in substantially vertical position, the stretcher-frame carrying the material being suspended, and being movable in any direction in a vertical plane. Co-operating with these needles are a series of rotating hooks, which contain bobbins, provided, preferably, with a thread of cotton, silk, or wool, or it may be chenille, which is to appear as the face of the material, the bobbin-holding slide being adjustable with relation to the hook to accommodate bobbins of different thickness.

The especial features in which my invention consists will be hereinafter described, and pointed out in the claims at the end of this specification.

Figure 1 is a front elevation of a sufficient portion of one of my improved machines to enable my invention to be understood; Fig. 2, a left-hand end view of Fig. 1; Fig. 2^a, a detail in side elevation of the pantograph-handle and its attached tracer. Fig. 3 is a plan view of a needle-carrier and the block to which it is attached, together with the needle and presser-foot; Fig. 4, a side elevation of Fig. 3; Fig. 5, an enlarged detail of one end of the roll for holding the material, together with the adjustable stretcher-bars, over which the material passes between the said rolls. Fig. 6 is an enlarged vertical partial section in the line *x*, Fig. 1, chiefly to show parts of the stitch-forming mechanism. Figs. 7 and 8 are details of one of the stretching-dogs, there being one such device attached to the stretcher-frame at each side in line with the line of stitching, the same being hid behind other parts of Fig. 1. Figs. 9 and 10 represent portions of the clutching mechanism removed from Fig. 1, and Fig. 11 represents the dog and its attached shaft and finger.

The frame-work A, of suitable shape to support the bearings for the working parts, has mounted in it the driver-shaft A′, provided with a bevel-gear, A^2, which engages and rotates a bevel-gear, A^3, the neck of which is held loosely in a bracket or stand, A^4, the said bevel-gear being splined on the shaft A^5.

The shaft A^5 is extended at its upper end through a box in a bracket, A^6, (shown in Figs. 1 and 6,) the said bracket being bolted to the stationary plate A^7. The bracket A^6 has also a suitable stud, *a*, to serve as a pivot for a bevel-gear, *a*′, which is engaged and rotated by the bevel-gear, a^2, fast on the shaft A^5. The bevel-gear *a*′ has attached to and moving in unison with it the spur-gear a^3, which engages a pinion, a^4, fast on the cam-shaft a^5, having suitable bearings supported by the frame-work. The cam-shaft a^5, extended across the machine, has at or near each end, outside the frame-work, a cam, *b*, which is shaped at its periphery substantially as shown in Fig. 6, to act upon the arms *b*′, one at each end of the rock-shaft b^2, to which are adjustably attached by suitable set-screws, b^4, the take-up levers b^3, one lever for each needle.

Each arm *b*′ is adjustable on the rock-shaft b^2 by a set-screw, b^5, (see Fig. 6,) adjustment of said arms enabling the effective movement of the take-up levers to be varied according to the thread employed and the material being stitched. The rock-shaft b^2 has also attached to it by a suitable set-screw, as b^6, (see Fig. 6,) a finger, b^7, which co operates with a stop, b^8,

and spring b^{15}, the said stop arresting the downward movement of the arm b', and consequently the throw of the take-up levers b^3. These two cams b at their inner sides are provided with cam-grooves b^{13}, (shown by dotted lines in Figs. 2 and 6,) in which grooves enter roller-studs t, attached to arms c, pivoted on studs c', one arm at each side of the machine, each of the said arms at or near its upper end being shown as slotted to receive a square block, c^2, loose on a stud or pin extended from the cross-head c^3, laid upon the plate A^7, the cross-head having attached to it by a screw, c^4, or in other suitable manner, a series of like blocks, c^5, preferably grooved transversely at 44, (see Figs. 4 and 6,) to embrace a lip or flange, 45, (see Fig. 6,) of the cross-head c^3, the said lip and groove preventing movement of the said blocks upon the cross-head in the direction of the length of the carriages, but permitting, when the screws c^4 are loose, the lateral adjustment of the said blocks on the cross-head, to thus enable the needle-carriers d, attached to the block, to be placed in position to co-operate each with a hook, h, the blocks where the screws pass through them being slotted. (See Fig. 3.) Each block c^5 has pivoted to it at d' a carrier, d, each carrier having attached to it not only a needle, d^2, but also a presser-foot, 2.

Each eye-pointed needle d^2 is provided with a thread taken from a suitable spool, e, or it may be a bobbin, the said thread in practice being passed around a suitable tension device or wheel, e', thence through the eye of a take-up lever, b^3, and the guide-eye e^2, (see Fig. 3,) and thence through the eye of the needle.

Each carrier is provided at one side with a screw, f, having, as herein shown, an eccentric head, the said screw co-operating with a hook or latch, f', pivoted at f^2 on the block c^5, to form a locking device to keep the carrier locked in operative position with relation to the block, the adjustment of the eccentrically-headed screw, or it might be a pin, enabling the hook f' to engage it properly, whatever may be the particular position of the carrier with relation to the block c^5, owing to the position of the carrier adjusting-screw f'', the latter being provided to enable the needle to be correctly adjusted to have its loop of thread entered by the point of the hook h, to be described.

Each needle d^2 is held in its carrier by a screw, d^3, and the distance of the eye of the needle from the end of the carrier, or the distance through the material to which the eye of the needle shall pass, is determined by an adjusting-screw, d^4, (see Fig. 3,) which, when the screw d^3 is loosened, may be turned to move the needle outward in its carrier. Each carrier, when the needle is to be threaded or replaced, or when any fault of stitch is to be corrected, may be turned upward and backward on its pivot d^5, the latch f' having been first turned away from the screw f. Each carrier is bored centrally and slotted at one side, as at 46, (see Fig. 6,) to receive the shank of the presser-foot 2, the slot referred to extending but for a portion of the length of the carrier and receiving a pin, 4, extended from one side of the said shank, the pin and slot determining the extent of the outward movement of the presser under the action of the spiral spring 5, surrounding it. The shaft a^5 at each end, next the cams referred to, has fast on it a gear, g, which meshes with a gear, g', of like size, fast to the end of the hook-driving shaft g^2, the said gears being shown in full lines in Fig. 2.

The hook-driving shaft g^2, supported in suitable bearings, has fast to it a series of bevel-gears, g^3, which engage like bevel-gears, g^4, fast on the shafts g^5, which at their upper ends have rotating hooks h, of usual construction, the said shafts being hereinafter denominated "hook-shafts." The hooks h herein shown are of the Wheeler and Wilson class, recessed at their faces, shown as placed uppermost, the said hooks receiving bobbins h', of any usual and suitable construction, the said bobbins containing either cotton, silk, or woolen threads, or yarns, or chenille. The bobbins are retained in place by bobbin-holders h^2, the shanks of which are extended each through a suitable bracket, h^3, where they have applied to their threaded parts suitable adjusting-nuts, h^4, the said shanks (see Fig. 6) being surrounded by suitable springs to permit the bobbin-holders to press in a yielding manner upon the bobbins. Each bracket h^3 is held adjustably by a thumb-nut, h^6.

The material, m, to be stitched or embroidered is attached in usual or suitable manner to the rollers i i', and moved more or less about one of the said rolls when the machine is started. The said material is wound from one to the other roll as the work progresses. Each roller has its journals at each end mounted in like boxes, i^2, attached in an adjustable manner to the stretcher-frame m' by bolts i^3, extended through slots in the said frame.

The stretcher-frame at each of its upper and lower corners has a foot-plate, m^2, which is extended therefrom into a guide-box, m^3, fixed to the frame, the plates and guide-box guiding the stretcher-frame in its vertical and in its lateral movements in a vertical plane, as will be described. The rolls i i' have at each end suitable ratchet-wheels, 47, the teeth of which are engaged by suitable pawls, i^4, on arms i^5, fast on the boxes i^2, the said pawls holding the rolls with the material stretched thereon. The material, m, between the rolls i i' is passed over stretcher-bars i^6, herein shown as adjustably secured to the stretcher-frame by bolts i^7, Fig. 5, preferably having thumb-nuts, whereby the said stretcher-bars may be quickly adjusted horizontally toward or away from the axis of the said rolls, to enable the material, m, whatever may be its thickness, to be placed against the throat-plate n, and so as to be moved in a plane parallel to the face of the said throat-plate, the latter being pro-

vided with suitable holes for the passage of the needles.

The bearings or boxes i^2 for the journals of the rollers i i' may be readily adjusted at any desired distance apart, to thus enable narrow strips or long pieces to be applied to the rolls.

The stretcher-frame m' has attached to it at its opposite sides in the line of stitching stretching-dogs composed of bent plates m^{12}. (See Figs. 8 and 9, which figures show the said dogs and parts of the stretcher-frame and part of the fabric, for in the other figures the stretching-dogs are concealed.) The dogs near one end are provided with teeth m^{15} to engage the material. Each dog has an ear, m^{16}, in which is placed a thumb-screw, m^{17}, one end of which is seated in a block, m^{18}, between the side bars of the stretcher-frame, the said thumb-screw serving to adjust the dogs to stretch the material in the line of stitching. Each dog is slotted, as at m^{13}, and a bolt, m^{14}, extended through said slot and entering the block m^{18}, serves not only as a guide or support for the dog, but also keeps the block and dog in proper position vertically on the stretcher-frame.

The upper cross-bar of the stretcher-frame m' has attached to it, as herein shown, yokes n^3, which hang on sheaves n^4, supported by levers n^5, pivoted upon uprights n^6, the inner ends of the said levers being acted upon by a weight, n^7, which substantially counterbalances the weight of the stretcher-frame and its attached parts, the said frame being suspended, as will be understood, upon the said sheaves, and being free to be moved in any direction in a vertical plane.

The frame is moved by a hand-lever, n^8, and two links, n^9 n^{10}, one of which is jointed to a standard, o, (see Fig. 1,) secured to the upper edge of the stretcher-frame, the other link, n^{10}, being jointed to a lug secured to a rigid bar, o^2, extended across the frame work, the two links being in turn jointed loosely to a link, o^3.

The lever-handle n^8 and the links described form part of a pantograph mechanism, which is and may be of any usual construction, the said lever-handle having a tracer, o^4, (see Fig. 2^a, where part of the said lever-handle is shown as detached from the machine,) the operator in practice engaging the said handle and moving it so that the said tracer is caused to travel along the lines on a diagram or pattern-plate, (not shown, but of usual construction,) all as commonly practiced in machines employing pantographs.

Instead of the particular pantograph devices herein shown by which to move the stretcher-frame, I may employ any other usual and suitable well-known equivalent device for like purposes.

The belt-receiving pulley is not fixed directly to the shaft A′, but is a clutch-pulley composed, essentially, of a wheel, C, loose on the shaft A′, and having at or near its center at one side an annularly-projecting hub, C′, provided internally with pockets 13, to receive the end $14^\times$ of a dog, 14, connected to one end of a short rock-shaft, 15, mounted in a sleeve like bearing, 16, projecting from a disk or plate, $C^\times$, secured to the shaft A′, the end of the rock-shaft 15 opposite that to which the said dog is secured having attached to it a finger, 17, which has connected to it a spiral spring, 18, (see Fig. 10,) attached to a lug, 19, of the disk or plate $C^\times$, the said spring acting normally to throw the broad end $14^\times$ of the said dog toward the inner side of the hub C′, to engage the pockets 13 thereof as the pulley C in its rotation reaches the said dog.

While the stitch-forming mechanism is being operated, the dog 14 rests in one of the pockets 13 of the hub C′ of the constantly-rotating wheel C; but the stitch-forming mechanism having been operated to form a stitch the finger 17 of the dog 14 in the rotation of the wheel C meets the buffer 20, which causes the shaft 15 to be turned to disengage the dog 14 from the pocket 13, holding it, and thereafter the wheel C runs loosely on the shaft A′ without actuating the stitching parts, the stitching parts being permitted to remain at rest while the stretcher-frame is being moved to place the material in position to have the next stitch made in it.

The buffer is herein shown as made movable with relation to a lever, p, having its fulcrum on a stud, p', the shank of the buffer, surrounded by a spiral spring, 22, having a pin, 23, to act against one end of the said spring. The lever p has a pin, $23^\times$, to which is joined a spring, 24, attached to a link, 25, pivoted to a treadle, 26, the said spring 24 normally acting to keep the lever p against a stop, 27, fixed to the frame-work, so as to place the buffer 20 in position to be struck by the finger 17 and stop the machine. The lever p has pivoted upon it at r a releasing-lever, r', (shown as of elbow shape,) the said lever being acted upon by a spring, r^2, which normally keeps one arm of the said lever in contact with a stop-pin, r^3, on the lever p.

When the stitch-forming devices are at rest, the finger 17 rests against the buffer 20 and the lever p rests against the stop 27. Now to start the stitch-forming devices the operator will depress the treadle and draw down the link 25, and the upper end of the latter, in engagement with one end of the releasing-lever r', will effect the movement of the lever p far enough to place it against the stop 28, which movement will remove the buffer from the finger 17, permitting the dog 14, acted upon by the spring 18, to be engaged by the next pocket 13 to overtake it.

The dog having been engaged, the disk or plate $C^\times$ and shaft A′ are started and made to rotate in unison with the wheel C; but as soon as the pin or projection 29 of the hub meets the releasing-lever r' the latter is turned on its pivot r far enough to be freed from the link 25, which immediately permits the spring 24 to throw the lever p upward against the stop 27, leaving the buffer in position to arrest the finger at the completion of the next stitch and

stop the mechanism. The link 25 is curved, as shown at 30, to co-operate with the stud 28 as the treadle is depressed to thereby push the lever *p* backward.

It is very essential in a machine of this class, wherein the feeding of the material and the length of stitch is made by a pantograph, especially when embroidery is being done wherein nearly every stitch differs from the preceding one in length, that the stitch-forming mechanism be stopped after each stitch, and remain at rest until the material has been moved for the next stitch, and to insure this the employment of an automatic clutch is a necessary element of a complete and practical machine, and instead of the particular clutch-pulley herein described, which is adapted to stop the machine after each full rotation of the shaft a^5, I may employ any other well-known usual equivalent clutch-pulley and treadle mechanism.

In Fig. 6 the cross-head c^3, to which are secured the needle carriers, is drawn back as it will be when the stitch-forming mechanism is at rest and the stretcher-frame is being moved.

When the wheel C in its rotation engages the dog 14 and starts the stitch-forming parts, the cross-head is moved toward the material, *m*, until the needle d^2 penetrates the material, and the point of the needle having entered the needle-throat the presser-foot strikes the material and holds it against the throat near the spot where each needle is then penetrating the material, the spring on the presser-foot yielding and the shank of the foot entering the carrier as the needle completes its movement to place the loop of thread carried by it in position to be entered by the hook *h*, which causes the loop of needle-thread to be cast about the bobbin, the material carried by the bobbin locking the loop of needle-thread and forming a lock-stitch, the material carried by the bobbin being preferably that used to appear prominently at the face of the fabric or leather being stitched.

I do not claim simply a multiple-sewing machine to stitch a series of seams, as such machines employing both shuttles and loopers and making both the lock and chain stitch are old and well known; nor do I broadly claim a pantograph or movable frame.

In Fig. 6, which represents some of the parts of the machine on an enlarged scale, I have shown the cam *b* as provided with an adjustable block, w^2, the outer edge of which constitutes an operative part of the said cam to move the take-up lever b^3 at the proper times to control the needle-thread and afford sufficient slack for the movement of the material in accordance with the pattern being stitched. The cam when adjusted into position is secured by the screw w^3, (shown by dotted lines,) it acting against the shank w^8. When the part w^4 of the cam acts upon the arm b', the lever b^3 is lifted, and the thread coming from the bobbin h' is drawn through the material. When the end of the arm b' rests upon the block w^2, as in Fig. 6, the needle-thread is slackened to permit the pantograph to be actuated to move the material for a new stitch. When the arm b' is on the part w^5 of the cam, the take-up lever is again raised to take up the slack in the needle-thread prior to the entrance of the needle into the goods. When the arm b' is on the part w^6 of the cam *b*, the take-up holds the needle-thread under steady strain.

I claim—

1. In a machine for stitching and embroidering, the combination, with the sliding cross-head c^3, a series of needle-carriers attached thereto, the shaft a^5, connected with the said slide to actuate the latter, and mechanism for rotating said shaft, of the shaft g^2, geared to the said shaft a^5, a series of hook-shafts geared to the shaft g^2, a series of rotary hooks carried by the hook-shafts, a stretcher-frame having rollers to hold the material, and a pantograph to operate the said frame, substantially as set forth.

2. In a machine for stitching or embroidering, the reciprocating cross-head, an attached block, and a needle-carrier pivoted to the latter, combined with a locking device to hold the carrier to the block, substantially as described.

3. The reciprocating cross head, connected block, and adjusting-screw f^3, combined with the carrier *d*, pivoted to the block, and the presser-foot sustained in the said carrier, substantially as described.

4. The reciprocating cross head, connected block, and the needle-carrier pivoted to the block and holding the presser-foot, and provided with an eccentric screw or stud, combined with means to adjust the carrier with relation to the block and with the latch f', to operate all substantially as described.

5. The combination, with the needle-carrier and needle, of the holding-screw d^3, tapped in the side of said carrier and abutting against the side of the needle, and the adjusting-screw d^4, tapped in the carrier above the needle and abutting against the top or end of the shank of the latter, substantially as set forth.

6. The cross head, its attached blocks, needle-carriers pivoted on the said blocks, the shaft a^5, and cams *b*, combined with the rock-shaft b^2, its arms b', and series of take-up levers b^3, substantially as described.

7. In a machine for stitching or embroidering, the suspended universally-movable stretcher-frame and rollers $i\ i'$, having their journals in bearings on the said frame, combined with adjustable stretcher-bars i^6 at or near each roller and adjustable toward and from the axes of the latter, and with the needle-hole plate to permit the material to be adjusted to the face of the needle-hole plate, substantially as described.

8. The stretcher-frame, its attached yokes, plates and guides at the corners of the stretcher-frame, and the rollers $i\ i'$, and boxes secured to the stretcher-frame to hold the journals of the said rolls, combined with the levers n^5, counterbalancing-weight n^7, and

sheaves on which the said yokes rest and move, substantially as described.

9. In a machine for stitching or embroidering, the shaft g^2, a series of hook-shafts, hooks thereon, gearing, substantially as described, to rotate the said hook-shafts, the bobbin-holders to hold bobbins in the face of each hook, and the throat-plate, the reciprocating cross-head, its attached blocks, the needle-carriers attached to the blocks and slotted at one side, the presser-feet having their shanks inserted in the said carriers loosely, springs to surround the shanks of the pressers, and means, substantially as described, to govern the extent of outward movement of the presser-feet, combined with means, substantially as described, to reciprocate the said cross-head and carrying the presser-feet against the material while the needle is in the material, and removing the said presser-foot from the material when the needles are withdrawn from and the material is being moved for a new stitch, substantially as described.

10. The stretcher-frame, means, substantially as described, to suspend it, the rollers i i', mounted thereon, the cross-head, its attached blocks and carriers containing the needles and presser-feet, the shaft a^5, means, substantially as described, actuated by it to move the cross-head, the hooks h, their shafts g^5, the shaft g^8, gearing between it and the hook-shafts to rotate the latter, and gears g and g', combined with a clutch and with means, substantially as described, whereby the shaft a^5 is arrested after the completion of each stitch by any one needle and hook, in order to permit the stretcher-frame and material to be moved for the proper distance in any direction in a vertical plane for the next stitch to be made, substantially as described.

11. In a sewing-machine, a take-up lever, its shaft, and arm b', combined with the cam b, having the adjustable block w^2, to provide more or less slack thread, according to the length of the stitch, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN O. PHILLIPS.

Witnesses:
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JAMES W. COGSWELL.