

No. 663,696.

Patented Dec. 11, 1900.

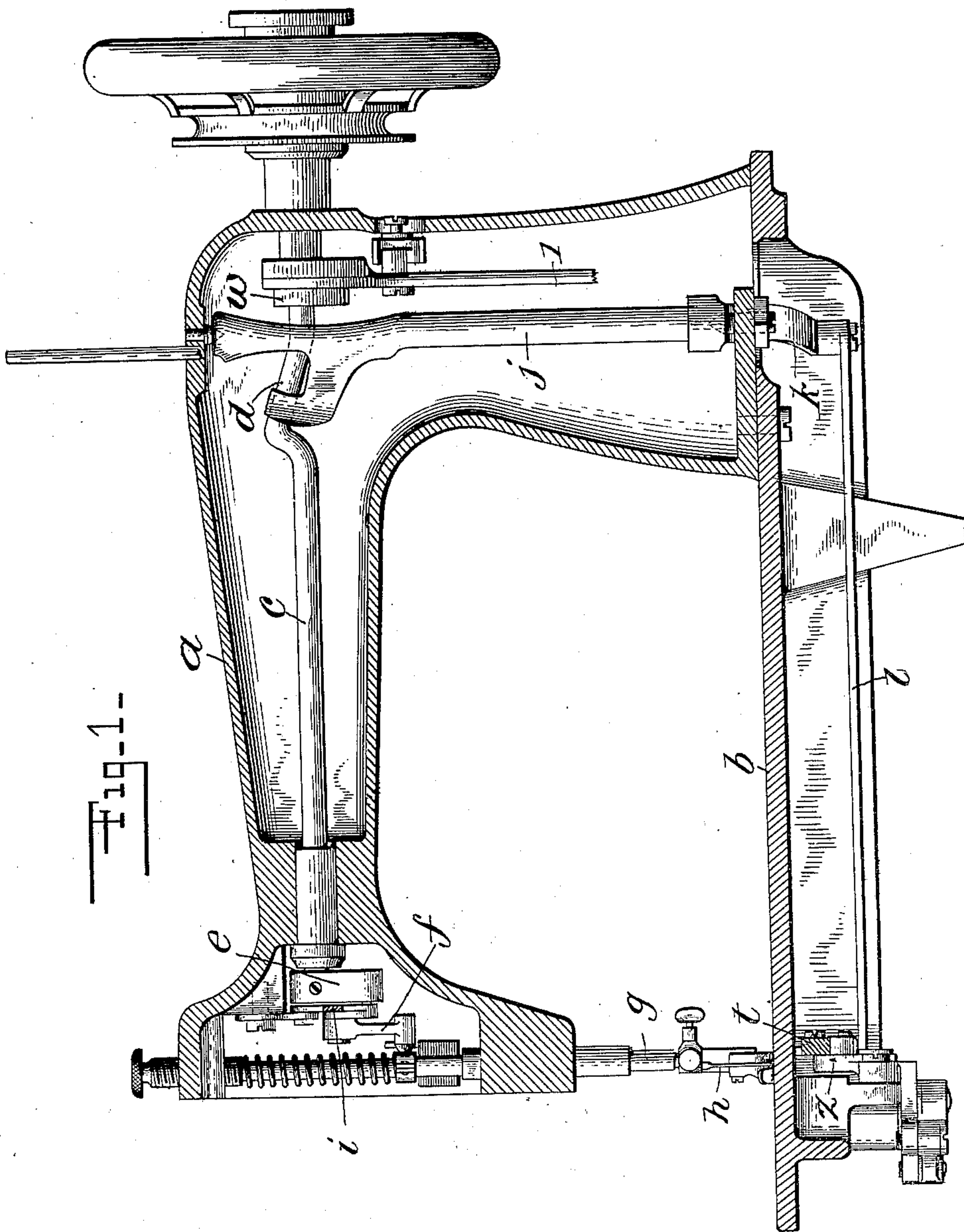
P. DIEHL & A. GRIEB.

CIRCULARLY MOVING HOOK SEWING MACHINE.

(Application filed Apr. 9, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

F. N. Roebuck
Wm. H. Roebuck

INVENTORS:

Philip Diehl
and Alfred Grieb
BY *Wm. H. Roebuck*
ATTORNEY

No. 663,696.

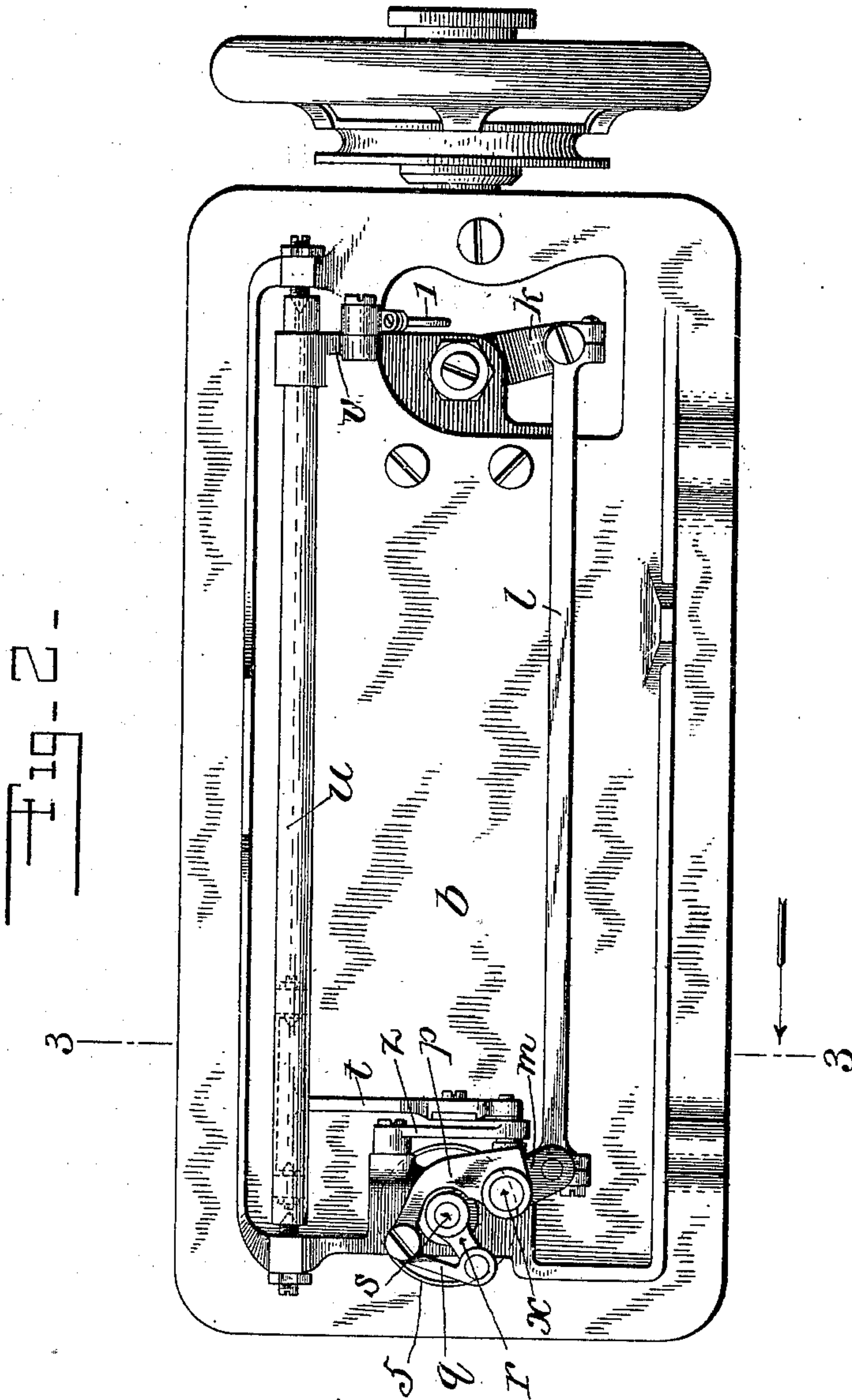
Patented Dec. 11, 1900.

P. DIEHL & A. GRIEB.
CIRCULARLY MOVING HOOK SEWING MACHINE.

(Application filed Apr. 9, 1900.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:

F. N. Roehrich
Attorney

INVENTORS:

Philip Diehl
and Alfred Grieb
BY *K. M. Falter*
ATTORNEY

No. 663,696.

Patented Dec. 11, 1900.

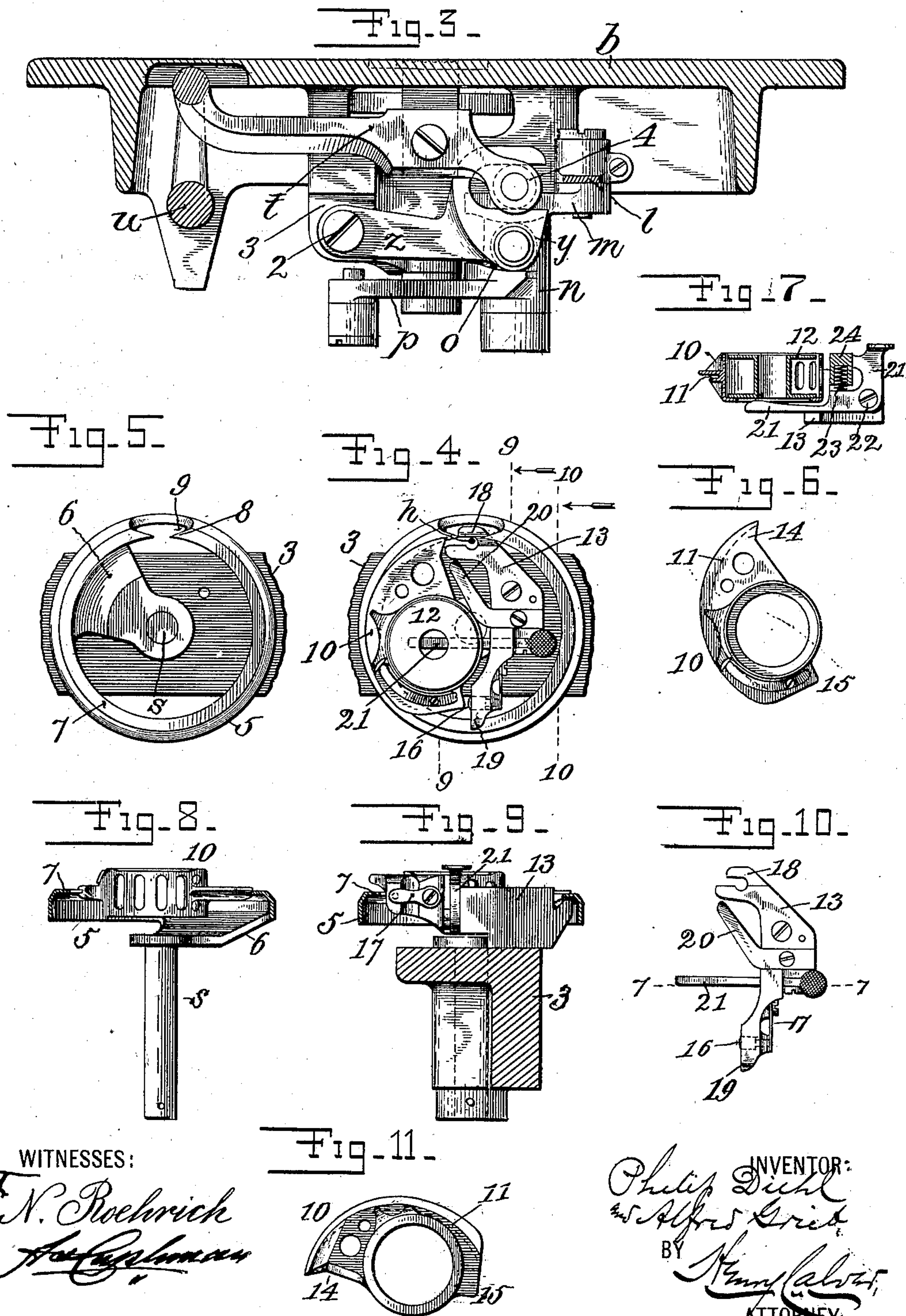
P. DIEHL & A. GRIEB.

CIRCULARLY MOVING HOOK SEWING MACHINE.

(Application filed Apr. 9, 1900.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES:

F. N. Boehrnick
Alfred Grieb

INVENTOR:

Philip Diehl
Alfred Grieb
BY *Kenneth C. Galt*
ATTORNEY

UNITED STATES PATENT OFFICE.

PHILIP DIEHL AND ALFRED GRIEB, OF ELIZABETH, NEW JERSEY, ASSIGNORS
TO THE SINGER MANUFACTURING COMPANY, OF NEW JERSEY.

CIRCULARLY-MOVING-HOOK SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 663,696, dated December 11, 1900.

Application filed April 9, 1900. Serial No. 12,215. (No model.)

To all whom it may concern:

Be it known that we, PHILIP DIEHL and ALFRED GRIEB, citizens of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of lock-stitch sewing-machines in which the loops of needle-thread are carried by a circularly-moving, oscillating, or rotating hook around a stationary thread-case supported by said hook, so that said thread-case does not have to be lifted by the loops of needle-thread in passing beneath it, thus allowing the needle-thread to pass around the thread-case with the least possible friction or drag on said needle-thread. In the present case the loop-taking hook is disposed horizontally, so as to move circularly in a horizontal plane, and is preferably given an oscillating movement, the loop-seizing beak or hook proper being formed on the inner face of the hook ring or segment by which the thread-case is supported and said thread-case being preferably eccentric to and, in fact, mainly to one side of the line of the axis of movement of the hook, so that the loops of needle-thread are carried around the thread-case to discharging position by a comparatively short circular movement of the hook.

In the accompanying drawings, Figure 1 is a sectional side view of a machine embodying the invention, and Fig. 2 is a bottom view thereof. Fig. 3 is a cross-section of the lower part of the machine on line 3 3, Fig. 2, looking in the direction of the arrow adjacent to said line. Fig. 4 is a detail plan view showing the circularly-moving hook, the thread-case, and the holder for maintaining the latter stationary. Fig. 5 is a detail plan view of the hook with the thread-case omitted and the holder removed from its supporting-bracket. Fig. 6 is a detail plan view of the thread-case. Fig. 7 is a cross-section of the thread-case and also of the bobbin, this view showing also the thread-case holder partly in elevation and partly in section on line 7 7, Fig. 10. Fig. 8 is a detail view to show the operative relation

of the thread-case and hook, the latter being in cross-section; and Fig. 9 is a similar view, but showing also the hook-shaft-supporting bracket as seen looking from the right of Fig. 4, with the hook-ring in section on line 9 9 and the bracket in section on line 10 10, Fig. 4, this view showing also the thread-case holder in elevation. Fig. 10 is a detail plan view of the thread-case holder, and Fig. 11 is a detail bottom view of the thread-case.

Referring to the drawings, *a* denotes the arm of the machine; *b*, the bed-plate; *c*, the horizontal driving-shaft, journaled in the upper portion of said arm and provided near its rear end with a crank *d* and having at its forward end a crank *e*, connected by a pitman *f* with the needle-bar *g*, carrying the usual eye-pointed needle *h*, said crank *e* being also connected in a well-known manner with the "link" take-up *i*. The crank *d* is embraced by a fork at the upper end of a vertical rock-shaft *j*, having at its lower end an arm *k*, connected by a pitman *l* to an arm *m* of a rocking hub *n*, provided with a grooved cam *o* and having a second arm *p*, joined by a link *q* to an arm *r* of the rocking hook-shaft *s*.

The feed-bar *t* is reciprocated horizontally, as is common in a well-known style of "Singer" feeding mechanism, by a rocking feed-shaft *u*, having at its rear end an arm *v*, to which is jointed the lower end of a feed connection or link *1*, operated from a cam or eccentric *w* on the driving-shaft *c*. The vertical movements of the feed-bar are imparted thereto from the grooved cam *o* in the rocking hub or sleeve *n*, journaled on the fixed pin or stud *x*, the groove of said cam being entered by a roller-stud *y* on a lever *z*, pivoted at 2 to the bracket 3, depending from the work-plate and forked or slotted at its free end to embrace a roller-stud 4, with which the feed-bar *t* is provided. This feeding mechanism is, however, not herein claimed, the same being embraced by our application, Serial No. 25,608, filed August 2, 1900.

The hook-shaft *s* carries at its upper end the horizontally-disposed circularly-moving hook or hook-ring 5, connected with said shaft by one or more webs or spokes 6, said hook-ring having an inwardly-extending rib or flange 7, on the inner face of which is formed

the loop-seizing beak or hook proper, 8, outside of which is a throat 9, in which the loops of needle-thread are carried around the thread-case 10, having a peripheral groove 11, entered by the said rib or flange 7, to enable the said thread-case to be entirely supported by the said hook-ring or hook owing to the rib-and-groove connection of these parts. The thread-case is preferably furnished with a bobbin 12 to contain the lower or locking thread; but it is obvious that a cop of thread might be used instead of the bobbin, if desired.

The thread-case 10 is preferably arranged eccentric to and, in fact, so as to have its thread-chamber or bobbin-chamber mainly to one side of the axis of movement of the circularly-moving hook. The eccentrically-arranged thread-case is on that side of the axis of the hook toward which the loops of needle-thread are first carried by the beak of the hook in spreading the loops of needle-thread around the thread-case, or, in other words, the said thread-case is eccentric to the axis of the hook toward that side of the circular path of the hook first traversed by the beak of the hook after said beak has taken a loop of needle-thread from the needle. This eccentric arrangement of the thread-case relative to the hook-ring or hook by which it is supported permits of an early cast-off in the movements of the hook of the loops of needle-thread over the thread-case, so that shorter circular movements of the hook than have heretofore been required to secure this cast-off may be employed, thereby lessening friction, so as to consume less power, and contributing to higher speed than heretofore, as also affording more time in the rotation of the driving-shaft for the easy and proper action of the feed and take-up.

Attached to the bracket 3 and arranged within the hook-ring is a holder 13, which serves to maintain the thread-case stationary as the hook-ring travels about it. The thread-case is not in contact with the said holder excepting at or near the opposite ends or horns of the latter and against one or the other of which parts the said thread-case will at times rest lightly. These points of contact between the holder and thread-case are respectively near the loop-dividing portion 14 and the loop-discharging or heel portion 15 of the said thread-case, the last-named point of contact of the holder and thread-case being preferably afforded by a small pin 16, having a rounded end for contact with the thread-case, the said pin being yieldingly mounted by reason of a small spring 17, which presses lightly against its opposite end, so that the said contact-pin may yield a little, if necessary, to allow the needle-loops to pass easily. The yielding contact afforded by the said spring-pressed pin 16 also serves to lessen or deaden any noise which might be occasioned by contact of the parts in the operation of the ma-

chine, or, in other words, the said yielding contact serves as a muffler.

The oscillating movements of the loop taker or hook 5 may be and preferably are so timed that when a loop of needle-thread is passing over the cast-off or loop-discharging portion of the thread-case the hook will have commenced its reverse movement, so that the light frictional contact between the hook and thread-case will tend to open a free thread-passage between the heel portion of said case and the contact-pin 16, and when the first limb of the loop is passing the loop-dividing portion of the thread-case the forward movement of the hook at that time will have a tendency to open a free thread-passage between the said loop-dividing portion of said thread-case and the contact portion of the holder adjacent thereto, and thus the loops of needle-thread will be carried around the thread-case with the least possible friction or strain on said needle-thread.

The holder 13 is preferably provided with a needle-guard 18 to guide the vertically-reciprocating needle *h* and keep it out of the way of the advancing beak 8 of the horizontally-moving hook, and the said holder is also preferably provided with a loop-guard 19, which extends cut over the flange 7 of the hook-ring adjacent to the loop-discharging portion of the thread-case and which serves to prevent the loops of needle-thread from catching on the said holder. A second loop-guard afforded by the arm 20, attached to the holder, serves to steady the loops of needle-thread after they have been carried around the thread-case and prevent them from flopping or kinking when being drawn up by the take-up and as they are passing between the thread-case 10 and the holder. The thread-case holder 13 is also preferably provided with a small bobbin-ejecting lever 21, one arm of which extends beneath the bobbin resting on an annular lip or flange at the bottom of the bobbin-chamber of the thread-case and the other or upper arm of which is constructed and arranged to afford a finger-piece to be pressed upon by the attendant to lift the bobbin from its seat in the thread-case, thus facilitating the removal of the said bobbin from said case. The bobbin-ejecting lever 21 is pivoted on the screw 22 and is held in its normal or inoperative position (shown in Fig. 7) by a small coil-spring 23, interposed between said lever and the portion 24 of the said holder.

In the operation of the machine the vertically-reciprocating needle *h* descends within the circularly-moving loop-taker or hook-ring 5, and as the needle rises and throws out its loop the latter is caught by the beak 8 and is carried in the throat 9 of the hook against the loop-dividing portion 14 of the thread-case 10. As the hook now continues its forward movement with the needle-thread held in the said throat 9 of the said hook one limb of the loop passes freely around beneath the thread-case

supported on the flange or rib 7 of the hook and clear of the web or webs connecting the hook ring or segment with the hook-shaft 5 and the other limb of the said loop passes freely over the top of the thread-case. The bight of the loop of needle-thread carried in the throat 9 of the hook passes freely around the periphery of the thread-case and after having been carried to the cast-off portion of said case can in being tightened by the take-up be readily drawn through between the thread-case and its holder, as hereinbefore described, and thus the loops of needle-thread are carried entirely around the thread-case with a minimum of friction on said thread. For this reason the lightest and finest needle-threads may be used with machines running at the highest speeds with little or no danger of breakage of the thread.

This improved machine, in which the eccentrically-arranged thread-case is supported by the circularly-moving horizontally-disposed loop taker or hook, presents very great advantages over machines in the prior art in which the thread-cases were not supported by the hooks and had therefore to be lifted by the thread each time a loop of needle-thread was passed around the thread-cases, as in machines of the kind just referred to the friction on the needle-thread in passing around the thread-cases was so great that high speeds were impossible without endangering breakage of the needle-thread. This improved machine, with its eccentrically-arranged thread-case supported by the hook, also possesses great advantages over machines known to the prior art in which the thread-cases were supported by the hooks, but were not so arranged, as is the thread-case of the present machine, as to secure an early discharge of the loops of needle-thread about the thread-cases, for the reason that the present invention obviates the necessity of the differential or irregular movements or double rotations of the hooks heretofore employed in order to secure sufficient time in the rotation of the driving-shaft for a proper operation of the feed and take-up.

It will be understood that the invention is not limited to the details herein shown and described or to a circularly-moving hook which oscillates, as such hook might have a continuous rotary movement, or to a circularly-moving loop-taker which is a complete ring, as the loop-seizing beak might be formed on a segment, the invention being capable of being varied widely in its details without departing from the essential features thereof.

We do not herein claim the combination, with a stationary thread-case supported by a loop-taking hook and arranged eccentric to the axis of the latter on that side of said axis toward which the loops of needle-thread are first carried by said hook in spreading said loops over said thread-case, of the particular needle-and-hook operating mechanism herein shown and described, this feature

of our invention being reserved to and embraced by our application, Serial No. 33,211, filed October 16, 1900, and which is a division of this application.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. In a sewing-machine, the combination with a curved, circularly-moving and horizontally-disposed loop-taker provided with an interior loop-seizing beak or hook, of a thread-case peripherally supported by said loop-taker, a holder for restraining said case from moving with said loop-taker, a vertically-disposed needle arranged to descend inside of the circular path of movement of said loop-taker, and means for operating said needle and loop-taker.

2. In a sewing-machine, the combination with a curved, circularly-moving and horizontally-disposed loop-taker provided with an interior loop-seizing beak or hook, of a thread-case peripherally supported by said loop-taker, a holder for restraining said case from moving with said loop-taker, said holder having one or more yielding contact parts to be engaged by said thread-case, a vertically-disposed needle arranged to descend inside of the circular path of movement of said loop-taker, and means for operating said needle and loop-taker.

3. In a sewing-machine, the combination with a curved, circularly-moving and horizontally-disposed loop-taker provided with an interior rib or flange having a loop-seizing beak or hook, of a thread-case peripherally supported by said loop-taker by a rib-and-groove connection, a holder for restraining said case from moving with said loop-taker, a vertically-disposed needle arranged to descend inside of the circular path of movement of said loop-taker, and means for operating said needle and loop-taker.

4. In a sewing-machine, the combination with a curved, circularly-moving and horizontally-disposed loop-taker provided with an interior rib or flange having an inwardly-pointing loop-seizing beak or hook, of a thread-case located eccentric to the axis of and peripherally supported by said loop-taker, a holder for restraining said case from moving with said loop-taker, a vertically-disposed needle arranged to descend inside of the circular path of movement of said loop-taker and means for operating said needle and loop-taker.

5. In a sewing-machine, the combination with a curved, circularly-moving and horizontally-disposed loop-taker provided with an interior rib or flange having an inwardly-pointing loop-seizing beak or hook, of a thread-case located eccentric to the axis of and peripherally supported by said loop-taker by a rib-and-groove connection, a holder for restraining said case from moving with said loop-taker, a vertically-disposed needle arranged to descend inside of the circular path of movement of said loop-taker, and means for operating said needle and loop-taker.

6. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a circularly-moving loop-taker provided with an interior loop-seizing beak or hook, a thread-case located eccentric to the axis of the said loop-taker and peripherally supported by said loop-taker on that side of the axis of the latter toward which the loops of needle-thread are first carried by said beak, means for imparting circular movements to said loop-taker, and a holder for restraining the said case from moving with said hook as the latter travels about said case.

7. In a sewing-machine the combination with a vertically-reciprocating needle and its operating mechanism, of a circularly-moving loop-taker provided with an interior loop-seizing beak or hook, a thread-case located eccentric to the axis of the said loop-taker and peripherally supported thereby by a rib-and-groove connection, means for operating said loop-taker, and a holder for restraining the said case from moving with said hook as the latter travels about said case.

8. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a horizontally-disposed hook-ring provided with an interior loop-seizing beak or hook, and having a loop-carrying throat outside of said beak or hook, a thread-case peripherally supported by said hook-ring, means for imparting a circular movement to said hook-ring, and a holder for restraining the said case from moving with said hook-ring as the latter travels about said case.

9. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a horizontally-disposed hook-ring provided with an interior loop-seizing beak or hook and having a loop-carrying throat outside of said beak or hook, a thread-case peripherally supported by said hook-ring, by a rib-and-groove connection, means for imparting circular movements to said hook-ring, and a holder for restraining the said case from moving with said hook-ring as the latter travels about said case.

10. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a circularly-moving hook-ring provided with an interior loop-seizing beak or hook, a thread-case located eccentric to the axis of movement of said hook-ring and peripherally supported thereby, means for operating said hook-ring, and a holder for restraining the said case from

moving with said hook as the latter travels about said case.

11. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a circularly-moving hook-ring provided with an interior loop-seizing beak or hook, a thread-case located eccentric to the axis of movement of said hook-ring and peripherally supported thereby by a rib-and-groove connection which is less than half a circle in extent, means for operating said hook-ring and a holder for restraining the said case from moving with said hook as the latter travels about said case.

12. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a horizontally-placed, circularly-moving hook provided with an interior loop-seizing beak, said needle descending within the circular path of movement of said hook, a thread-case within and supported by said hook, means for operating said hook, and a holder, also located within said hook and serving to restrain the said case from moving with said hook as the latter travels about said case.

13. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a horizontally-placed, circularly-moving hook provided with an interior loop-seizing beak, said needle descending within the circular path of movement of said hook, a thread-case within and supported by said hook by a rib-and-groove connection, and a holder, also located within said hook and serving to restrain the said case from moving within said hook as the latter travels about said case.

14. In a sewing-machine, the combination with a vertically-reciprocating needle and its operating mechanism, of a horizontally-disposed, circularly-moving loop-taker provided with a beak or hook, means for operating said loop-taker, a thread-case within said loop-taker and provided with a bobbin, and a stationary thread-case holder provided with a bobbin-lifting lever or ejector extending horizontally beneath the bobbin of said thread-case.

In testimony whereof we affix our signatures in the presence of two witnesses.

PHILIP DIEHL.
ALFRED GRIEB.

Witnesses:

HENRY J. MILLER,
W. IRVING HOUGHTON.