No. 862,547. PATENTED AUG. 6, 1907.

J. E. FEFEL.

BLINDSTITCHING MACHINE.

APPLICATION FILED AUG. 31, 1906.

3 SHEETS—SHEET 1.

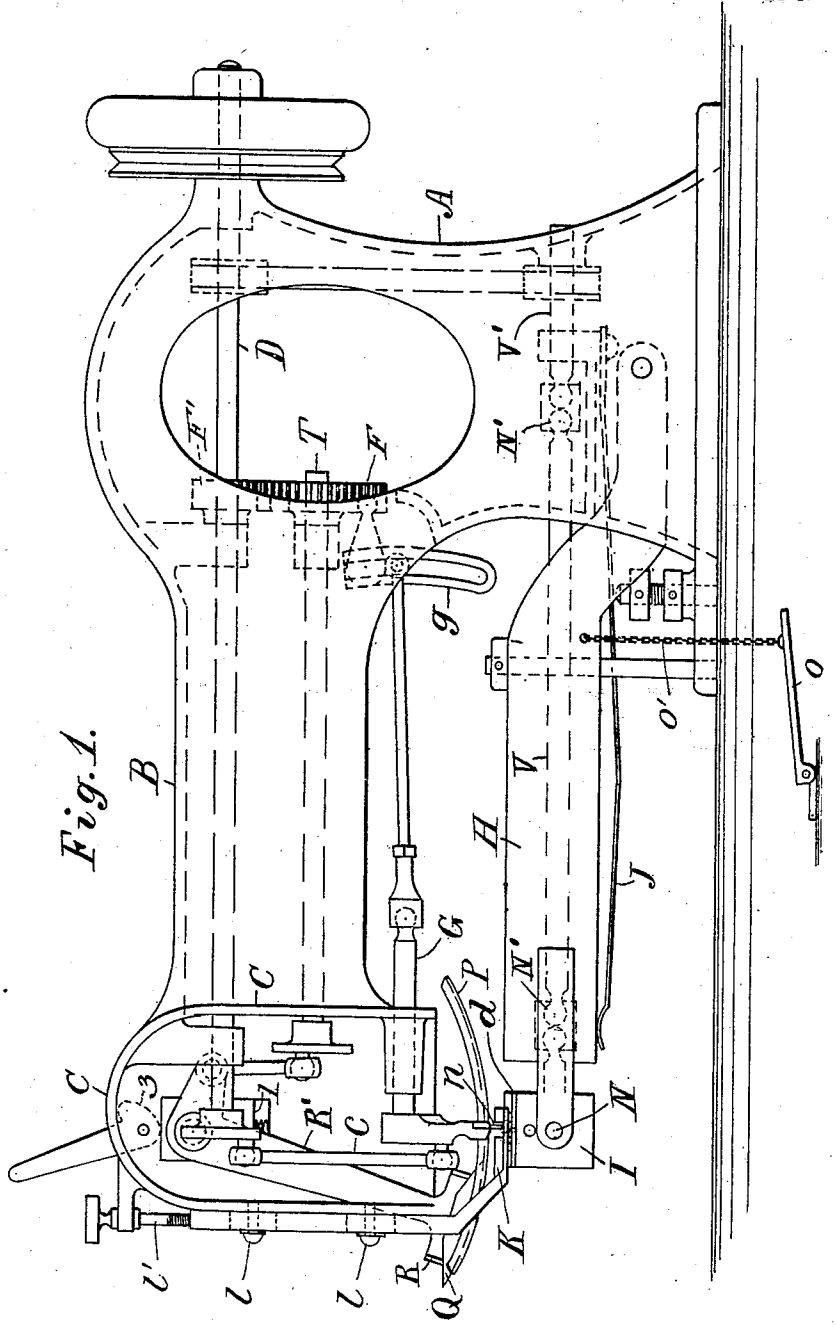


Fig. 1.

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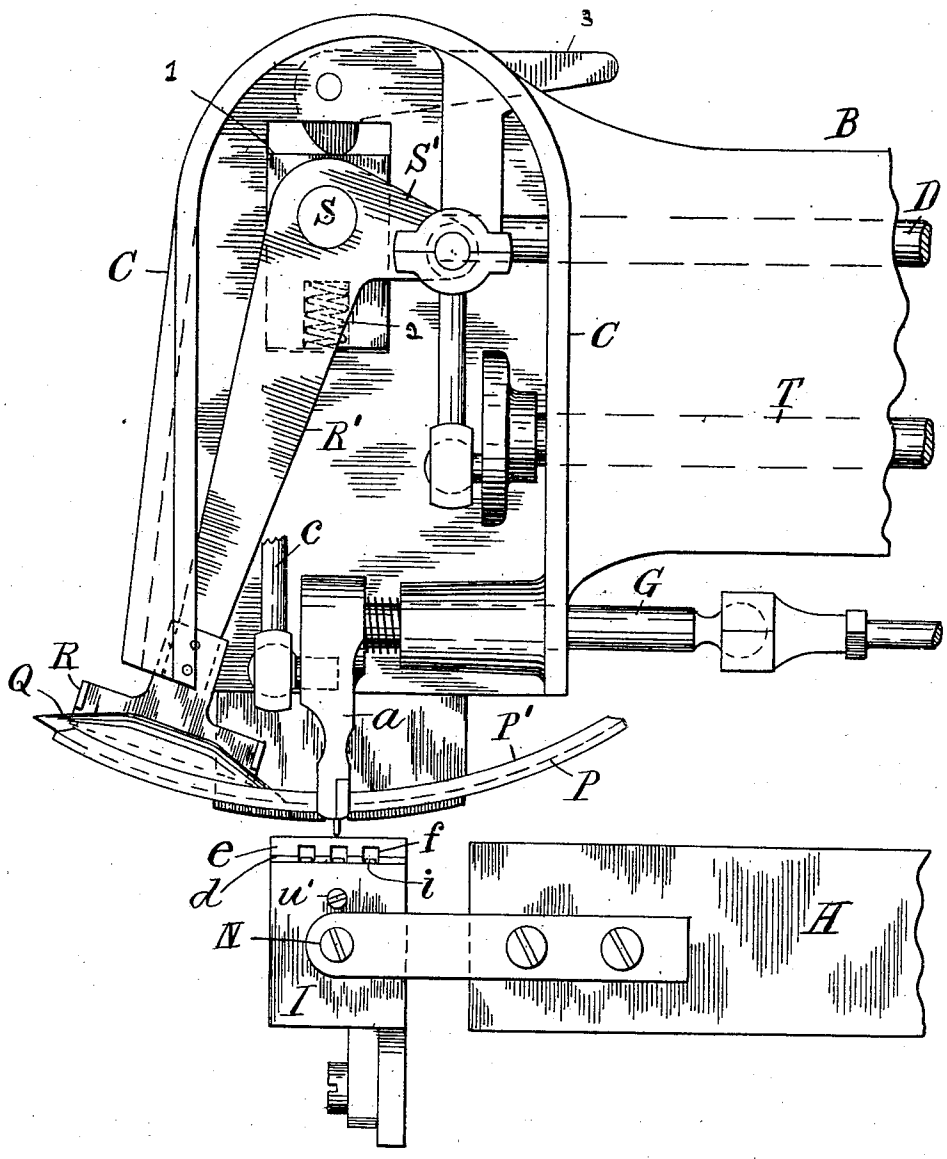
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3 SHEETS—SHEET 2.

Fig. 2.



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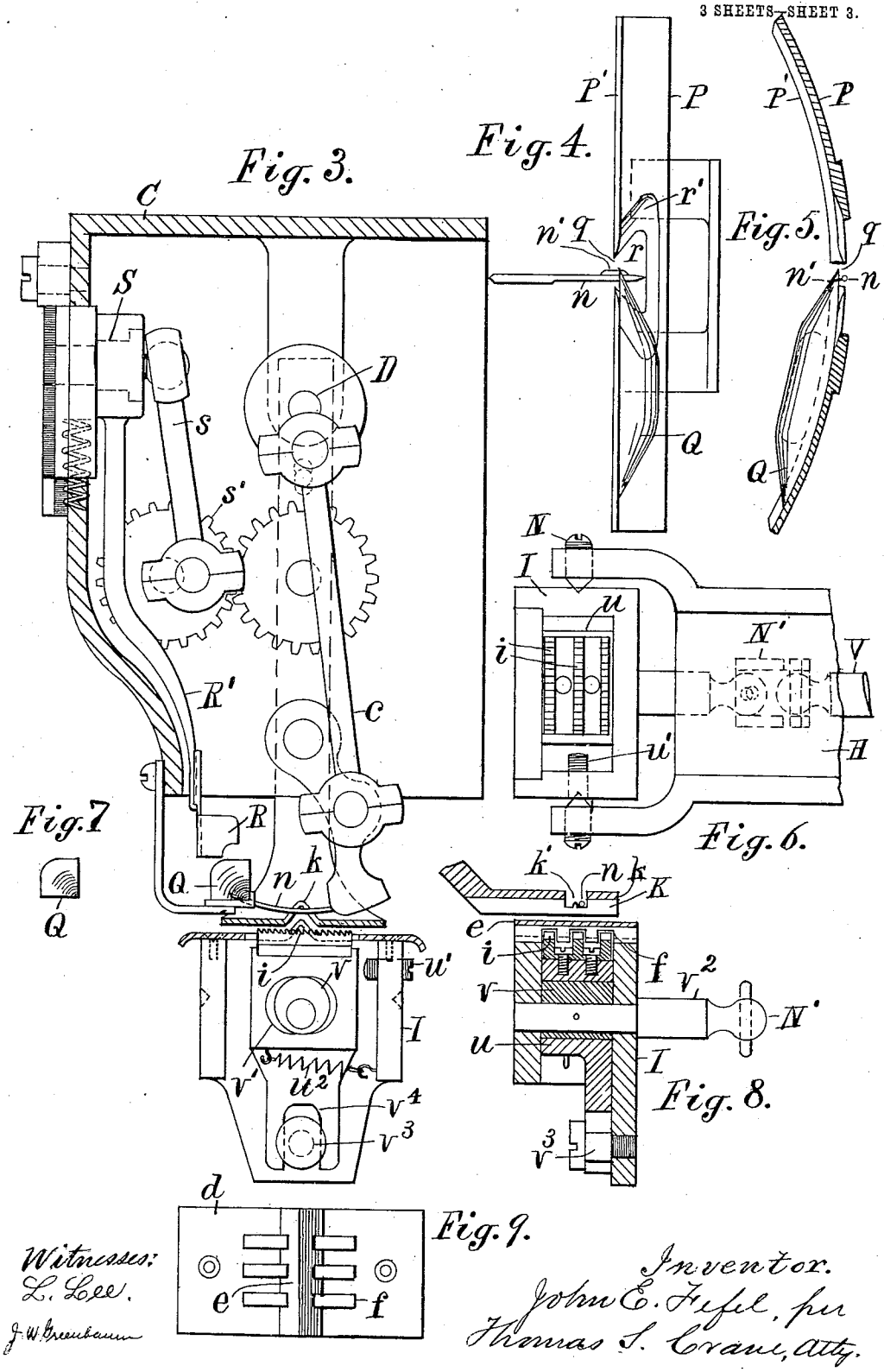
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JOHN E. FEFEL, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE UNITED STATES FELLING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BLINDSTITCHING-MACHINE.

No. 862,547. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed August 31, 1906. Serial No. 332,765.

To all whom it may concern:

Be it known that I, JOHN E. FEFEL, a citizen of the United States, residing at 632 Sterling Place, Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Blindstitching-Machines, (C,) fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to furnish an improved construction for a felling or blind-stitching machine, by which the cloth, and facing to be sewed, can be placed beneath the needle with the least amount of care on the part of the operator, and made thereafter to feed forwardly in a uniform and positive manner. To accomplish these objects I form the cloth supporting plate or table with a ridge, across which the cloth is fed, and form apertures in such table, and in the ridge below its apex, through which toothed dogs may be operated by a reliable four-motion feed. The needle is curved and is moved, by an oscillating carrier, transverse to the ridge and close thereto, so as to pass through the materials laid upon the cloth-plate without penetrating or passing through the cloth. The foot which holds the cloth has a hollow ridge corresponding to that upon the cloth-plate, and the ridge has a transverse notch through which the needle moves above the flat portion of the foot, when passing through the cloth.

The stitch is formed by a shuttle which is oscillated transverse to the needle above the foot, in the manner described and claimed in my application No. 305,032, filed March 9, 1906. The shuttle-raceway in the present invention differs from that shown in my former application, which was supported above the path of the needle, in having its floor arranged below the path of the needle, and a flange formed upon the raceway with a mere notch to admit the needle, such flange lying next to the needle carrier, so that the point of the needle passes through the notch near the close of the needle's forward movement. The floor of the raceway is curved, and the rapid reciprocation of the shuttle, in such a curved path, produces a centrifugal force which presses the shuttle hard upon the floor of the raceway, and prevents the thread which loops over the point of the shuttle from slipping freely over the body of the shuttle, to form the loop necessary to make the stitch. To free the thread from such a pressure, I make an aperture through the floor of the raceway, adjacent to the notch where the needle enters, and bevel the floor of the raceway to the bottom of such aperture; proportioning the aperture and the bevel to form a clearance for the thread beneath the shuttle, while the shuttle passes through the loop. The aperture and its beveled edges are inclined toward both sides of the notch in the raceway flange, so that the point of the shuttle loses its support for only a brief time in bridging the aperture.

The shuttle-carrier is an arm vibrated in a vertical plane upon a pivot in the head of the machine, and in order to clear the carrier readily from the shuttle when placing the shuttle in, or removing it from the raceway, I mount such pivot upon a movable fulcrum-block, and provide a spring to normally lift the block, and a cam lever to depress the block for holding the carrier-plate in engagement with the shuttle when sewing. The cloth-plate is mounted upon a so-called feed-block, which is pivoted upon the forward end of a feed-arm projected from the standard of the frame beneath the head of the machine; the feed-arm itself being pivoted upon the standard, and provided with a spring to press the cloth-plate or table normally upward toward the foot. The pivoting of the feed-block and cloth-table upon the feed-arm enables the cloth-plate to automatically attain a position parallel with the bottom of the foot, when cloth or fabric of different thickness is placed between the foot and the cloth-plate.

This invention will be understood by reference to the annexed drawing, in which

Figure 1 is a side elevation of a felling-machine provided with the improvements; Fig. 2 is an elevation of the head upon a larger scale with a driving mechanism for the needle-bar removed to expose the carrier-arm; Fig. 3 is an end view of the head with the end-plate cut away to expose the interior; Fig. 4 is a plan of the raceway and shuttle; Fig. 5 an elevation of the same in section along the inner side of the flange P′, looking toward the flange of the raceway; Fig. 6 is a plan of the feed-box and the end of the feed-arm, the cloth-plate being removed; Fig. 7 is an end view of the shuttle; Fig. 8 is a vertical central section of the feed-box and the bottom of the foot; Fig. 9 is a plan of the cloth-plate.

The machine is shown with a frame having a hollow post A, goose-neck B and head C, with a driving-shaft D extended into the head. The connections for the needle-carrier are the same as shown in my application No. 305,032; but such carrier is termed a "needle-arm" herein to distinguish it from the shuttle-carrier. G designates the rock-shaft for the needle-bar *a*, which not only oscillates, but moves lengthwise in its bearing back and forth, to form zigzag stitches. The oscillation is effected by a link *c*, and the reciprocation by an oscillating segment *g*. The feed-arm H is pivoted upon the post A and is forked at the end, with the feed-box I pivoted between the arms of the fork by pivots N. The cloth-supporting-plate *d*, upon the top of the feed-box I, is provided with a transverse ridge *e* as shown in Figs. 3, 8 and 9, and has slots *f* extended through the ridge below the apex. Feed-dogs *i* project through the slots to feed the cloth which lies on the cloth-plate and extends across the ridge. The body of the foot K is flat, like the cloth-plate, and has a hollow ridge

k which corresponds with and fits over the ridge e, and ridge k is notched transversely in the middle for the passage of the needle, which in practice moves just above the ridge e.

In blind stitching, a zigzag stitch is employed; the successive movements of the needle being made in different vertical planes, and the notch k is, as shown in Fig. 8, provided at each side of the ridge with a pin or blade k', which guides the needle into its proper position in its alternate movements. The foot, as shown in Figs. 1 and 3, is supported adjustably upon the head by screws l and its vertical position regulated by a set-screw l'; but is held rigid and stationary when suitably adjusted in relation to the needle and the raceway. The cloth is introduced beneath the foot and removed therefrom by lowering the feed-arm. The feed-arm is pressed normally upward by a spring J and a treadle o' is shown in Fig. 1 connected with the feed-arm by a chain o to depress the arm. The needle n is shown in Fig. 3 slightly retracted from its extreme movement; which position in practice loosens the needle-thread, so as to form an open loop n' to engage the point of the shuttle p' and a shuttle Q is shown in Fig. 4 with its point just above the path of the needle, and resting upon the floor of the raceway P which, owing to the upward curvature of the needle, lies chiefly below the path of the needle.

The raceway has a flange P′ upon the edge next to the needle-bar a. Figs. 4 and 5 show a notch q in the flange, with an aperture r extending from the same through the floor of the raceway, and a bevel r' surrounding such aperture to increase the area of clearance beneath the shuttle, without forming any shoulder which might catch and engage the thread. The edges of the aperture r and of the bevel r' are sloped toward the notch; to clear the thread of the loop as it is dragged gradually back from the notch in its passage over the shuttle.

The needlle n is shown in Figs. 4 and 5 with the loop n' just engaged upon the point of the shuttle. The shuttle carrier is formed with notched plates R at the ends, which engage the tapering portion of the shuttle, which is pointed at both ends to make a stitch in each of its movements; and the carrier-arm R′ is pivoted upon a pin S in the top of the head C. The pivot S is mounted in a vertical fulcrum-block 1 fitted movably in the side of the head C and pressed normally upward by a spring 2. A cam 3 is provided to press the block downward, which brings the notched plates R in engagement with the ends of the shuttle. To discharge the shuttle from the raceway, the cam is turned so as to let the spring press the block upwardly, which raises the springs R clear of the shuttle and allows it to be slipped out of the raceway. The turning of the cam away from the top of the fulcrum-block, operates through the spring 2 to raise the pivot S of the carrier R′ and disengages the carrier from the shuttle; whereas, the depression of the cam depresses the fulcrum-block to maintain such engagement when sewing. A horizontal arm S′ is extended from the arm R′ and connected by link s with a crank-plate s' which is geared to a shuttle-shaft T. This shaft is driven from the driving-shaft D by gears F and F′; the gear F having a cam-groove in the back to oscillate the segment g. The feed-dogs i are mounted upon a four-motion block u, and a cam v is extended through a slot v' in the block u and gives the same the customary four-motion movement. A gage-screw u' is fitted through the side of the feed-box I to regulate the throw of the block u, and a spring u^2 presses the block normally toward the gage-screw. The tail of the feed-block is formed with a slot v^4 which fits over a stud v^3 with sufficient clearance to let the block move horizontally in a right line when the feed-dogs are pressed against the cloth upon the underside of the foot-plate. This construction permits the feed-dogs a movement parallel with the feed-plate and an equal grip upon the cloth at both sides of the ridge e; the dogs being made long enough to project through the slots in the cloth-plate at both sides of the ridge, as shown in Figs. 7 and 9. The cam v is shown of circular form, and as it pushes the dogs upwardly through the cloth-plate it presses the feed-arm H downwardly, in opposition to the spring J; but holding the dog constantly toward the feed-plate during the feeding movement of the dog, and thus feeding the cloth positively.

The downward movement of the feed-arm separates the cloth-plate a little from the foot during the feeding movement, and thus enables the cloth to move forward freely over the ridge; the dogs grasping the cloth at both sides of the ridge to propel it positively. The contrary effect is produced during the retraction of the dog, as the feed-arm then presses the cloth-plate firmly against the foot and thus holds the cloth tightly upon the ridge during the forming of the stitch. The use of a four-motion feed in connection with the ridge having apertures below its apex, for the passage of the dogs, thus produces a release of the cloth during the feeding movement, and a special clamping of the cloth during the formation of the stitch. The feed-box I is jointed to the feed-arm by pivot-screws N, and the shaft v^2 of the feed-cam extends within the feed-arm, where it is coupled by universal joints N′ with a feed-bar V which extends into the post A. A feed-shaft V′ is journaled in the post and driven in unison with the driving-shaft D, and is coupled by universal joint N′ with the feed-bar V. Such connections for the cam-shaft enable the cam to be driven uniformly in any position to which the feed-box may be forced by various thicknesses of cloth or fabric lying between the cloth-plate and the foot.

From the above description it will be seen that the ridged cloth-plate, and the foot having a hollow ridge or groove corresponding thereto, serve as an effective clamp for the cloth while the stitch is being formed; while the feed-dogs are also sustained in the most advantageous position to operate upon the cloth at both sides of the ridge; so as to feed the cloth positively and at the same time operate as a means of separating the cloth-plate from the foot to allow the free movement of the cloth. The modification of the raceway, by placing it below the path of the needle, permits the corner of the shuttle to operate upon the side next to the needle-arm, and the beveled aperture through the floor of the raceway enables the thread to move freely over the shuttle in forming the stitch.

What I claim as my invention, and desire to secure by Letters Patent is:—

1. In a blind stitching machine, the combination, with a foot and a curved needle movable above the same, of an arm pivoted upon the frame of the machine and having a cloth-supporting-plate pivoted upon the arm below the foot,

means for pressing the arm toward the foot, four-motion feed-dogs operated through the surface of the cloth-plate, a cam for working the feed-dogs, and a feed-shaft upon the frame of the machine with universal joints connecting the same to the four-motion feed-cam.

2. In a blind stitching machine, the combination, with the frame of the machine having a post, goose-neck, and head with driving-shaft extended into the head, of the feed-arm H pivoted upon the post and having a forked end projected below the head, a feed-box pivoted between the arms of the fork and having a cloth-supporting-plate provided with a transverse ridge, a foot supported upon the head and having a hollow ridge with notch in its apex for the transverse movement of the needle, a needle-carrier pivoted upon the head and reciprocating a curved needle through said notch, and feeding means for feeding the cloth transversely to the ridge.

3. In a blind stitching machine, the combination, with the frame of the machine having a post, goose-neck, and head with driving-shaft extended into the head, of the feed-arm H pivoted upon the post and having a forked end projected below the head, a feed-box pivoted between the arms of the fork and provided upon the top with a cloth-supporting-plate having the ridge *e* parallel with the line of the feed-arm, such ridge having transverse slots *f* for the passage of feed-dogs, feed-dogs *i* operating through the slots transverse to the ridge to grasp the cloth at both sides of the ridge and propel it across the same, a foot sustained upon the head with notch for the passage of the needle, a curved needle reciprocated through the notch transverse to the ridge, and means for forming stitches therewith.

4. In a blind stitching machine, the combination, with the frame of the machine having a post, goose-neck, and head with driving-shaft extended into the head, of the feed-arm H pivoted upon the post and having a forked end projected below the head, a feed-box pivoted between the arms of the fork and provided upon the top with a cloth-supporting-plate having the ridge *e* parallel with the line of the feed-arm, a foot held stationary upon the head and having a hollow ridge with notch in its apex for the passage of the needle, means for pressing the feed-arm toward the foot, a needle-carrier pivoted upon the head and reciprocating a curved needle through said notch transverse to the ridge upon the cloth-plate, and feeding means for feeding the cloth transversely to the ridge.

5. In a blind stitching machine, the combination, with the frame of the machine having a post, goose-neck and head with driving-shaft extended into the head, of the feed-arm H pivoted upon the post and having a forked end projected below the head, a feed-box pivoted between the arms of the fork and having a cloth-supporting-plate provided with a transverse ridge, a foot supported upon the head with corresponding hollow ridge having a notch in its apex for the passage of the needle, means for feeding the cloth across the ridge, a needle-bar pivoted upon the head with curved needle oscillated transverse to the ridge, a raceway supported upon the head transverse to the path of the needle, and a shuttle and means for reciprocating the same in the raceway to engage the loop of the needle-thread.

6. In a blind stitching machine, the combination, with the needle and means for operating the same to form the stitch, of a foot sustained adjacent to the needle and provided with a hollow ridge and a notch across the same arranged in the path of the needle, an arm attached to the frame of the machine with a cloth-supporting plate pivoted thereon below the foot, and having a ridge transverse to the path of the needle with apertures below its apex, means for pressing the cloth-supporting plate toward the foot, a dog-carrier movable below the cloth-supporting plate and having feed-dogs upon the top movable through the said apertures, a cam extended through the carrier, a stud extended through the lower end of the carrier, with clearance for a horizontal movement of the carrier, and a feed-shaft upon the frame connected by universal points with the cam, whereby the feed-dogs are adapted to move parallel with the foot when pressed against the same.

7. In a blind-stitching machine, the combination, with the head of the machine, a feed-arm projected below the head and an oscillating needle-bar with needle oscillated transversely above the arm, of a raceway supported upon the head transverse to the path of the needle with flange along the side next to the needle and a notch in said flange to admit the needle, a shuttle having point fitted to the raceway adjacent to the flange, and the needle and shuttle operated for the said point to engage the thread-loop as the needle withdraws from the raceway; whereby the needle clears the body of the shuttle during the formation of the loop.

8. In a blind stitching machine, the combination, with the head of the machine, a feed-arm projected below the head and an oscillating needle-bar with needle oscillated transversely above the arm, of a raceway supported upon the head transverse to the path of the needle with a notch at one side to admit the needle, and a shuttle movable in the raceway with its point operated to engage the thread-loop as the needle is withdrawn from the raceway, and the bottom of the raceway recessed at the sides of the said notch to clear the thread during the formation of the loop.

9. In a blind-stitching machine, the combination, with the head of the machine, a feed-arm projected below the head, and an oscillating needle-bar with needle oscillated transversely above the arm, of a raceway supported upon the head transverse to the path of the needle and curved in a vertical plane as set forth, with notch at one side to admit the needle, and double-pointed shuttle movable in the raceway and operated for either point to engage the thread-loop as the needle-eye is retracted from the raceway, and the bottom of the raceway adjacent to the notch having the perforation *r* with its sides beveled as set forth, to clear the thread during the formation of the loop.

10. In a blind stitching machine, the combination, with the head, and the feed-arm pivoted upon the frame and projected below the head, and having forked end as set forth, of a feed-block pivoted in the fork of the arm, a cloth-plate upon the block with a transverse ridge having apertures for feed-dogs, four-motion dogs operated in the feed-block through the said apertures, an oscillating needle-bar with needle oscillated across the top of the ridge, a raceway with shuttle transversed across the path of the needle adjacent to the ridge, and a foot supported upon the head and having a hollow ridge fitted to the ridge of the cloth-plate, and provided with a notch for the passage of the needle, the whole arranged and operated in the manner set forth.

11. In a blind stitching machine, the combination, with the head of the machine, a cloth-plate below the same, and an oscillating needle-arm with a curved needle oscillated above the plate, of a raceway supported upon the head and having flange along the side, next to the needle, and the floor of the raceway arranged below the path of the needle, and the flange having a notch to admit the needle, a shuttle movable in the raceway, and an oscillating shuttle-carrier, with means for raising the pivot of the said carrier to disengage it from the shuttle when required.

12. In a blind stitching machine, the combination, with the head of the machine, a cloth-plate below the same, and an oscillating needle-arm with a curved needle oscillated above the plate, of a raceway supported upon the head and having flange along the side next to the needle, and the floor of the raceway arranged below the path of the needle, and the flange having a notch to admit the needle, a shuttle movable in the raceway, and shuttle carrier pivoted above the raceway and having a horizontal arm with connections for oscillating the same, a fulcrum block supporting the said pivot, a spring to normally raise the fulcrum block to disengage the carrier from the shuttle, and means for depressing the block to maintain such engagement when sewing.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN E. FEFEL.

Witnesses:
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THOMAS S. CRANE.