

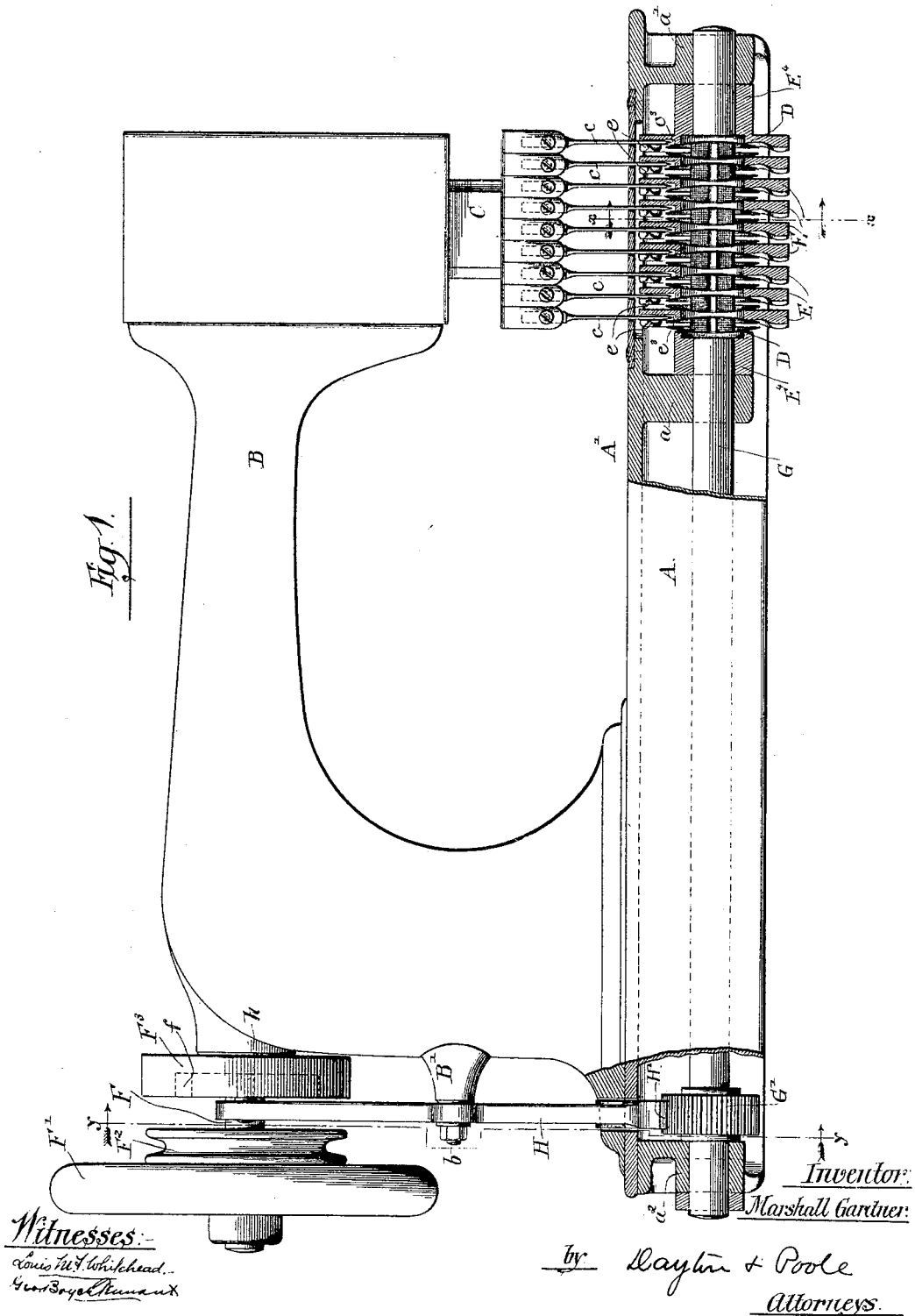
(No Model.)

3 Sheets—Sheet 1.

M. GARDNER.
GANG SEWING MACHINE.

No. 386,700.

Patented July 24, 1888.



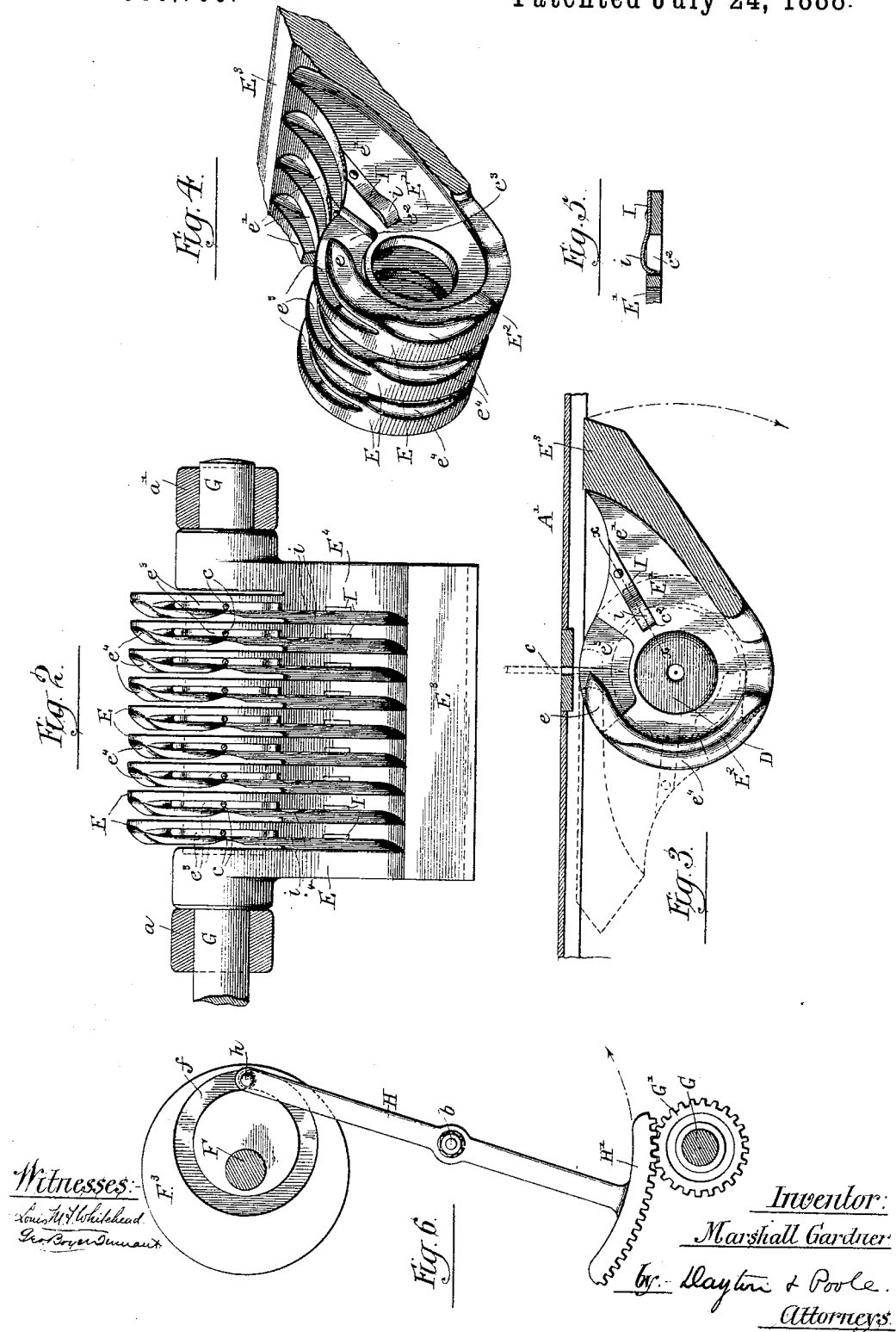
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3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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Fig. 7.

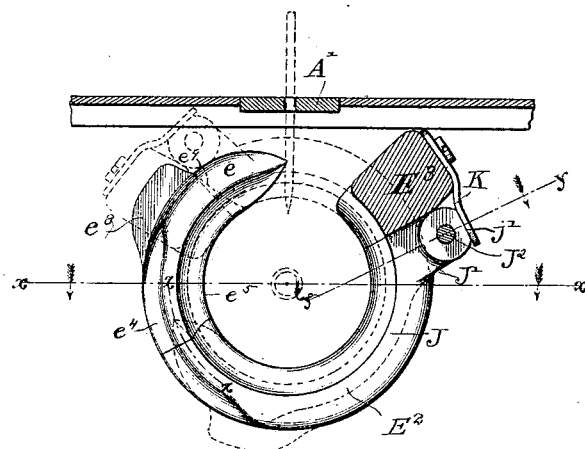


Fig. 11.

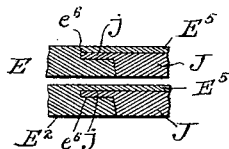


Fig. 9.

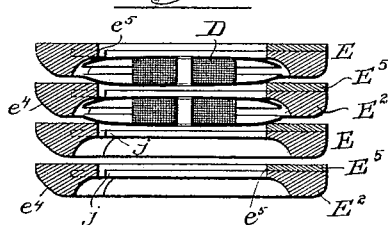


Fig. 10.

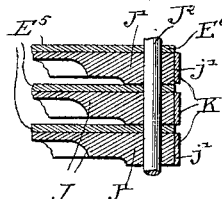
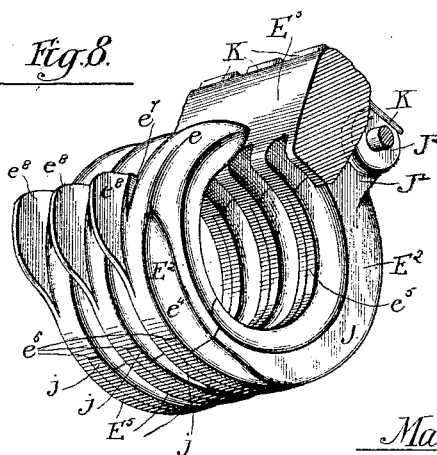


Fig. 8.



Witnesses:

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UNITED STATES PATENT OFFICE.

MARSHALL GARDNER, OF AURORA, ILLINOIS, ASSIGNOR TO JAMES STONE
AND THOMAS H. BALL, BOTH OF SAME PLACE, AND SIMON FLORSHEIM,
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GANG SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 386,700, dated July 24, 1888.

Application filed June 22, 1886. Serial No. 295,850. (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 Gang 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 the letters of reference marked thereon, which form a part of this specification.

This invention relates to sewing-machines of that class known as "gang-machines," or machines adapted for sewing at once two or more parallel lines of stitching.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

The machine herein illustrated as embodying my invention comprises as its essential features a reciprocating needle-bar carrying a series of needles arranged side by side at a distance apart equal to the spaces between the proposed lines of stitching, a series of shuttles or bobbins of disk form, and a series of "hooks" or hooked bobbin-carriers generally similar to the revolving hook bobbin-carriers heretofore employed in single-needle machines; but which are constructed to oscillate instead of to revolve, as will hereinafter fully appear.

The said machine is more particularly intended for use in stitching bones in corsets; but it may be employed as well in other cases where it is desired to make a number of parallel lines of stitching.

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

Figure 1 is a side elevation, with the principal operative parts in central vertical section, of a sewing-machine constructed in accordance with my invention. Fig. 2 is a plan view of the devices for holding and actuating the bobbins detached from the other parts of the machine. Fig. 3 is a detail section illustrating the bobbin-carriers, taken upon line *xx* of Fig. 1. Fig. 4 is a detail perspective view illustrating the main parts of the bobbin-carriers. Fig. 5 is a detail section taken upon

line *xx* of Fig. 3. Fig. 6 is a detail sectional view taken upon line *yy* of Fig. 1, illustrating a device employed in the particular machine shown for actuating the oscillating bobbin-carriers. Fig. 7 is a sectional view similar to Fig. 5, illustrating another form of the bobbin-carriers. Fig. 8 is a perspective view of several bobbin-carriers like that shown in Fig. 7. Fig. 9 is a sectional view taken upon line *xx* of Fig. 7. Fig. 10 is a detail sectional view taken upon line *yy* of Fig. 7. Fig. 11 is a detail sectional view taken upon line *zz* of Fig. 7.

As illustrated in the said drawings, A indicates the main frame of the machine; A', the top plate thereof; B, the needle-arm; C, the reciprocating needle-bar, and *cc* a series of needles arranged side by side at a distance apart equal to the spaces between the proposed lines of stitching and having operative connection in any common or preferred way with the said needle bar.

D D are bobbins of a well known disk form, consisting of two convex plates and a central connecting-bar, and E E are a series of oscillating hooked bobbin-carriers adapted to turn about an axis coincident with the central axes of the bobbins, and provided with hooks *e*, constructed and operating in the oscillating movement of the bobbin-carriers to engage the loops of the needle-threads and to carry them around the bobbins.

F is a longitudinally-arranged revolving shaft, by means of which motion is given to the several parts of the machine, said shaft being, as herein shown, located in the needle-arm B and provided with the usual balance-wheel, F', and belt-pulley F". The said shaft F is connected with the needle-bar by devices giving a reciprocatory movement to the latter in any well known or preferred manner.

The several hooked bobbin-carriers E E in the particular construction shown are attached to and supported and actuated by a longitudinally-arranged shaft, G, having bearings at *a* *a'* in the machine-frame adjacent to the stitching-forming devices and a third bearing, *a''*, at a point at the opposite end of the machine. Any suitable means may be provided for giving the

desired oscillatory movement to the said shaft G and the hooks *e*, one desirable device for this purpose being herein shown, and consisting of an oscillating lever, H, pivoted between its ends to a stud, *b*, upon the needle-arm B, and provided with a pin, *h*, at its upper end engaging a cam, F³, upon the driving-shaft F, and with a segmental gear, H', at its lower ends engaging a tooth-pinion, G', upon the shaft G. A cam groove, *f*, is formed in the flat face of the cam-wheel F for engagement with the pin *h*, said cam-groove being constructed to give one complete vibration of the lever H at each single rotation of the shaft F, so that the shaft G and the hooks will be given a backward and forward oscillatory movement during each complete reciprocation or upward and downward movement of the needle. The said cam-groove will be shaped to move the shaft G and the hooks at varying speeds at different parts of their movement, so as to give suitable slow motion or dwell at the time the hook is engaging the needle-thread, as is common in thread carrying devices of the character described. It is of course obvious that other means may be employed for giving an oscillatory movement to the hooks; but a construction embracing a cam for giving motion to said parts is preferred, inasmuch as the cam enables a desired speed to be obtained in different parts of the motion of the said hooks, as above set forth.

The bobbin carriers E E in the particular construction thereof herein illustrated in Figs. 1 to 5 are constructed of flat plates E', centrally perforated for lightness, and provided with marginal ribs or flanges E², forming central spaces or recesses, within which the bobbins are placed. The several carriers are attached to each other at their side margins by rigid connections constructed to hold them parallel with each other and supporting them from the shaft G, said rigid connections, as herein shown, being formed by laterally-extending parts *e'* of the plates E', which parts *e'* are attached at their outer margins to a longitudinal part or bar, E³, arranged to rigidly sustain the several carriers without interfering with the action of the hooks *e* in carrying the needle-threads about the bobbins. The bar E³ is preferably attached to the shaft G by means of crank-arms E⁴, fixed to the said parts; but said bar may be otherwise attached to the shaft in practice, as may be found convenient or desirable.

The plates E' of the several bobbin-carriers, made as above described, are placed at suitable distances apart to receive the bobbins between them, the bobbin belonging to and operating in connection with one of the carriers being held in operative position with relation thereto by contact with the adjacent surface of the next carrier of the series, as clearly shown in the sectional view, Fig. 1, and in the plan view, Fig. 2. The marginal flange or rib E² of each carrier is extended from the hook *e*, which forms a part or extension of the said flange,

around the margin of the plate E' to a point nearly opposite the hook, the flange being omitted in a space adjacent to the point of the hook wide enough to admit the bobbin edgewise to its seat.

In the particular construction illustrated the flange E' of each carrier merges into the connecting part or bar E⁴, and the latter is constructed to form with the parts *e'* of the plates E' curved passages or recesses opening at one side of the structure formed by the several connected parts and operating to guide or direct the bobbins as the latter are inserted and removed, as clearly shown in Figs. 3 and 4.

Any suitable spring retaining device adapted to permit the bobbins to be easily inserted and removed, while at the same time retaining them from accidental displacement when in position for operation, may be employed in connection with the carriers provided with lateral passages or openings, as above described. A simple and convenient device for this purpose is herein shown, in which a spring, I, is inserted and secured in a recess, *e''*, in the part *e'* of the plate E', said spring I being provided with a curved and yielding end, *i*, adapted to extend normally beyond the flat face of the said web in position to engage the marginal part of the bobbin when the latter is in place, and constructed to yield backwardly into the recess by a relatively slight pressure thereon, so that a bobbin may be readily slipped past said spring in inserting it within and removing it from the carrier.

In the construction of the bobbin-carriers E E herein illustrated said carriers are made with spaces or recesses *e''*, formed in the flat faces of the plates E' adjacent to the bobbin and extending behind the hook *e* to receive the point of the needle in the downward movement of the latter. The operation of the parts in making the stitch is more clearly illustrated in the sectional view, Fig. 3, in which the hook *e* is shown in full lines at one limit of its oscillatory movement and in position to engage the loop of the needle-thread held upon the needle *c*, said needle being shown in said figure at the lower limit of its movement, with its point within the recess *e''*. The dotted lines of said Fig. 3 illustrate the position of the hook when at the opposite limit of its movement and after the needle-thread has been carried around the bobbin.

Each carrier E is provided in its periphery with a beveled surface, *e'*, adjacent to and at the rear of the hook *e*, adapted to deflect the thread-loop caught by the hook to one side of the hook, so as to cause the passage of said loop around the bobbin in a well-known manner. The hooks are constructed to oscillate through an arc of sufficient length to bring them in such position that the thread-loops may be easily drawn or will slip therefrom, so as to form the stitches in the same manner as when a revolving hook is used, the said hooks being curved at their ends to facilitate the slipping of the thread-loops therefrom, as shown.

As herein illustrated, the hooks are constructed to turn through an arc of somewhat more than one-half of a circle, as clearly shown in Fig. 3, in which figure is shown in dotted lines the position of the loop of the needle-thread at the moment before it is cast off or released from the hook.

Another and for some reasons a preferable construction in a hooked bobbin-carrier of the character above described is shown in Figs. 7 to 11. In this instance the form of the bobbin carrier or support is generally the same as that before described, and the several carriers are connected at one side thereof by a longitudinal bar or connecting-piece, E^3 , similar to that before described; but said bar, instead of being connected with the several bobbin-carriers by lateral extensions or plates upon the said carriers, is connected directly with the circular parts or ribs E^2 of said carriers, and provision is made for the insertion and removal of the bobbins laterally from between the several carriers by making the latter with movable sections or gates J , adapted to be opened or removed to form openings through which bobbins may be slipped in placing them in their seats and removing them therefrom. Each section or gate embraces a part of the annular rim of such thickness that when the gate is open an opening or space of sufficient width will be formed between the permanent part of the rim and the adjacent face of the next carrier to allow the free passage of the bobbin, as clearly shown in Figs. 8 and 9. Said section or gate J preferably embraces approximately one-half of the diameter of the rim of the carrier and is formed at the side of the carrier upon which the flange E^2 is located, and includes said flange. For the general purposes of the invention the said movable section or gate J may be detachable or removably secured upon or connected with the hooked carrier in any manner found convenient or desirable. One desirable construction in the said gate or section is shown in the drawings, in which the gate is pivotally supported upon the carrier by a hinge or joint at one of its ends, so that its opposite or free end may be swung open, when desired, for the removal of the bobbin.

In the particular form of the hinged gate herein illustrated the gate extends from a point adjacent to the connecting-bar E^3 half-way around the circumference of the carrier toward the hook e , and said gate is provided at its end adjacent to said connecting-bar with an outwardly projecting lug or arm, J^2 , adapted to engage the pivot-pin J^1 , desirably formed by a single rod extending the full length of the bar E^3 . The dividing-line between the gate J and the stationary part of the carrier is desirably arranged to pass through the inner edge of the marginal part or flange e^5 , which in this construction takes the place of the plate E' in the form of the device before described, and which serves to separate and hold in place the several bobbins, this construction

obviously leaving a thin and flat curved plate, E^5 , to afford the necessary rigid connection between the part of the carrier adjacent to the hook e and the bar E^3 . The said plates E^5 are, as more clearly shown in Figs. 8 and 10, extended outwardly adjacent to the connecting-bar E^3 to form bearings or supports E^6 for the pivot-rod J^2 , said bearings or supports being located between and affording lateral bearings for the lugs J^2 of the gates J . The said gates are preferably provided at their free ends with projections or tongues j , entering and engaging notches e^6 in the rim of the carrier, so as to hold the said gates immovably in place when the latter are closed. Any suitable securing device may be applied for holding gates pivotally sustained, as above described, in their closed position, a convenient construction for this purpose being herein shown, in which the projections or arms J' upon the gates are provided with flat faces j' , upon which faces rest free ends of a series of springs, K , suitably secured to the bar E^3 , said springs obviously tending to retain the free ends of the gates in close contact with the parts of the carrier engaged thereby.

In the construction above described, and illustrated in Figs. 1 to 5, the flat plates E' thereof are extended behind the hooks e , so as to form a rigid connection between the said hook and the lateral projections e' of the said plates, recesses e^1 being provided to afford room for the descent of needles. By reason of the narrowness of the space between the needles it may sometimes be desirable to omit any connecting part between the hook e and the bar E^3 , and a construction of this kind is illustrated in Figs. 7 to 11, the entire space between the hooks in this case being available for the accommodation of the lower end of the needle when the latter descends to bring the loop in position for engagement with the hook. When this construction is used, however, there is danger (owing to the narrowness of the external annular face or periphery of the carrier) that the part of the thread-loop carried behind the hook, and which is intended to slip forward over the latter by the action of the beveled face e^4 , may slip past or over the shoulder e^7 into the space between the carrier with which the loop is engaged and the adjacent one. To avoid the possibility of this occurrence, I provide the carrier adjacent to said shoulder e^7 with an outward extension or flange, e^8 , constructed to come close to the under surface of the top plate of the machine in the forward rotative movement of the hook, so as to close the space between the hook and the said top plate at the moment the loop is being drawn around the hook and against the said shoulder e^7 , and thereby effectively prevent the loop from slipping over said shoulder.

An important advantage gained by providing the hooked carriers with gates J as a means of inserting the bobbins is that by this construction the employment of a relatively

small laterally-extending part or projection at one side of the the carriers only is necessary, so that said carriers may be oscillated through an arc of considerably more than one hundred and eighty degrees without bringing the connecting part or bar E³ against or in contact with the top plate of the machine, such extended oscillatory movement of the carriers obviously being desirable in order that the hooks may be brought into a position more convenient for the escape of the thread loops therefrom. The position of the hook at the moment the thread-loop is cast therefrom is indicated in dotted lines in Fig. 7. By reason of the advantages gained by the employment of the gates J, as above stated, a form of carrier embracing said gates is herein specifically claimed as part of my invention.

In the particular construction illustrated the several bobbin-holders of the series shown are formed in or of a single piece of metal; but said parts may obviously in practice be formed or built up in any other way found desirable or practicable.

I have herein illustrated only the parts of a sewing-machine immediately concerned in making the stitch, it being of course understood that any well-known or preferred form of feeding devices, supports for thread-spools, tension devices, &c., may be used in practice, as may be desired or preferred. A feeding device adapted for use with a series of needles and a corresponding series of thread-carriers or bobbins is shown, for instance, in a prior application for Letters Patent, Serial No. 189,566, filed by me in the United States Patent Office upon the 25th day of January, 1886.

In the understanding that a thread-carrying device comprising a series of hooked bobbin-carriers constructed and adapted to oscillate about a common axis is new, I do not wish to be restricted to any particular form of or construction in the carriers themselves, or to be limited to the devices herein shown for supporting and actuating said carriers. Certain features of construction in the devices herein shown and above described, whereby the main feature of my invention may be conveniently and advantageously carried into practice are, however, made the subject of specific claims herein.

I claim as my invention—

1. The combination, with a series of reciprocating needles, of a series of bobbins, a series of hooked bobbin-carriers rigidly connected with each other and constructed to oscillate about a common axis, and means giving an oscillatory motion to said bobbin-carriers, substantially as described.

2. The combination, with a series of reciprocating needles and a series of bobbins, of a series of oscillating hooked bobbin-carriers rigidly connected with each other and turning about a common axis, said several bobbin-carriers being provided with lateral openings for the bobbins, admitting the latter edgewise into the carriers, and holding devices for retaining the bobbins within the carriers, substantially as described.

3. The combination, with a series of reciprocating needles and a series of bobbins, of a series of rigidly-connected hooked bobbin-carriers having lateral openings or spaces adapted for the insertion of the bobbins edgewise into the carriers, and provided with movable parts or gates closing said openings and holding the bobbins in place, substantially as described.

4. The combination, with a reciprocating needle and a bobbin, of an oscillating hooked bobbin-carrier having a lateral space or opening adapted for the insertion of the bobbin edgewise into the carrier, and provided with a movable section or gate pivoted to the carrier with its pivotal axis parallel with that of the bobbin, and a means for securing the gate when the latter is closed, substantially as described.

5. The combination, with a reciprocating needle and a bobbin, of a hooked bobbin-carrier having a lateral space or opening adapted for the insertion of the bobbin edgewise into the carrier, and provided with a movable section or gate pivoted to the carrier with its pivotal axis parallel with the axis of the carrier, and a spring applied to hold the gate in its closed position, substantially as described.

6. The combination, with a reciprocating needle and a bobbin, of a hooked bobbin-carrier having a lateral space or opening adapted for the insertion of the bobbin edgewise into the carrier, and provided with a movable section or gate pivoted to the carrier with its pivotal axis parallel with the axis of the carrier, said gate being provided with a projection or tongue, *j*, engaging a notch or recess in the carrier, and means for holding the gate in its closed position, 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 TYLER.