No. 646,944. Patented Apr. 10, 1900.

G. W. BAKER.

SEWING MACHINE.

(Application filed Mar. 14, 1896.)

(No Model.) 3 Sheets—Sheet 1.

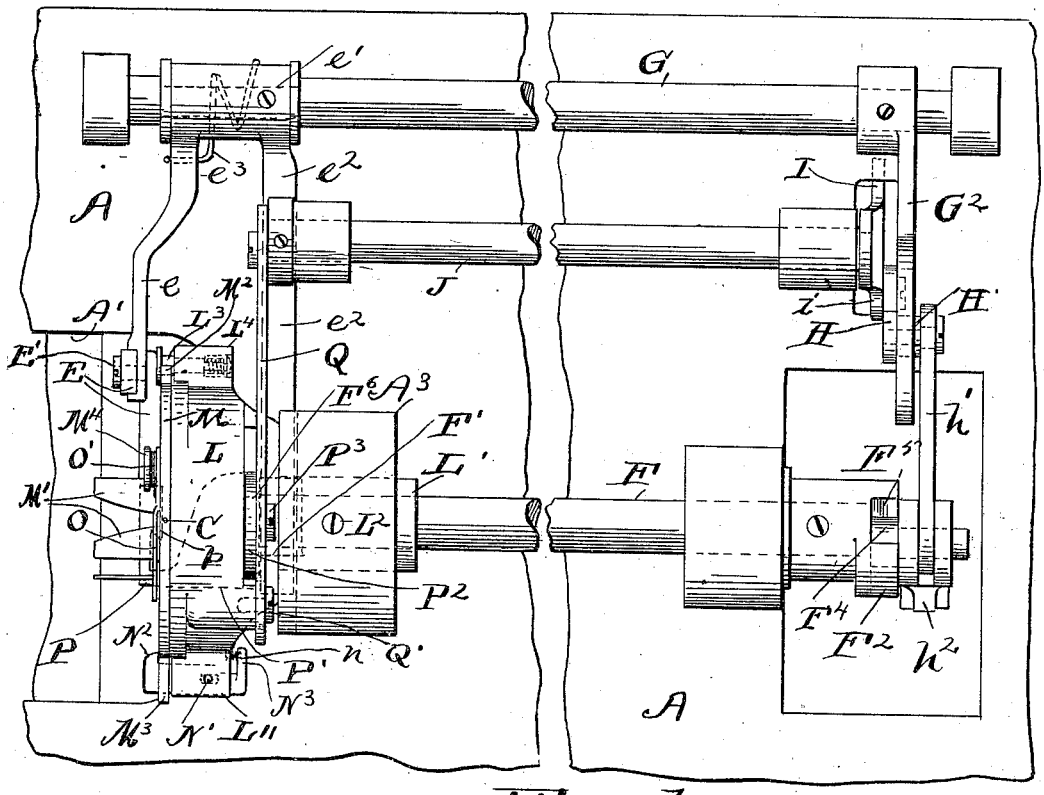

Fig. 1.

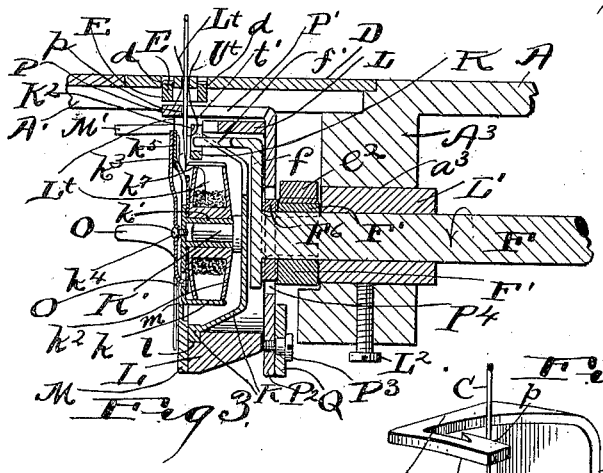

Fig. 3.

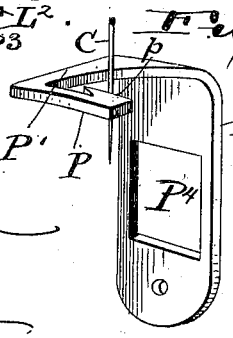

Fig. 4.

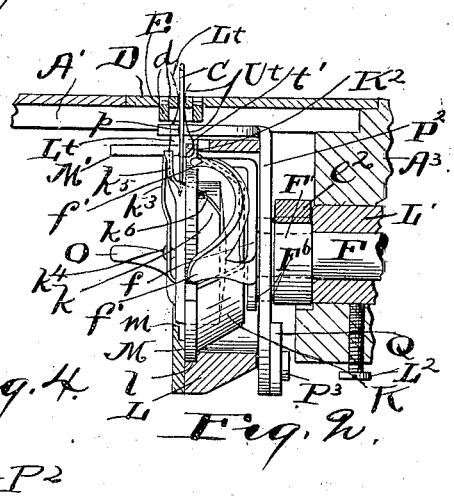

Fig. 2.

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G. W. BAKER.

SEWING MACHINE.

(Application filed Mar. 14, 1896.)

(No Model.) 3 Sheets—Sheet 2.

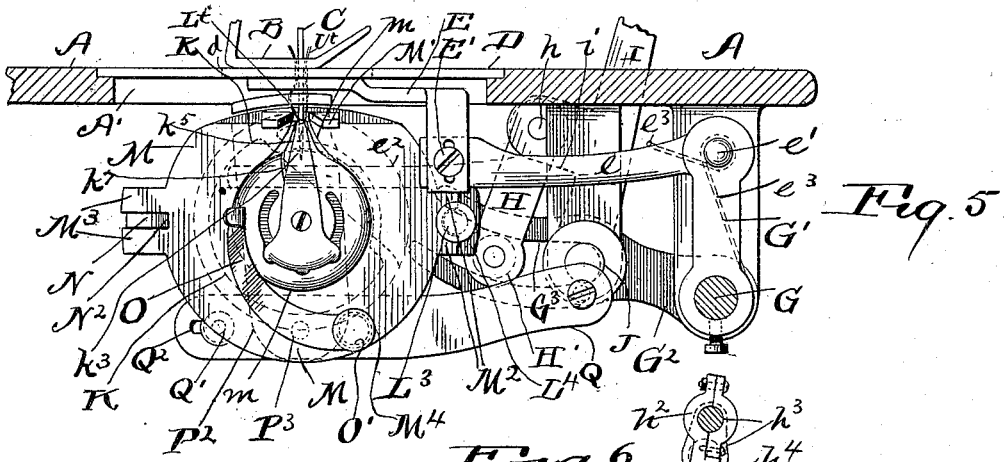


Fig. 5

Fig. 6.

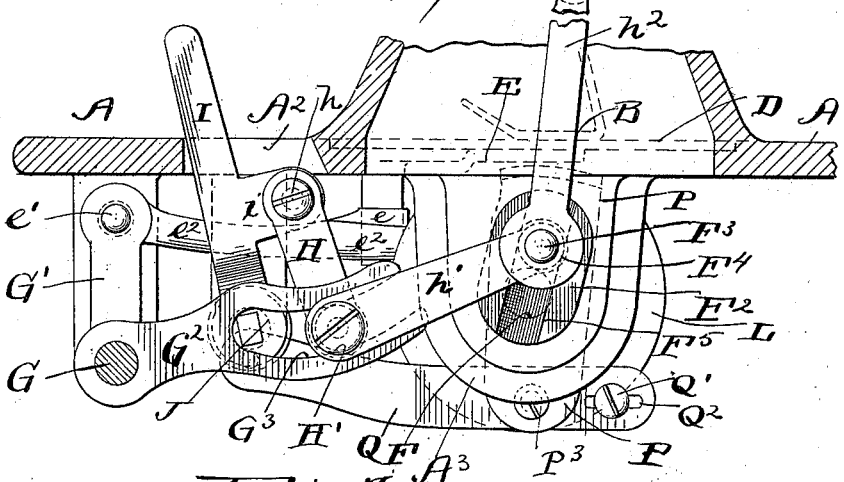
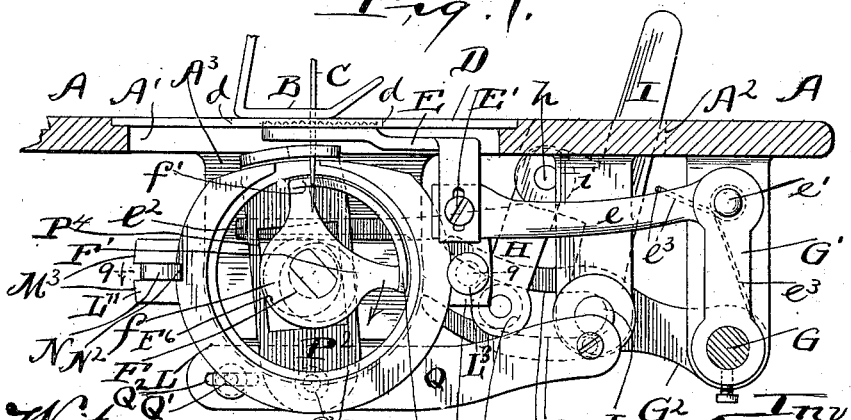


Fig. 7.



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SEWING MACHINE.

(Application filed Mar. 14, 1896.)

(No Model.) 3 Sheets—Sheet 3.

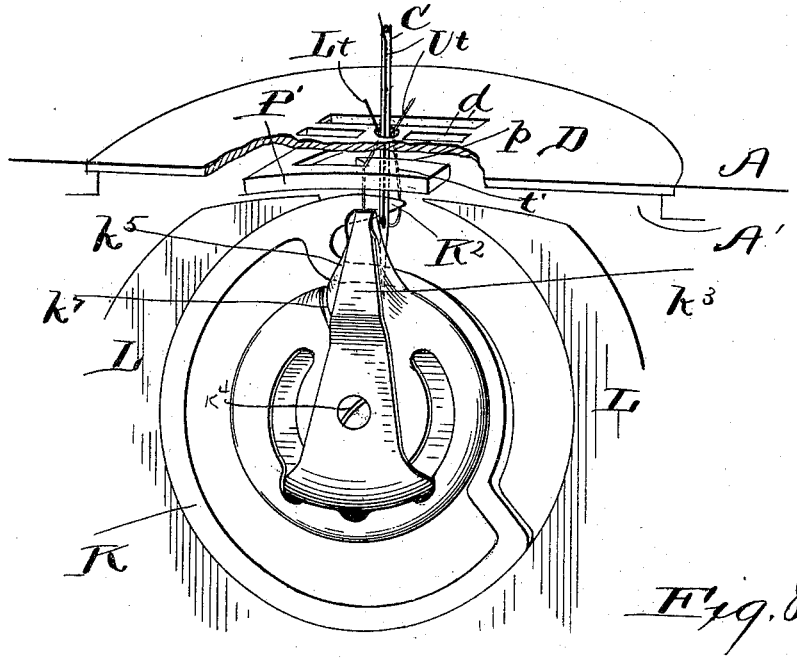

Fig. 8.

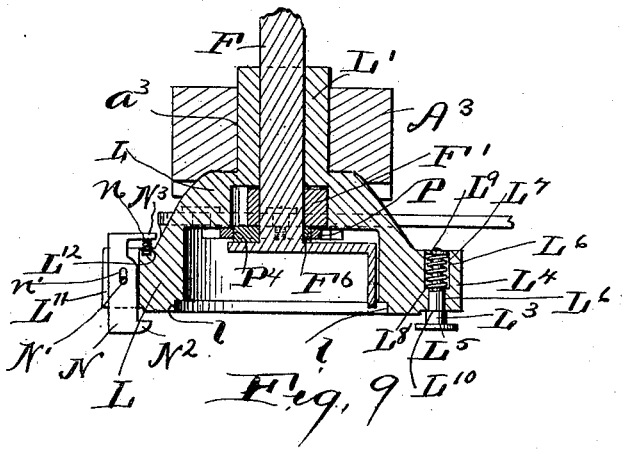

Fig. 9

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UNITED STATES PATENT OFFICE.

GEORGE W. BAKER, OF CLEVELAND, OHIO, ASSIGNOR TO THE WHITE SEWING MACHINE COMPANY, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,944, dated April 10, 1900.

Application filed March 14, 1896. Serial No. 583,156. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. BAKER, of Cleveland, Cuyahoga county, Ohio, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in sewing-machines; and it consists, among other things, in an improved means for preventing the loop that is formed in the needle-thread and instrumental in pulling up the lower thread in a rotary-shuttle sewing-machine from being thrown beyond the needle-path's side that is opposite to the side of said path at which the shuttle takes said loop, and thereby avoid skipping of stitches during the sewing operation.

My invention consists also in improved means for positively pulling from the bobbin the amount of lower thread required to be pulled up by the upper thread or needle-thread in the formation of the stitch, and thereby accommodate the employment of more tension upon the lower thread and insure greater uniformity in the stitches.

My invention consists, moreover, in certain other meritorious features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a bottom plan of a sewing-machine bed and mechanisms supported therefrom. The central and other portions of the bed are broken away in this figure to reduce the size of the drawing. Fig. 2 is a side elevation, partly in vertical section, exhibiting the cloth-plate of the sewing-machine bed, the cloth-feeder, sewing-machine needle, shuttle-race, shuttle, and my improved means for preventing the upper thread in the operation of the machine from throwing its loop on the wrong side of the sewing-machine needle and the means employed in pulling from the bobbin the amount of thread required in the formation of a stitch and at the same time accommodate the employment of greater tension on the lower thread. Fig. 3 is a vertical section taken longitudinally through the shuttle-operating shaft and shows the parts exhibited in Fig. 2. Fig. 4 is an enlarged view in perspective of the member instrumental in preventing the upper thread from throwing its loop on the wrong side of the sewing-machine needle in the operation of the machine, which member is shaped to form a hook that is instrumental in pulling the lower thread from the bobbin during the downward movement of the needle. Fig. 5 is a left-hand end elevation of the lower portion of the sewing-machine bed, partly in section. Fig. 6 is a right-hand end elevation of the sewing-machine bed, partly in section. Fig. 7 is an elevation corresponding with Fig. 5, except that in Fig. 7 the shuttle-race cap and shuttle are removed. Fig. 8 is a view in perspective, partly broken away, showing more clearly the operation of my improved attachment for preventing the upper thread from throwing its loop on the wrong side of the sewing-machine needle during the operation of the machine and said attachment's hook that is instrumental in taking from the bobbin the amount of thread required to be pulled up by the upper thread in the formation of a stitch and accommodating the carrying of a greater tension on the lower thread. Fig. 9 is a top plan, mostly in section, on line 9 9, Fig. 7.

Referring to the drawings, A designates the sewing-machine bed; B, (see Figs. 5 and 7,) the presser-foot; C, the sewing-machine needle; D, the cloth-plate, that is vertically slotted in the usual manner at *d* for accommodating the operation of the cloth-feeder E and the sewing-machine needle, and A′ the slot in plate A for accommodating the operation of the feeder and needle. Feeder E is suitably secured at its forward end, preferably by means of a screw E′, (see Figs. 5 and 7,) to the rear and free end of a forwardly-extending and approximately horizontally arranged arm *e*, horizontally pivoted at its forward end, as at *e′*, to the upright arm G′ of the horizontally-arranged oscillating feed-shaft G, that extends longitudinally of and is supported a suitable distance below and from the forward portion of the bed. Another and approximately horizontally arranged arm e^2, arranged at the right of and almost parallel with arm *e*, is rigid and pref-

erably integral with said arm e and extends rearwardly and at its rear end extends over and is adapted to be operated by a cam F', formed upon the shuttle-operating shaft F, that extends longitudinally of and is supported from and below the central portion of the bed. It is obvious, therefore, that the cloth-feeder is reciprocated longitudinally during the oscillation of shaft G and is moved up and down during its longitudinal movement through the instrumentality of cam F', and said movements of the cloth-feeder are required to properly and positively effect the feeding of the cloth during the machine's operation. A suitably-applied spring e^3 acts to retain bar e^2 in engagement with cam F'.

A rearwardly-projecting arm G^2 is formed upon and at or near the right-hand end of shaft G. Arm G^2 is slotted laterally and longitudinally, as at G^3, (see Figs. 5, 6, and 7,) and slot G^3 forms a slideway that is engaged by a roller H', secured to or formed upon the lower end of a short upright oscillating link H, that at its upper end is horizontally fulcrumed or pivoted at h to a rearwardly-projecting arm i of the upright stitch-regulating hand-lever I, that at its lower end is operatively mounted upon a shaft J, arranged between shafts F and G and longitudinally of and supported from the bed. Lever I extends upwardly through said bed within convenient reach of the operator, and said plate is vertically slotted, as at A^2, to accommodate the location and operation of said lever.

Roller H' is operatively connected, by means of a link h', (see Fig. 6,) with the suitably-actuated upwardly-extending pitman or rod h^2, that is operatively connected in the usual manner with the crank h^3 of the driving-shaft h^4 above and employed in operating the sewing-machine needle. Shaft h^4 is shown in Fig. 6 only. The trend of slot or slideway G^3 in arm G^2 and the arrangement of parts are such that roller H' shall, upon the reciprocation of rod h^2, be actuated endwise of said slideway, and thereby oscillate the arm G^2 and shaft G as required to effect the longitudinal movement of the cloth-feeder. It is obvious that the length of the stitch will be increased or decreased according as the reciprocations of the cloth-feeder are lengthened or shortened, and by the construction hereinbefore described the length of the oscillations of lever G^2, and consequently the length of the reciprocations of the cloth-feeder, is increased or decreased according as hand-lever I is adjusted rearwardly or forwardly.

Pitman h^2 at its lower end is also operatively connected with the wrist or crank pin F^3 of a crank F^2, (see Figs. 1 and 6,) formed upon the right-hand end of the shuttle-operating shaft. To accommodate the movement of said member F^3 longitudinally of crank F^2 during the machine's operation, as required in the construction illustrated, said member F^3 is formed upon a roller F^4, engaging and capable of moving endwise of a slideway F^5, formed in and longitudinally of crank F^2. By the construction hereinbefore described it will be observed that only one pitman is required for operating both the shuttle and cloth-feeder.

K (see Figs. 2 and 3) designates the rotary shuttle, that is operatively connected in any approved manner with the shuttle-driver f, formed upon the left-hand end of the shuttle-operating shaft F. The shuttle-driver is provided, preferably, with two laterally and outwardly projecting arms f', located a suitable distance apart, and the shuttle extends between these arms and is thereby operatively connected with the shuttle-operating shaft. The circular shuttle-race l is formed, preferably, within the outer end of a circular or approximately-circular shell L, that is made stationary in any approved manner and is provided, preferably, with an inwardly-extending collar L', that affords bearing for the shuttle-operating shaft and engages a horizontal hole or bore a^3, formed within a bracket A^3, depending from and integral with bed-plate A, and shell L is held stationary preferably by means of a screw L^2, that extends through a correspondingly-threaded hole in bracket A^3 and engages and firmly secures collar L' within and to the surrounding wall of bore a^3, as shown in Fig. 3. The shuttle is provided centrally thereof with a horizontally-arranged and outwardly-projecting pin or bearing K', upon which the inwardly-projecting collar k' of the bobbin-case k is loosely mounted, and the bobbin k^2, that supplies the lower thread during the sewing operation, is loosely mounted upon collar k' within the bobbin-case. The bobbin-case at its outer side and upper end is provided with a tension device for placing tension upon the lower thread, and said tension device consists, preferably, of an upwardly-projecting spring k^3, adjustably secured, by means of a screw k^4, to the bobbin-case and having its upper end arranged opposite to the upper end of an upwardly-projecting arm k^5 of the bobbin-case. The lower thread Lt passes from within the bobbin upwardly through a hole or perforation k^6 (see Fig. 2) in the upper side of the bobbin-case, thence through a slot k^7 in arm k^5, (see Fig. 3,) and thence upwardly to and between the upper ends of members k^5 and k^3, that constitute the tension device, and thence upwardly to the fabric (not shown) upon which the sewing operation is performed and to which fabric said thread is secured. The tension of the lower thread is increased or decreased according as screw k^4 is tightened or loosened. The tension device of the bobbin-case extends upwardly between two laterally and outwardly projecting arms M' of the shuttle-race cap M, by which construction circumferential displacement of said case and tension device is prevented. Cap M is removably secured, preferably as hereinafter described, to the outer end of shell L and pre-

vents outward displacement of the shuttle from the shuttle-race.

Cap M is secured to the shuttle-race-forming shell preferably as follows: Said cap at its forward extremity and centrally is provided with two forwardly-projecting lugs or arms M^2, arranged a suitable distance apart vertically and (see Fig. 5) overlapping the upper side and lower side, respectively, of a horizontally-arranged pin L^3, that has bearing (see Fig. 9) in a forwardly-projecting lug L^4, formed upon the forward side of shell L. Members M^2 extend between the head L^5, formed upon the outer end of the pin, and the outer side of lug L^4, as shown in Fig. 1. Lug L^4 is provided, of course, with a hole or bore L^6 for the reception of pin L^3, and a spiral spring L^7, confined upon said pin, within hole L^6 and between a shoulder L^8, formed upon the surrounding wall of said hole, and a shoulder, L^9 formed upon and externally of the pin, acts to retain the pin's head in snug engagement with members M^2 of the shuttle-race cap, and thereby press said cap against the shuttle-race-forming shell. Pin L^3 at any suitable point between its head L^5 and lug L^4 is provided with an external shoulder L^{10}, adapted to engage the outer side of said lug, and thereby limit the inward movement of the pin.

A horizontally-arranged latch N (see Figs. 1 and 9) is vertically pivoted at or near its central portion at N′ to a rearwardly-projecting lug or lugs L^{11}, formed upon the rear side of shell L. Latch N is adapted to hold or lock the rear portion of the shuttle-race cap in the latter's operative position. The forwardly-projecting locking-arm N^2, formed upon the outer end of the latch, in the latter's operative position overlaps the outer side of said cap, (see also Figs. 5 and 7,) and a suitably-applied spring n acts to retain the latch in its locking or operative position. The shuttle-race cap upon tilting the cap-engaging arm or member of the latch rearwardly out of engagement with the shuttle-race cap can be readily displaced from pin L^3 and removed from the shuttle-race-forming shell, and thereby accommodate access to the shuttle and shuttle-race. The shuttle-race cap is also provided at its rear extremity with two rearwardly-projecting arms or lugs M^3, (see Figs. 5 and 7,) arranged, respectively, above and below latch M, so that the latter is not only instrumental in securing the shuttle-race cap in place laterally, but in conjunction with said members M^3 of the shuttle-race cap also supports or prevents vertical displacement of the rear portion of said cap. In assembling the parts the shuttle-race cap is applied before the bobbin and bobbin-case, and said cap is therefore provided centrally with an opening m, large enough to accommodate the reception and application of said bobbin and bobbin-case. Spring n is preferably a spiral spring, as shown more clearly in Fig. 9, seated at one end in a recess L^{12}, formed in shell L, and at its other end engaging the adjacent side of an arm N^3, projecting forwardly from the inner end of latch N, and the pivot N′ of the latch extends, preferably, through a slot n', formed in and arranged longitudinally of the latch and accommodating a limited endwise movement of the latch, and thereby facilitating the interposition and removal of the shuttle-race cap between member N^2 of the latch and cap, and it is obvious that when said cap has been applied spring n acts to retain said member N^2 of the latch in snug engagement with the outer side of the cap and press the latter against the shuttle-race-forming shell.

The outer side of the shuttle-race cap is preferably provided with means for holding the bobbin-case from displacement outwardly from the shuttle, and said means consists, preferably, of a vertically-tilting latch O, (see Figs. 1 and 5,) loosely mounted or fulcrumed at one end upon a laterally and outwardly projecting lug or pin M^4, formed upon the outer side of the lower portion of the shuttle-race cap. Latch O in its operative position overlaps the outer side of the bobbin-case, and thereby prevents the latter from outward displacement, and a suitably-applied spring O′ engages and acts to retain said latch in its operative position. It will therefore be observed that the bobbin-case by tilting latch O against the action of spring O′ and to the extent required to disengage it from said case is rendered free to be removed from the shuttle. The needle-thread or upper thread Ut passes from the overhanging arm or gooseneck (not shown) of the sewing-machine bed to and through the eye of the needle and thence to the fabric or goods upon which the sewing operation is performed.

The shuttle-operating shaft, and consequently the shuttle, is rotated in the direction indicated by the arrow in Figs. 3 and 7, and the shuttle at its external periphery is provided with a hook K^2, projecting in the direction in which the shuttle rotates and adapted to engage the loop t', formed in the needle-thread during the descent of the needle, and carry said thread loop during the shuttle's rotation around the lower thread, so that when the needle-thread is again pulled upwardly during the next succeeding ascent of the needle the lower thread shall be pulled upwardly by the needle-thread, as required in the formation of the stitch.

I provide improved means for pulling from the bobbin the amount of thread required to be pulled up by the upper thread during the needle's descent, and the means employed for the purpose consists, preferably, of a suitably-actuated hook P, arranged to travel back and forth at the left-hand side of the sewing-machine needle. Hook P (see Figs. 3, 4, 7, and 8) projects forwardly from the outer end of the arm P′, extending laterally and outwardly, rearward of the needle's path and below the cloth-feeder, from the upper end of

an upright plate P^2, that is pivoted at or near its lower end, as at P^3, to any suitable support and is oscillated back and forth upon its pivot by a cam F^6, formed upon the shuttle-operating shaft adjacent to the shuttle-carrier at the right-hand side of the needle's path. Cam F^6 engages a suitably-shaped hole P^4 within the hook-bearing plate.

The lower thread leads from the tension device of the bobbin-case upwardly through hook P, and the arrangement of parts is such and the parts are so timed that said hook shall be moved rearwardly during the descent of the sewing-machine needle the distance required to pull from the bobbin the amount of thread required to be pulled up by the needle-thread during the next succeeding ascent of the needle, and said hook P shall be moved forwardly during the ascent of the needle, and thereby render the thread pulled thereby from the bobbin slack and free to be readily pulled upwardly by the upper thread. By this construction it is obvious that more tension can be placed upon the lower thread without impairing or impeding the operation of the machine, and I would here remark that a comparatively-heavy tension upon the lower thread is required to establish uniformity in the stitches during the sewing operation.

It is obvious that the stroke of hook P must be shortened or lengthened according as the length of the stitch is reduced or increased, and I therefore pivot the hook-bearing plate P^2 to an approximately horizontally arranged bar Q, that extends forwardly and is operatively connected at its forward end with and at one side of the axis of the intermediate or stitch-regulating shaft J, by which construction it will be observed that the lower thread-pulling hook P is adjusted forwardly or rearwardly by means of the same hand-lever that regulates the length of stroke of the feeder and that the amount of thread pulled from the bobbin is increased or decreased according as the hook is adjusted rearwardly or forwardly, and the arrangement of parts is such that said hook is adjusted rearwardly or forwardly according as the stitch-regulating lever is tilted rearwardly or forwardly. Bar Q is secured at its rear end, rearward of pivot P^3, to shell L. The bolt or pin Q′, that thus secures bar Q to shell L, extends through a lateral slot Q^2, formed within and arranged longitudinally of said bar Q and accommodating the endwise adjustment of said bar Q.

I have also provided improved means for preventing the needle-thread's loop that is instrumental in pulling the lower thread upwardly from being thrown, during the sewing operation, beyond the needle-path's side opposite to the side of said path at which hook K^2 of the shuttle takes said loop, and thereby positively avoid skipping of stitches, and the means employed for this purpose consists, preferably, of a guard *p*, that is formed by the inner side or edge of hook P at the left-hand side of and in close proximity to the path of the sewing-machine needle. The length of guard *p* should be such that it will effectually perform its function during the oscillation of plate P^2, and said guard *p*, being rigid or integral, as shown, with hook P of course oscillates with said hook back and forth at the left-hand side of the sewing-machine needle during the sewing operation—that is, the guard moves rearwardly during the descent of the needle and forwardly during the needle's ascent.

Of course it will be understood that shell L is slotted and its inwardly-extending member L′ is slotted or cut away, as required, to accommodate the location and operation of cams F′ and F^6 and plate P^2.

I would remark that I am aware that nearly all reciprocating-shuttle sewing-machines have a guard on one side of the needle to throw the loop of the needle-thread opposite the side of the guard, and I do not, therefore, claim a guard opposite the needle broadly; but my invention involves, essentially, a movable guard in a rotary-shuttle sewing-machine, which guard is actuated at each motion of the needle, and the movability of the guard is required in order to make room for the upper thread to draw up after passing over the bobbin-case.

What I claim is—

1. In a rotary-shuttle sewing-machine, the combination with the sewing-machine needle; the rotary shuttle, and means for operating the said elements: of the rearwardly and forwardly movable hook P, the guard *p* formed upon the said hook, and mechanism for operating the hook, all arranged and operating substantially as shown, for the purpose specified.

2. The combination with the sewing-machine bed, the suitably-actuated shuttle-operating shaft arranged below and longitudinally of said bed, and a hand-lever-bearing shaft arranged forward of the shuttle-operating shaft; of a bar operatively connected with and at one side of the axis of said forward shaft and extending rearwardly, an upright plate pivoted horizontally to said bar and provided with the hook P arranged to pull a suitable amount of thread from the bobbin during its movement in one direction, means for moving said hook-bearing plate forwardly and rearwardly and operatively connected with the shuttle-operating shaft, a stationary bolt or pin supporting the rear end of the aforesaid bar, and the hole in said bar through which the aforesaid bolt or pin extends being elongated longitudinally of the bar, substantially as shown, for the purpose specified.

3. In a rotary-shuttle sewing-machine, a hook located between the cloth-feeder and shuttle and movable forwardly and rearwardly and arranged to pull thread from the bobbin during its rearward stroke, mechanism for actuating said hook, and a guard *p* ar-

ranged below the cloth-feeder at the needle-path's side that is opposite to the needle-path's side at which the shuttle takes the loop formed in the upper thread during the sewing operation, and the said guard being formed upon the aforesaid hook, substantially as and for the purpose set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 12th day of March, 1896.

GEORGE W. BAKER.

Witnesses:
C. H. DORER,
ELLA E. TILDEN.