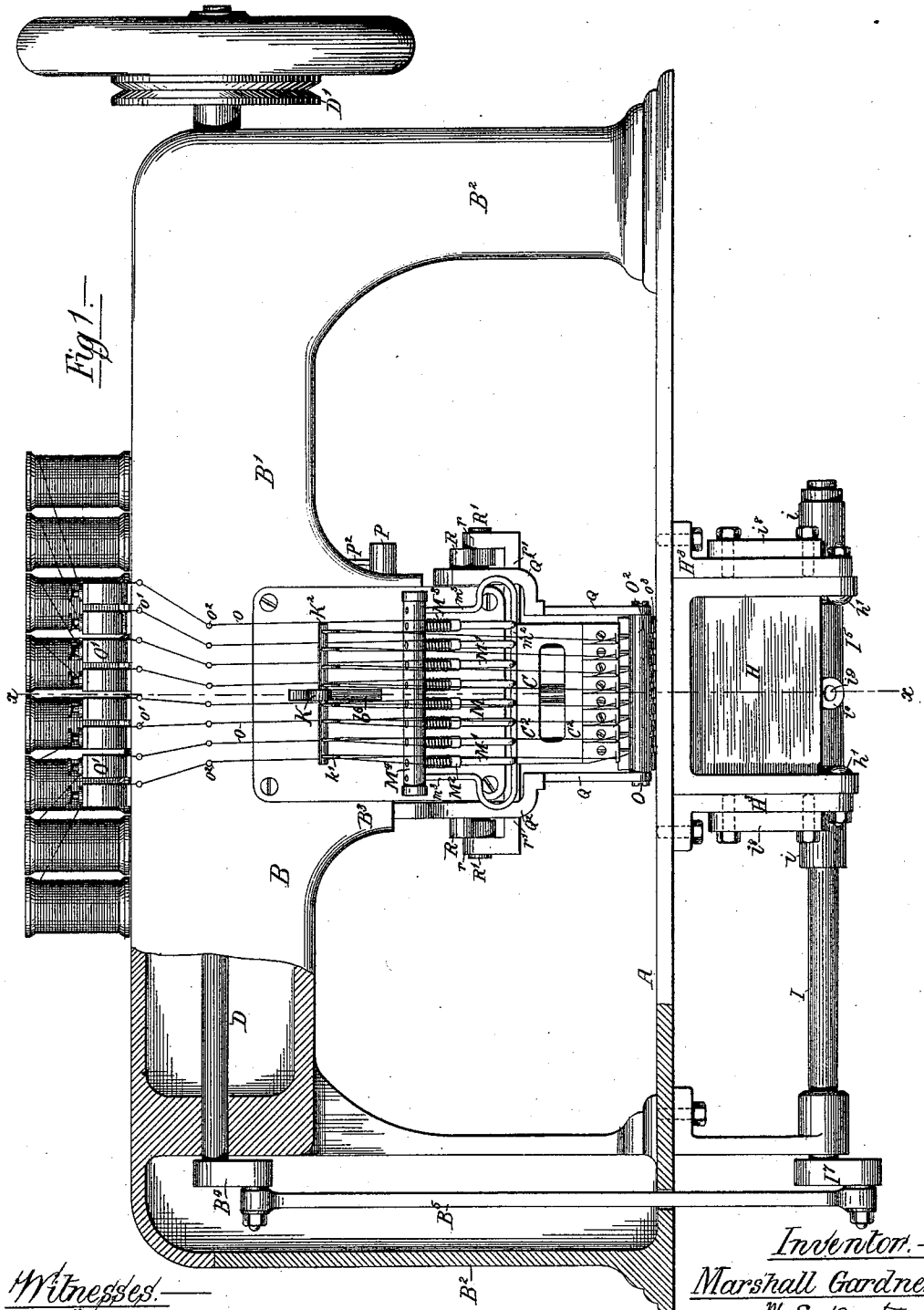
(No Model.) 5 Sheets—Sheet 1.

M. GARDNER.

SEWING MACHINE.

No. 447,307. Patented Mar. 3, 1891.

Fig 1.—



Witnesses.—
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(No Model.) 5 Sheets—Sheet 2.

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SEWING MACHINE.

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Fig 2.—

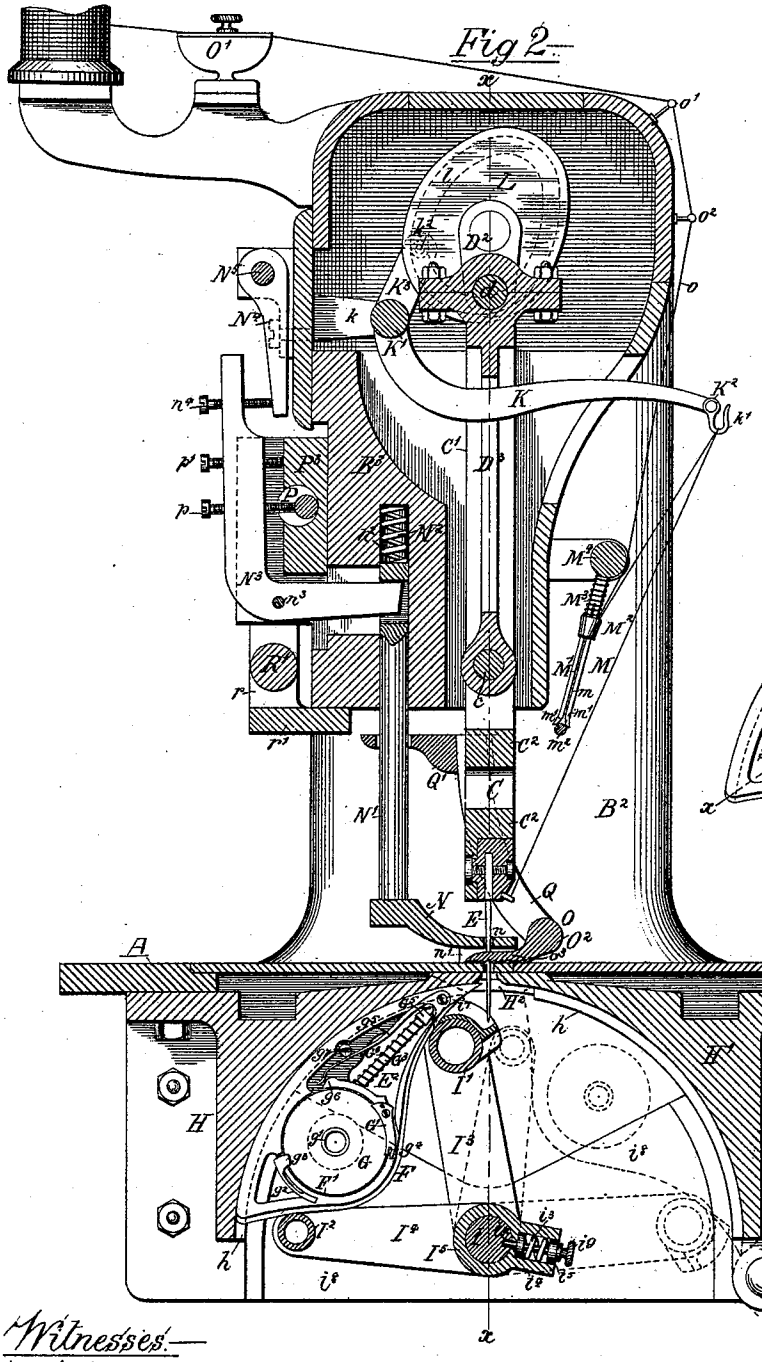


Fig 13.—

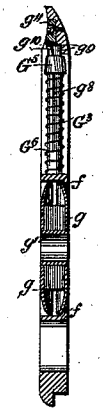
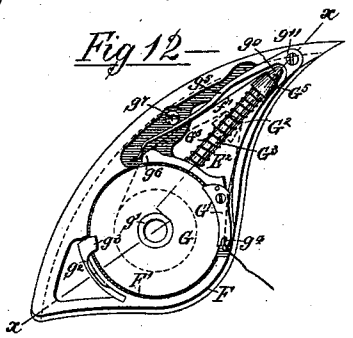


Fig 12.—



Witnesses.—
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(No Model.) 5 Sheets—Sheet 3.

M. GARDNER.

SEWING MACHINE.

No. 447,307. Patented Mar. 3, 1891.

Fig 3—

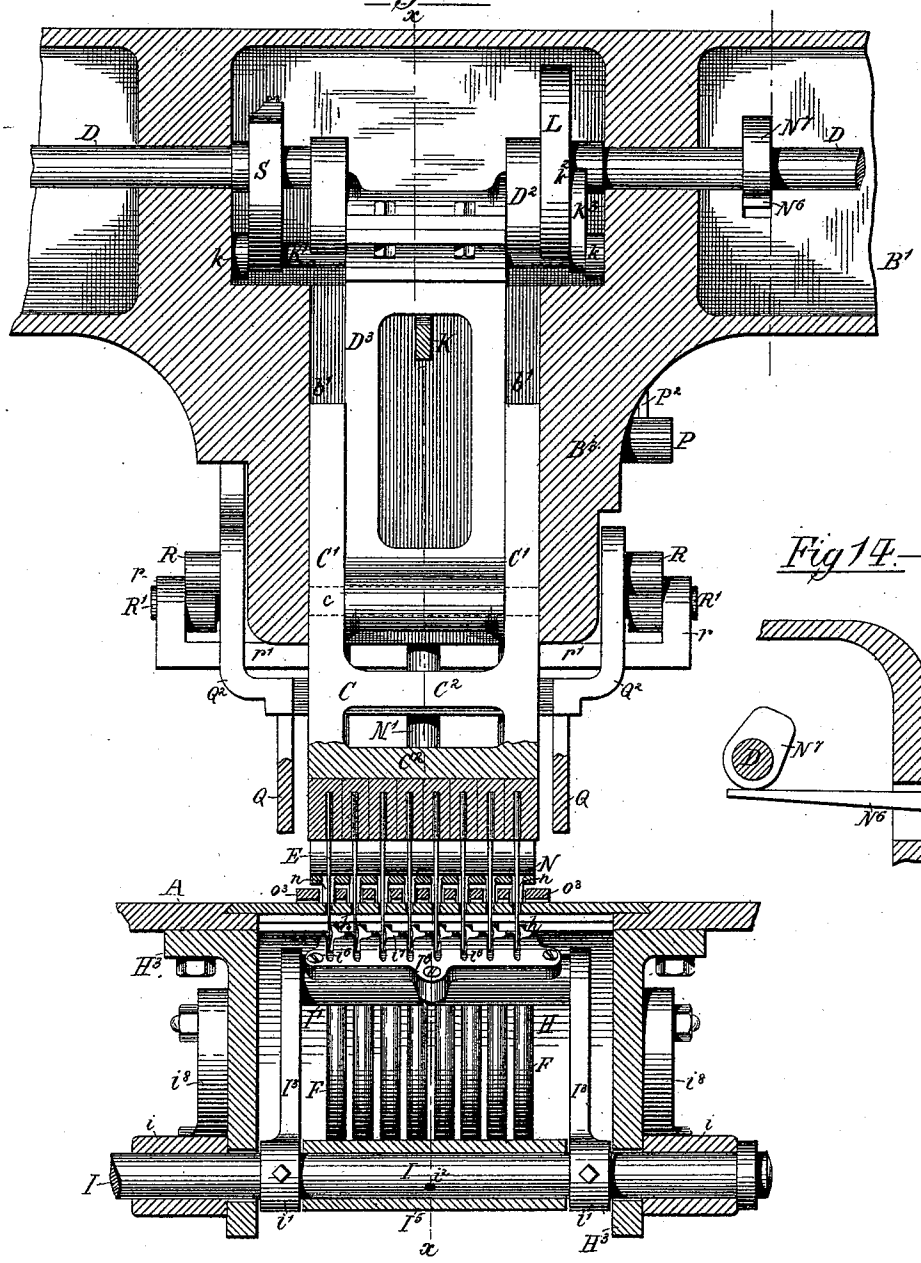

Fig 14—

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(No Model.) 5 Sheets—Sheet 4.

M. GARDNER.

SEWING MACHINE.

No. 447,307. Patented Mar. 3, 1891.

Fig 4.—

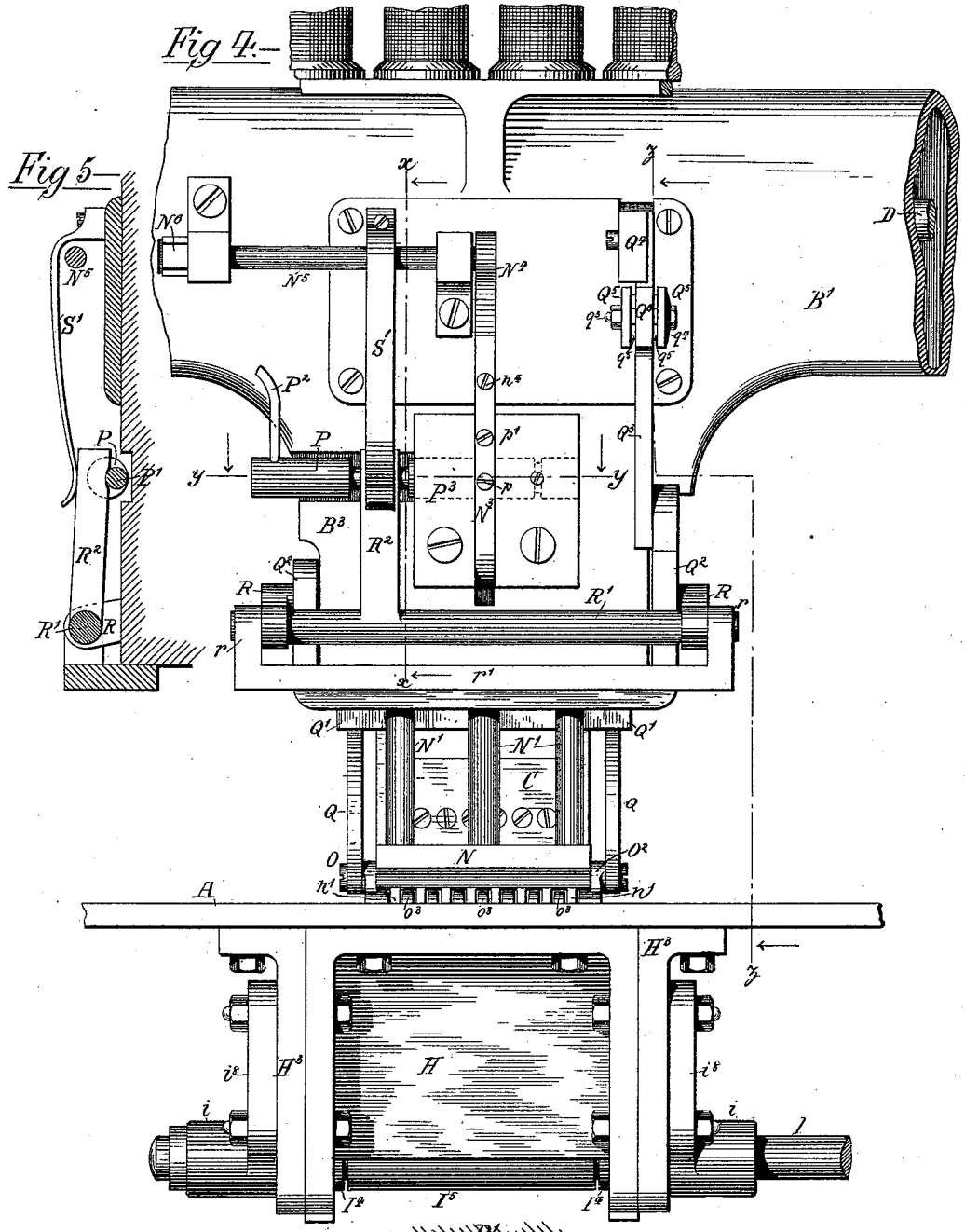
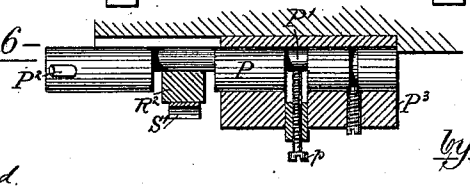


Fig 5—

Fig 6—



Witnesses.—
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(No Model.) 5 Sheets—Sheet 5.

M. GARDNER.

SEWING MACHINE.

No. 447,307. Patented Mar. 3, 1891.

Fig 7.—

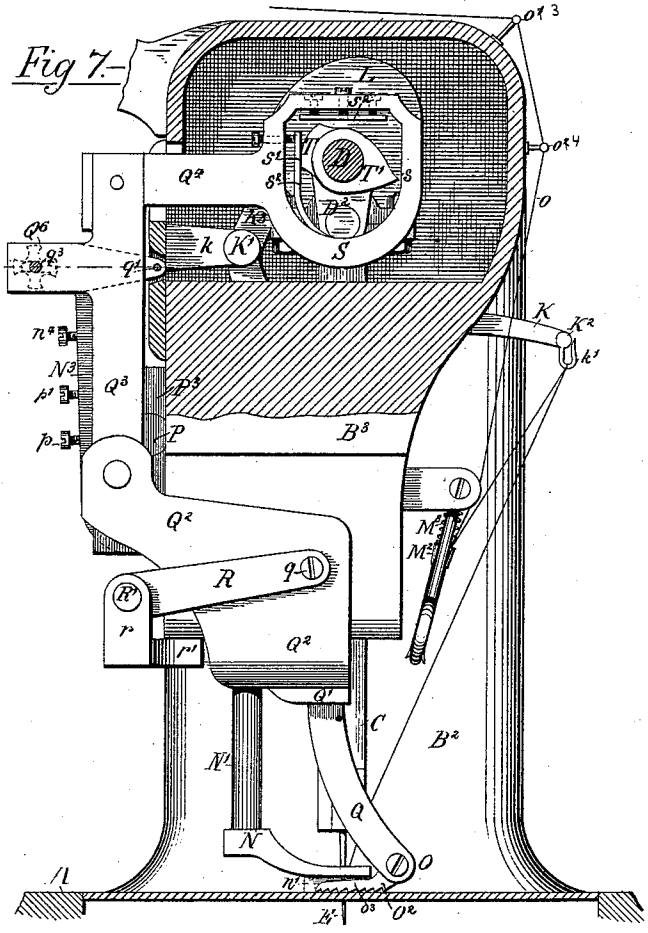


Fig 15.—

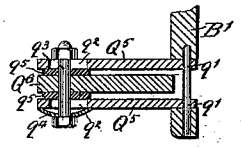


Fig 9—

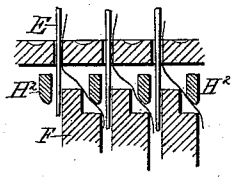


Fig 10.—

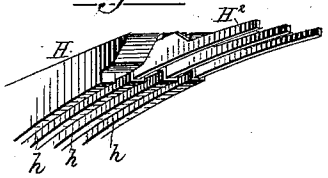


Fig 8.—

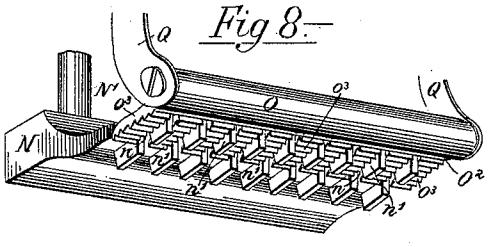
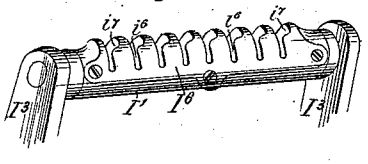


Fig 11.—



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UNITED STATES PATENT OFFICE.

MARSHALL GARDNER, OF AURORA, ILLINOIS, ASSIGNOR TO THOMAS H. BALL AND JAMES STONE, OF SAME PLACE, AND SIMON FLORSHEIM, OF CHICAGO, ILLINOIS.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 447,307, dated March 3, 1891.

Application filed June 21, 1887. Renewed January 7, 1891. Serial No. 376,974. (No model.)

To all whom it may concern:

Be it known that I, MARSHALL GARDNER, of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In a prior application for patent, Serial No. 224,735, filed by me January 18, 1887, is shown and described a sewing-machine of that class known as a "double-thread shuttle-machine," and embracing improvements applicable both to single-needle machines and to those having a plurality of needles and commonly denominated "gang-machines."

The present invention embraces improvements in the machine shown in said prior application in several particulars, as will hereinafter appear; and it consists in the matters hereinafter described, and pointed out in the appended claims.

The invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of a sewing-machine embodying my invention. Fig. 2 is a transverse sectional view of the same, taken upon line *x x* of Figs. 1 and 3. Fig. 3 is a sectional view taken upon line *x x* of Fig. 2. Fig. 4 is a detail elevation of the central portion of the machine viewed from the rear. Fig. 5 is a detail section taken upon line *x x* of Fig. 4. Fig. 6 is a horizontal detail section taken upon line *y y* of Fig. 4. Fig. 7 is a sectional elevation taken upon line *z z* of Fig. 4. Fig. 8 is a detail perspective view of the presser-foot and feed-dog as seen from beneath. Fig. 9 is an enlarged detail sectional view taken upon line *x x* of Fig. 2, showing the throat-plate and parts adjacent thereto. Fig. 10 is a perspective view of the fingers upon the shuttle-guides, shown in Figs. 2, 3, and 9. Fig. 11 is a detail perspective view of one of the cross-bars of the oscillating shuttle-carrier. Fig. 12 is a side view of a shuttle removed from the machine. Fig. 13 is a sectional view of the same, taken upon line *x* of Fig. 12. Figs. 14 and 15 are detail views hereinafter referred to.

In the said drawings, A indicates the work-plate of the sewing-machine, B a supporting frame or arm attached to and extending over the said plate, and C a vertical reciprocating needle-bar, having bearings in the said frame. The said arm B in the particular machine herein illustrated consists of a horizontal part B′, which is supported at both ends from the plate A by means of standards B^2 B^2, said horizontal part B′ being provided at its middle part with a depending part or projection B^3, in which the bearings for the needle-bar C are formed.

D is a horizontal crank-shaft, having suitable bearings in the frame B, said crank-shaft being provided with the usual drive-pulley D′ outside of the frame at one end of the latter, and with a crank D^2, engaging a pitman D^3, by which the crank is connected with the needle-bar C.

The machine herein shown is what is known as a "gang" machine, or one adapted for sewing a number of lines of stitches side by side, and said machine is provided with a series of needles E E E and with a corresponding series of shuttles F F F, which latter are provided with thread-carriers or bobbins G G G.

H H′ are two castings located beneath the work-plate A of the machine, and in the lower surfaces of which are formed a series of curved shuttle-races or guide-grooves *h h*.

The several shuttles F F F are flat in form, and are held and guided at their outer or upper edges in the said curved races or guide-grooves *h h*, and have an oscillatory or back-and-forward motion therein through an arc of about one-fourth of a circle. Oscillatory motion is given to the said shuttles by means of a shuttle-carrying device, which is so constructed as to support the shuttles in engagement with the guide-grooves, while at the same time giving oscillatory motion thereto. Such shuttle-carrying device comprises as its main parts a rock-shaft I, mounted in bearings *i i*, arranged at either side of the guides *h h* and concentrically therewith, and two horizontal bars I′ I^2, which are rigidly connected with and are moved by the said rock-

shaft. The said bars I′ I² are constructed to engage the shuttles F F at points near the forward and rear ends of the latter in such manner as to hold the said shuttles in place within the guide-grooves, and at the same time to transmit the oscillatory movement of the carrier to the said shuttles.

In the particular machine herein shown the shuttle-actuating devices are made in detail as follows: The bar I′ is sustained from the rock-shaft I by means of two arms I³ I³, attached to opposite ends of said bar I′ and provided with collars i', which are secured upon the rock-shaft by means of set-screws. Said bar I′ is located in position to engage the shuttles near their forward ends or points in the manner clearly shown in the drawings. The bar I² of the shuttle-carrier, which engages the rear ends of the shuttles, is attached at its ends to two arms I⁴ I⁴, which are rigidly connected with a single tubular shaft or sleeve I⁵, mounted upon the said rock-shaft and detachably secured to the latter. The said sleeve I⁵ is adapted to turn upon the rock-shaft by releasing the attaching devices connecting it with the shaft, the object of this construction being to enable the carrier-bar I² to be moved away from the carrier-bar I′, so as to allow the removal of the shuttle from the bottom of the machine, if desired.

The devices herein shown for attaching the sleeve I⁵ to the shaft consist of a pin i^9, mounted to slide in the sleeve I⁵, and engaging at its inner end with a hole i^2 in the rock-shaft I, and a spiral spring i^3, located in a tubular extension i^4 upon the sleeve I⁵, said spring being arranged to act against the ends of a pin i^5, inserted through the pin i^9, so as to hold the latter normally in engagement with the shaft.

The shuttle-carrier, as far as it is above described, is similar to a shuttle-carrier illustrated in said prior application hereinbefore referred to.

Each of the shuttles F consists of a single flat piece of metal curved upon its outer edge to conform to the curvature of the guide-grooves h h, pointed at its forward end, and made sufficiently wide at its rear end to receive the circular bobbin G, the part of the shuttle between the point thereof and the bobbin being tapered in a familiar manner. The bobbins G G, herein illustrated, are formed by two concavo-convex disks g g, connected by a short tube g'; which forms the barrel upon which the thread is wound.

The shuttle is provided with a seat for the bobbin, consisting of a circular aperture F′ extending through the shuttle, and provided upon one side thereof with an inwardly-extending lip or flange f, against which the bobbin rests. The bobbin is held in place against the flange f by means of a plate G′, which is affixed to the shuttle in such manner as to overlap the aperture F′, together with a spring-catch g^2, which is secured to the shuttle at the opposite side of said opening, said plate and catch being arranged to engage the opposite sides of the bobbin, and thus hold the latter in place. The said spring-catch g^2 is herein shown as consisting of a spring-plate, secured within a recess formed in the rear part of the shuttle, said spring-plate having a lip g^3, which extends over and engages the bobbin. The plate G′ is desirably provided with an eye g^4, which forms the exit thread-guide of the shuttle.

Within the body of the shuttle, between the bobbin-seat F′ and the point or beak of the the shuttle, is formed a recess E², and within this recess, in its part adjacent to the outer curved margin of the shuttle, is placed a tension device for the shuttle-thread, consisting of a leaf-spring g^5, secured at one end to the shuttle near the point of the latter and bearing at its free end against an opposing part or surface g^6 of the shuttle. The end portion of the spring g^5 and the opposing bearing-surface g^6 are arranged in the same plane with the bobbin, so that the thread passing from the bobbin may pass between said spring and bearing-surface.

For adjusting the tension of the spring g^5 a screw-stud g^7 is inserted in the body of the shuttle behind the spring, said screw having an eccentric head adapted to bear upon the spring. By turning the screw the spring may be made to press with greater or less force upon the thread, thus enabling the tension to be increased or decreased, as desired.

As an improved construction in a take-up device for the shuttle-thread, particularly adapted for use in a shuttle of the kind herein shown and above described, I provide a device which is made as follows: G² indicates the take-up device as a whole, located within the recess E² between the bobbin-seat and the point of the shuttle. G³ is a cylindric rod or bar, provided with a longitudinal slot g^8, and about which is placed a sliding ring G⁵, adapted to move freely in a longitudinal direction thereupon. G⁶ is a spring, herein shown as made of spiral form and operating to throw the ring or sliding piece G⁵ toward one end of the rod G³. In the particular form of shuttle herein shown the said spring G⁶ is arranged to throw the ring G⁵ toward the point or beak of the shuttle. f' indicates the shuttle-thread, which is wound about the bobbin G in the usual manner, and which passes from the said bobbin between the end portion of the tension-spring g^5 and the opposing bearing-surface g^6, then through the slot g^8 of the rod G³ outside of the sliding ring G⁵, and from said ring backwardly to and through the delivery-eye g^4 of the shuttle. When the said shuttle-thread is drawn taut, the ring G⁵ will be forced or carried backwardly, and will assume the position shown in dotted lines in Fig. 12, and when the shuttle-thread is relaxed the spring will throw the sliding ring G⁵ outwardly and immediately take up the slack, and thus exert at all times a constant and uniform tension on the thread.

To enable the shuttle to be easily threaded, I have herein shown the slot g^8 as extended to the outer end of the rod G^3, thus forming two arms or fingers g^9 g^9, one of which is secured at its end to the shuttle and the other left free and beveled upon its inner face, as shown at g^{10}, Fig. 13, so that the thread may be readily slipped over its end into the slot from one side of the shuttle.

In the particular construction illustrated the outer end of the tension-spring g^5 is formed with an enlarged part or hub g^{11}, which is fitted in a recess adjacent to the point of the shuttle, and secured therein by a screw in the manner clearly shown in Figs. 12 and 13, the said end part g^{11} being arranged to extend over and hold in place the end of one of the fingers g^9 of the rod G^3, while the outer surface of the said part g^{11} is inclined to fit the beveled inner surface of the other or free finger g^9.

The shuttles F and the shuttle-races of grooves h h in the machine illustrated are so proportioned that the shuttles must be moved through about one-fourth of a circle in carrying the lower thread through the loop of the needle-thread. The oscillating movement of the shuttle-carrying devices for giving this movement to the shuttles is afforded by means of a crank-arm I^7 upon the end of the rock-shaft I, connected by a pitman or rod B^5 with a crank B^4 upon the shaft D.

In a machine having a shuttle which moves through a part of a circle and in which the delivery-eye of the shuttle is remote from the axis of oscillation of the shuttle-carrier the distance between the delivery thread-guide and the needle-aperture of the throat-plate is obviously increased or decreased when the shuttle is oscillated, such distance being greatest when the shuttle is at the forward and backward limits of its movement, and least when the thread-guide is vertically beneath the needle-aperture.

The purpose of the take-up device for the shuttle-thread, hereinbefore described, is to take up the slack of the shuttle-thread, which would otherwise be present at each forward and backward movement of the shuttle, as set forth is said prior application, Serial No. 224,735, in which a take-up device operating to take up the slack of the shuttle-thread for the purpose and in the manner above described is shown and broadly claimed. In the machine shown in said prior application for patent the shuttle-carrying device comprises horizontal bars similar to the bars I' I^2, which are given an oscillatory motion and engage and move the shuttles substantially in the same manner as do those herein shown. In the employment of a machine of the character illustrated in said prior application for the purpose of stitching bones in corsets it is found that the needles are liable to be thrown out of line or laterally deflected by contact with the edges of the bones or stiffening-strips, with the result that the needles are struck by the shuttles and bent or broken. To avoid the possibility of this result and as a further improvement in sewing-machines, I have provided the shuttle-carrier with a series of guide-grooves for the ends of the needles. Such guide-grooves, in the case of the shuttle-carrier of the form shown, are conveniently formed in a plate or bar I^6, attached to or formed on the bar I' of the shuttle-carrier, Figs. 2, 3, and 11, said plate or casting I^6 being so located as to extend forward of the points of the shuttles, (at the time the latter are at the rearward limit of their movement,) so that the grooves i^6 i^6 therein will engage the points of the needles when the latter are at the lower limit of their movement and at the time the shuttles advance to engage the loops of the needle-threads. To insure the proper location of the points of the shuttles with relation to the said guide-grooves i^6, the casting I^6 is preferably provided with notches i^7, wherein the edges of the shuttles may rest, as clearly shown in Fig. 2.

I have herein shown the needle-guide plate I^6 as made separate from and secured by screws to the cylindric bar I' of the carrier; but said needle-guide plate and the bar may be made in one piece, or the parts may be otherwise constructed to afford suitable support for the shuttles and guide-grooves for the needles, as may be found convenient or desirable.

H^2 H^2 H^2 indicate a series of fingers, which are attached to the casting H and extend across the space between said casting H and the casting H′ at points between the needle-apertures of the throat-plate a at a short distance below the latter. These said fingers H^2 H^2 H^2 are located between the grooves h h, so that they form extensions or prolongations of the ribs or projections between the grooves, as clearly shown in Fig. 9, and said fingers are made thinner than the said ribs or projections and narrower vertically than the spaces between the shuttles and the throat-plate, so as to leave open spaces for the passage of the loops of the needle-threads between the said fingers and the shuttles, as clearly shown in Fig. 9. The purpose of said fingers is to confine the loop of the needle-thread, and thus avoid possibility of the latter being caught by the point of the next adjacent shuttle. The said fingers H^2 H^2 may be secured to the casting H in any manner found convenient or desirable. As herein shown, however, the fingers are made of separate pieces of sheet metal inserted and held in saw-kerfs formed in the marginal part of the said casting, the free ends of the fingers being fitted to the adjacent marginal part of the casting H′ in the manner clearly shown in Figs. 2 and 9.

In the device shown in the said prior application hereinbefore referred to, the bar I^2 of the shuttle-carrier is made movable upon the rock-shaft I and adapted to swing downwardly away from the other bar in the manner herein

illustrated and above described. The shuttles are removed and inserted solely by releasing the said bar I^2 and allowing the said shuttles to drop from the lower rear part of the shuttle-races. As an improved means of inserting the shuttles in and removing them from the machine, I have made the casting H′ (within which the forward parts of the guide-grooves are formed) movable, so that it may be moved or swung outwardly away from the shuttles to expose the latter and allow one or more of said shuttles to be removed from the carrier, as desired. The said casting H′ may be detachably secured in place in any suitable or convenient manner; but, as herein shown, it is pivotally supported by means of pivots h' h' at its lower margin in such manner that its upper and inner edge may be swung upwardly and outwardly into the position shown in dotted lines in Fig. 2. For conveniently supporting the said casting H, and as a means also of sustaining the casting H′, depending flange-plates H^3 H^3 are bolted between the work-plate A, the casting H being bolted to the said plate in the manner shown and the casting H′ being pivoted between said plates. When this construction is employed, the bearings i of the rock-shaft I are conveniently supported by means of flanges or wings i^3 i^3 upon the bearings, bolted to the said plates H^3 H^3 in the manner clearly shown in Fig. 1.

As far as the operation of the stitching-forming devices above described are concerned, the particular details of construction employed in the devices for actuating the needles in the take-up and tension devices for the upper thread and the other operative parts of the machine are unimportant. The machine herein shown, however, embraces several improvements in the take-up device for the upper thread and in feed devices, the parts above the work-plate in said machine being made as follows: The needle-bar C consists of two parallel side pieces C′ C′, connected at their lower ends by cross-bars C^2 C^2, the latter being arranged to afford support for the needles E E. The said side pieces C′ C′ of the needle-bar are held or guided in suitable grooves b', formed in the depending part B^3 of the machine-arm B′. The lower end of the pitman D^3, by means of which motion is transmitted from the crank D^2 to the needle-bar, is located between the bars C′ C′, and is connected with the latter by means of a pivot-pin c, fixed in the bars and passing through the lower end of the pitman. The said pitman is formed at its upper part to afford bearings for the crank pin d of the crank D^2, and is formed at its middle part to afford a space through which the take-up arm passes in the same manner as shown and described in said prior application. K is the take-up arm for the upper threads. Said arm is attached to a rock-shaft K′, mounted in bearings k k within the hollow interior of the frame B′, and is constructed to pass through the central opening of the pitman D^3 and through a slot b^6 in the front wall of the part B^3 of the frame-arm. Said arm K is provided at its outer or free end with a horizontal bar K^2, provided with a series of thread-guides k' k' severally engaging the upper threads o o. For actuating the said take-up arm K, the rock-shaft K′ is provided with a rigid arm K^3, having upon its free end a pin k^2, which engages a cam-slot l, formed in a cam L, which is attached to the crank-shaft D, these parts being similar to those contained in the machine shown in said prior application.

As an improved construction in spring take-up devices for use in connection with a positively-actuated take-up such as is above described, I employ the following construction: M M M indicate a series of spring take-up devices located beneath the take-up arm K, and each consisting of a slotted rod M′, a sliding ring M^2, mounted upon the rod, and a spring M^3, applied to move said ring upon the rod. The several rods M′ are secured at their upper ends in a horizontal bar M^4, mounted upon the machine-frame beneath and parallel with the cross-bar K^2 of the take-up arm. The said take-up devices M M are constructed and operate in substantially the same manner as the take-up devices of the shuttles of the lower thread, hereinbefore described, the several threads passing through suitable guides o' o^2 upon the frame downwardly through the slots of the said rods M′ M′, against the lower surface of the ring M^2, then upwardly through the thread-guides k' of the take-up arm, and then downwardly to the needles. The slots m m of the rods M′ M′ are herein shown as extending upwardly from the lower free ends of said rods, so as to form two separate parallel arms or forks m' m', between which the thread is inserted, the said arms or forks m' m' being bent outwardly or beveled at their lower ends to facilitate the insertion of the thread into the slot between them. To avoid the accidental catching of threads or articles of cloth being handled upon the points of the said arms m' m', a horizontal bar m^2 is preferably located below and adjacent to the ends of the said rods M′ M′, said bar m^2 being connected with the machine-frame by spring-arms m^3 m^3, whereby the bar m^2 may be thrust backwardly to enable the threads to be conveniently inserted in the tension devices, and will when released return to its normal position opposite the ends of said rods.

The machine is shown as provided with the usual tension devices for the upper threads, as indicated at O′ O′, Figs. 1 and 2.

The spring take-up device, embracing the slotted rod, sliding ring, and spring arranged to act downwardly and located below the take-up arm, between the latter and the needle, in connection with the thread-guide so arranged that the thread passes from the guide first to the spring take-up, then to the take-up arm, and then to the needle, affords a take-up

mechanism of superior sensitiveness and great quickness of action, owing to the direct action of the sliding ring upon the thread, which latter is drawn upwardly away from said ring at both sides of the latter.

My invention embraces also an improved construction in feed devices for sewing-machines, such feed devices being applicable to all machines, but being more especially intended for use upon machines employed for securing between two layers of cloth a series of stiffening strips or bones, as desirable in the manufacture of corsets or corset-stiffening. The said feed device is located entirely above the work-plate of the machine, and embraces a vertically-movable or reciprocating presser-foot N, and a vertically and horizontally reciprocating feed-dog O, operating in the manner of what is commonly known as a "four-motion" feed. Means is provided for actuating the said presser-foot and the feed-dog in such manner that the feed-dog is depressed and moved forward at the time the presser-foot is lifted to release the material beneath it, while the presser-foot is thrust downwardly to firmly hold the said material at the time the feed-dog is lifted and is being carried backwardly preparatory to another forward movement. These motions of the presser-foot and feed-dog are, furthermore, so timed with relation to the movements of the needle that the presser-foot is lifted and the feed-dog depressed and advanced at the time the needle is at the upper limit of its movement and free from the cloth or material being operated upon in the same manner as heretofore common with feed devices located beneath the work-plate. For the general purposes of this part of the invention motion may be given to the presser-foot and the feed-dog in any manner found convenient or desirable. I have, however, herein illustrated devices for moving the said parts, which embrace certain features of novelty, as will hereinafter appear. The said presser-foot and feed-dog also embrace in themselves certain novel features of construction adapting them for use in gang-machines.

To first describe the peculiarities of construction in the presser-foot and feed-dog, the said presser-foot and the feed-dog are made with interpenetrating projections or fingers, so that they may both act upon the material being operated upon at points adjacent to and between each of the several needles of the machine. Said presser-foot is made of suitable width to embrace several needles of the machine, and is provided with holes n n, severally receiving the needles. In the lower surface of the presser-foot, in the same vertical planes with the needles, are arranged a series of downwardly-projecting teeth or flanges n' n', arranged to bear upon the material being operated upon both at the front and in rear of the needles. In case the machine having a presser-foot thus made is employed for sewing bones in corsets or corset-stiffening, the said ribs or flanges n' will enter and press upon the layers of cloth in the spaces between the bones at the points where the rows of stitches are inserted, thus drawing and holding the said layers close together at this point, and causing the cloth layers to be drawn and held tightly about the bones by the rows of stitching. The main part or body O^2 of the feed-dog O extends continuously across in front of the presser-foot N, and attached to the said main part O' are a series of projections or fingers o^3, which extend beneath the body of the presser-foot and into the spaces between the projections or flanges n' n' thereof and between the needles, the said fingers o^3 being roughened or serrated upon their lower surfaces in a familiar manner. By this construction of the feed-dog the latter is caused to press upon the work at both sides of each needle, so that said presser-foot operates to press upon the work and hold it in place at the time the presser-foot is lifted to allow the forward movement of said work under the action of the feed-dog.

The devices shown for supporting and actuating the presser-foot N are as follows: N' N' N' are vertical shafts mounted to slide in guide-recesses n^2 n^2 in the part B^3 of the frame, and rigidly secured at their lower ends to the presser-foot N. N^2 is a spring applied to throw the presser-foot downwardly, said spring being located, as herein shown, in one of the recesses n^2 above the shaft N'. N^3 is a bell-crank lever mounted upon a pivot n^3, and provided with a horizontal arm which extends inwardly through a slot or opening in the frame-casting and engages one of the said shafts N'. The vertical arm of the lever N^3 is engaged at its upper end with a depending rigid arm N^4 upon a rock-shaft N^5, mounted upon the upper part of the frame at the rear side of the latter. Said rock-shaft has upon its opposite end a second rigid arm N^6, which extends inwardly to a point beneath the crank-shaft D, and is adapted to engage a cam N^7 upon said shaft, as clearly shown in Figs. 3 and 14. In the operation of this device the cam N^7, acting upon the arm N^6, gives an oscillatory motion to the rock-shaft N^5, which is transmitted through the medium of the arm N^4 and lever N^3 to the presser-foot. As herein shown, the lever N^3 is provided in its upper end with an adjustable bearing-point, conveniently made in the form of a set-screw n^4, inserted through the said lever and bearing against the lower end of the arm N^4, said set-screw n^4 serving as a means whereby the extent of the movement of the presser-foot may be controlled, as desired.

To enable the presser-foot to be lifted above the work-plate independently of the actuating devices described for inserting and removing the work, I have provided devices as follows: P is a horizontal shaft mounted upon the machine at the rear of the frame-arm and be-

tween the latter and the vertical part of the lever N^3. Said shaft P is provided with an eccentric P′ at a point opposite the said lever N^3, and in the said lever is inserted a stud p, adapted to bear upon the eccentric, the parts being so arranged that when the shaft is turned the upper end of the lever will be thrust outwardly by the action of the eccentric, with the effect of lifting the end of the horizontal part of the said lever, and thus raising the presser-foot. The stud p is for the purpose of adjustment, herein shown as screw-threaded, and inserted through the said lever N^3. The shaft P is provided with a handle P^2, whereby it may be conveniently turned for lifting the presser-foot in the manner above described. In the particular machine herein illustrated said shaft P is mounted in the block P^3, secured to the rear surface of the part B^3 of the machine-frame, the said block being constructed to also support the pivot n^3 of the lever N^3. To enable the extent of downward motion of the presser-foot to be limited independently of the action of the eccentric P′ and of the actuating devices above described, a screw-stud p' is inserted through the said lever N^3 in such manner as to bear at its inner end against the block P^3, as clearly shown in Fig. 2.

The devices employed for sustaining and actuating the feed-dog O are as follows: Said feed-dog is supported in position for operation by means of two arms Q Q, which arms are attached at their upper ends to a plate or casting Q′, which extends horizontally beneath the part B^3 of the frame, adjacent to and at the rear of the needle-bar. Said plate Q′ is attached at its ends to two vertical plates Q^2 Q^2, located at opposite sides of said part B^3 of the frame, and the said parts Q′ Q^2 Q^2, with the arms Q Q attached thereto, are pivotally supported by means of two horizontal crank-arms R R, which are rigidly attached to a rock-shaft R′, supported in bearings r r upon the part B^3 of the frame at the rear of and parallel with the needle-bar. Said bearings r r are herein shown as formed by means of upwardly-projecting lugs upon the ends of the horizontal plate r', which is bolted to the lower surface of the casting B^3. The construction described affords a vertical movement of the arms Q Q and the feed-dog by the swinging of the arms R R about the pivotal axis of the rock-shaft R′, while a horizontal movement is allowed in the said feed-dog by the swinging of the said arms Q Q and the plates Q′ and Q^2 Q^2 upon the pivots q q, connecting said plates Q^2 Q^2 with the arms R R. To one of the plates Q^2 is rigidly attached a bar Q^3, Fig. 7, which bar extends upwardly at the rear of frame-arm, and is provided at its upper end with a rigidly-attached horizontal arm Q^4, which extends into the interior of the frame-casting B′, and is provided at its end with a yoke S, which surrounds the crank-shaft D. Said yoke is constructed to engage with two cams T T upon the crank-shaft D, which cams are so arranged as to give a combined horizontal and vertical movement to the yoke, which movement is transmitted to the feed-dog through the several parts by which said yoke is rigidly connected with the feed-dog. One T of said cams is arranged to act alternately upon opposite vertical bearing-faces s s of the yoke S in such manner as to move the said yoke horizontally, and to thereby swing the arms Q Q about the pivots q q to give the necessary horizontal reciprocatory movement to the feed-dog O. The other cam T′ operates upon a horizontal surface s^2 of the yoke S in such manner as to lift the yoke and parts connected therewith, a downward movement of the feed-dog for the purpose of pressing the latter against the work being produced by a spring S′, attached to the rear surface of the frame-piece and acting against a rigid arm R^2, attached to the rock-shaft R′. Said spring acts against the said arm R^2 in a direction to carry the crank-arms R R downwardly, and to thereby thrust the feed-dog toward the work-plate of the machine. The cams T and T′ are located side by side, and the surface s, s', and s^2 of the yoke S are arranged in different vertical planes, so that the cams may act thereon independently of each other. The said bearing-surfaces s s' are herein shown as formed on movable or adjustable plates s^2 s^2, adjustably secured to the yoke in the same manner as are the plates of a similar yoke described in said prior application Serial No. 224,735.

As a further improvement in devices for operating the feed-dog O, I have provided a device giving frictional engagement between the upper end of the arm Q^3 and a part attached to the sewing-machine frame, such device preventing any movement of the said lever and connected parts excepting when positively moved by the actuating-cam. The said device for producing frictional engagement may be made in any one of a number of well-known forms. The device herein shown is made as follows: Q^5 Q^5 are two plates pivoted at q' to the rear of the frame-arm B′ and extending horizontally to the rear and at either side of a rearwardly-projecting arm Q^6 upon the bar Q^3. The said plates Q^5 Q^5 are provided with horizontal slots q^2 q^2, Fig. 15, and through an aperture in the arm Q^6 and the said slots q^2 q^2 is inserted a bolt q^3, provided with a head at one end and a nut at the other. Between the head of the said bolt and one of the plates Q^5 is placed a spring-washer q^4, which operates to press the said plates Q^5 Q^5 against the arm Q^6, and thereby produce frictional engagement between the parts, for the purpose above stated. I have herein shown washers q^5 q^5, of leather or cloth, as inserted between the arm Q^6 and plates Q^5 Q^5. Such washers are, however, not essential for the operation of the device.

A presser-foot and feed-dog having interpenetrating teeth or projections acting upon

the material being sewed in its part adjacent to the needles, together with means for actuating said presser-foot and feed-dog in such manner that the presser-foot is raised at the time the feed-dog is depressed and the feed-dog is elevated when the presser-foot is thrust downwardly, I consider to be novel, and a construction embracing these parts is herein claimed as part of my invention without limitation to any particular devices for actuating said presser-foot and feed-dog, inasmuch as any one of a number of well-known actuating devices may be employed to give the desired relative motion to the parts.

The shuttle and feeding mechanism herein shown are described and claimed in two separate applications, Serial Nos. 275,742 and 275,743, filed subsequently to the date of filing of this application.

I claim as my invention—

1. The combination, with a curved shuttle-race, of a shuttle-carrier comprising two horizontal bars I′ I², the bar I′ adjacent to the point of the shuttle being provided with a guide-groove for the needle and with an adjacent notch to receive the edge of the shuttle, substantially as described.

2. The combination, with a series of oscillating shuttles, of a curved shuttle-race formed of two horizontally-arranged parts or castings H H′, arranged at opposite sides of the needles and provided with a series of parallel downwardly-opening guide-grooves in their under surfaces, a shuttle-carrier located beneath the several shuttles and supporting the same in engagement with the race, one of said parts or castings, as H′, being pivoted at its outer margin to the frame, whereby it may be moved to permit the extraction and insertion of the shuttles, substantially as described.

3. The combination, with a series of oscillating shuttles moving in parallel planes, of a curved shuttle-race provided with a series of downwardly-opening guide-grooves, and an oscillating shuttle-carrier comprising two bars I′ I², each engaging the said several shuttles and sustaining them in engagement with the grooves of the race, the said shuttle-race consisting of two pieces or castings H H′, one of which is pivotally supported to admit of its being removed to allow the extraction and insertion of the shuttles, substantially as described.

4. The combination, with the reciprocating needle-bar of a sewing-machine and an oscillating take-up arm for the needle-thread, of a spring take-up comprising a slotted rod, a sliding block or ring upon the rod, and a spring for actuating said block or ring, the said rod being arranged with its end toward which the ring is thrown by the spring downward and remote from the take-up arm, and a guide for the needle-thread located above said rod, whereby the needle-thread is drawn upwardly away from the ring at both sides of the latter, substantially as described.

5. A take-up device for the needle-threads of a gang sewing-machine, consisting of a series of slotted rods M′ M′, a series of sliding rings upon said rods, springs actuating said rings, and a bar located adjacent to the ends of the several rods, transverse to the latter, and sustained by a spring arm or arms, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

MARSHALL GARDNER.

Witnesses:

JAMES STONE,

CHARLES F. TYLER.