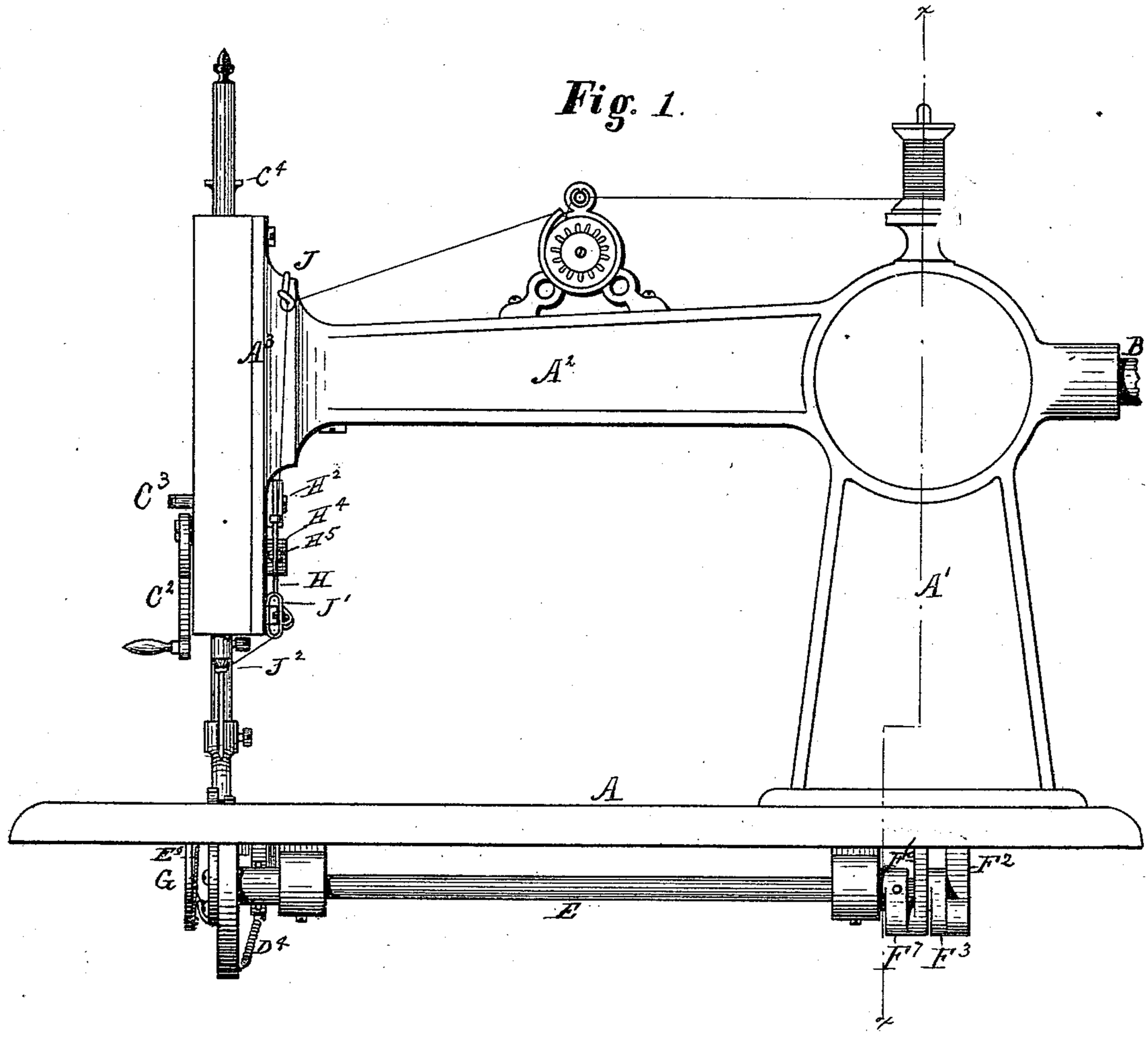
5 Sheets—Sheet 1.

G. S. DARLING.
Sewing-Machine.

No. 213,038. Patented Mar. 11, 1879.

Fig. 1.



Witnesses:
Ford R. Smith
H. W. Munday

Inventor:
Geo. S. Darling
by Munday & Evarts
Attorneys.

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G. S. DARLING.
Sewing-Machine.

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Fig. 2

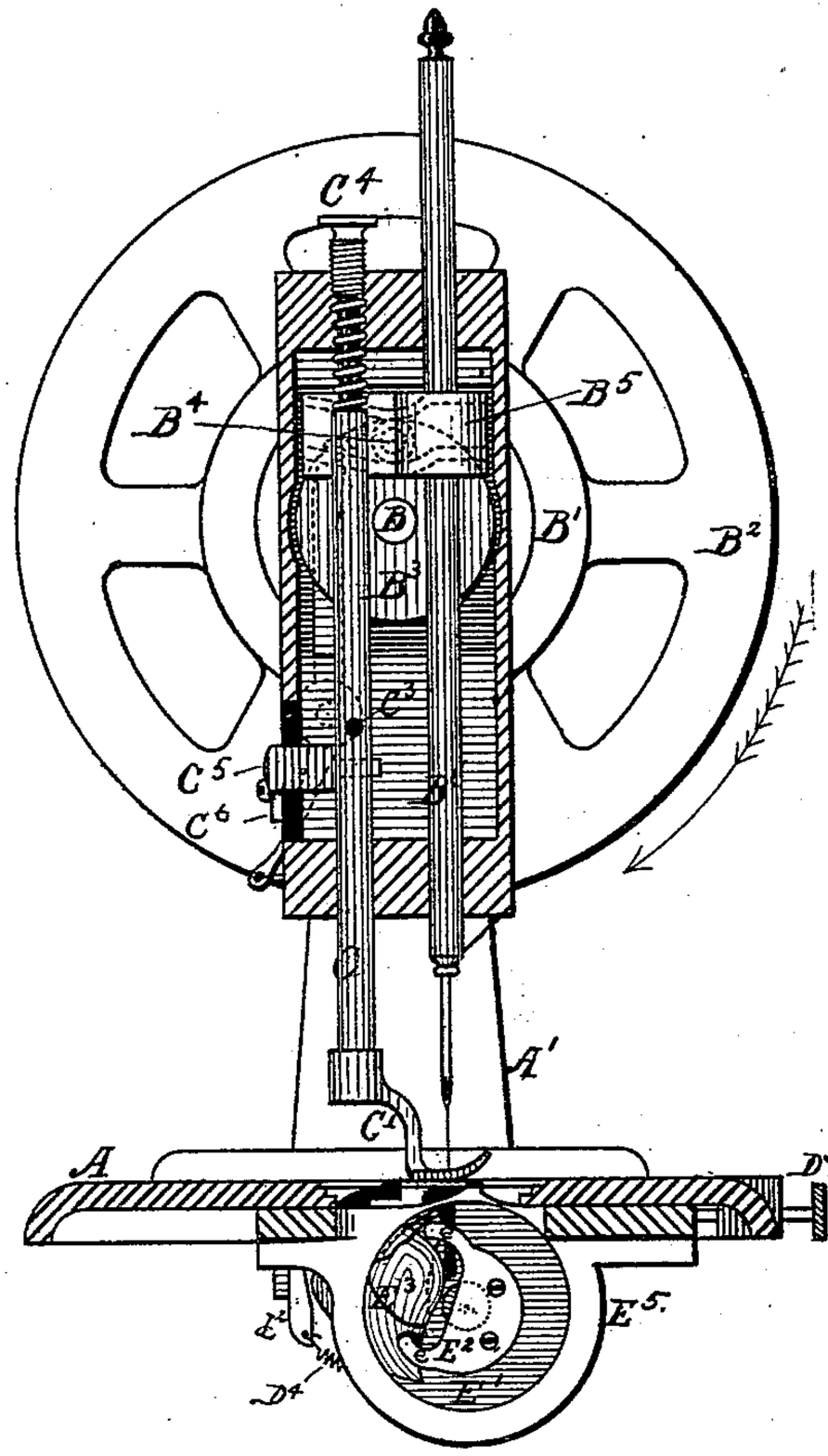
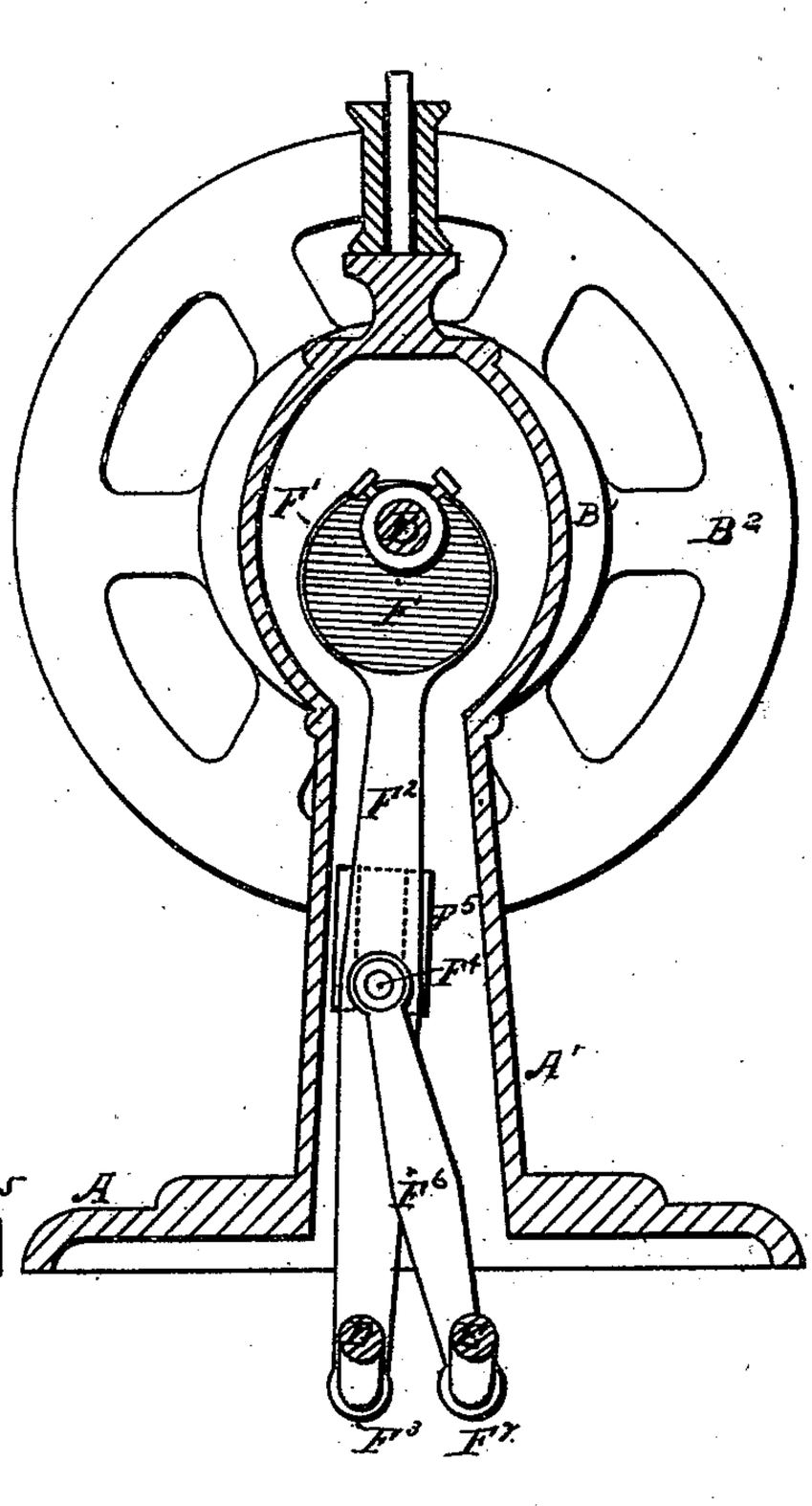


Fig. 3.



Witnesses:

Ford R. Smith

N. W. Munday

Inventor:

Geo. S. Darling

by Munday & Evarts

Attorneys.

5 Sheets—Sheet 3.

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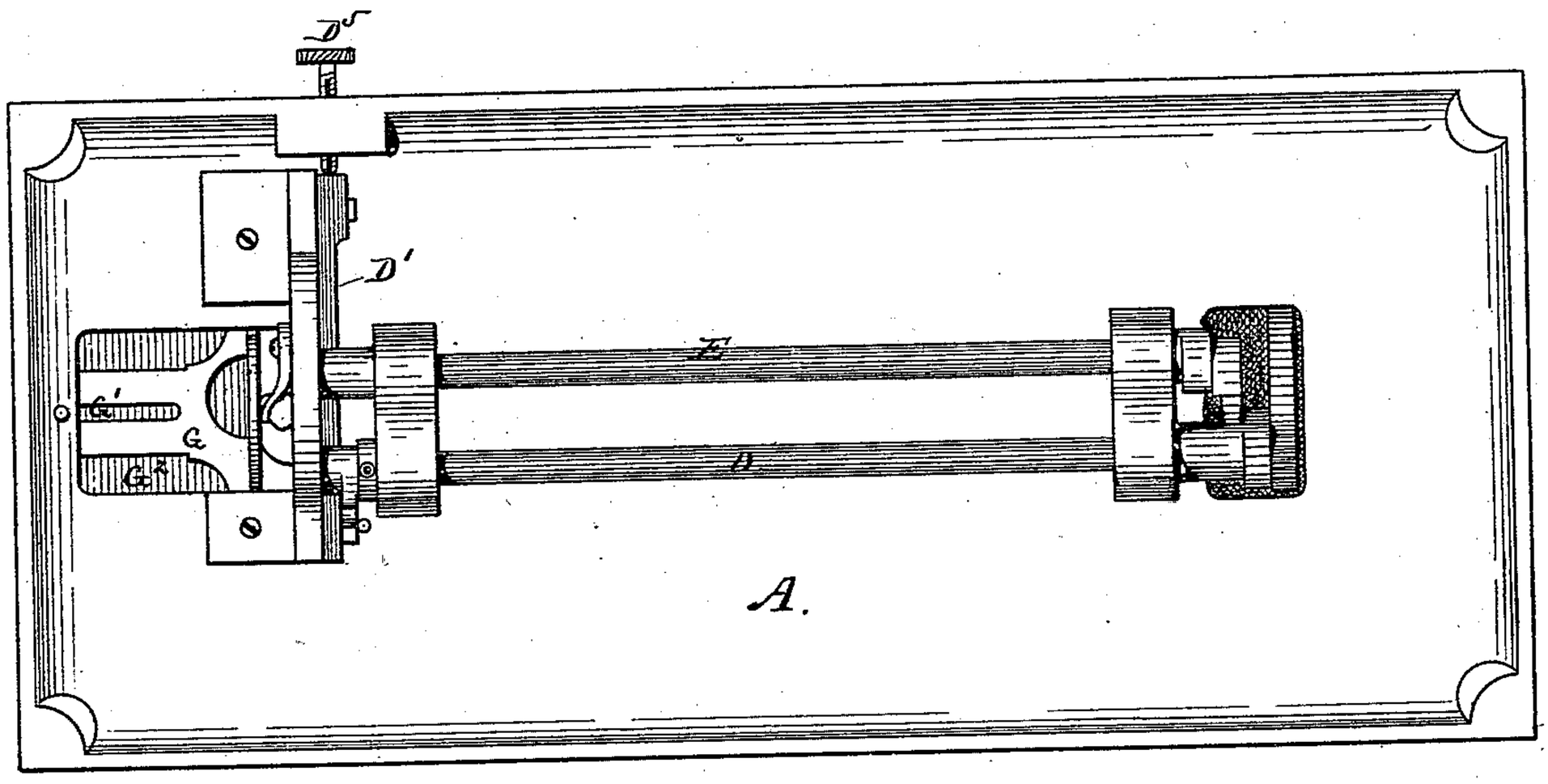
Fig. 4.



A.

Witnesses:

Ford R. Smith

A. W. Munday

Inventor:

Geo S. Darling

by Munday & Evarts

Attorneys.

5 Sheets—Sheet 4.

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Fig. 5

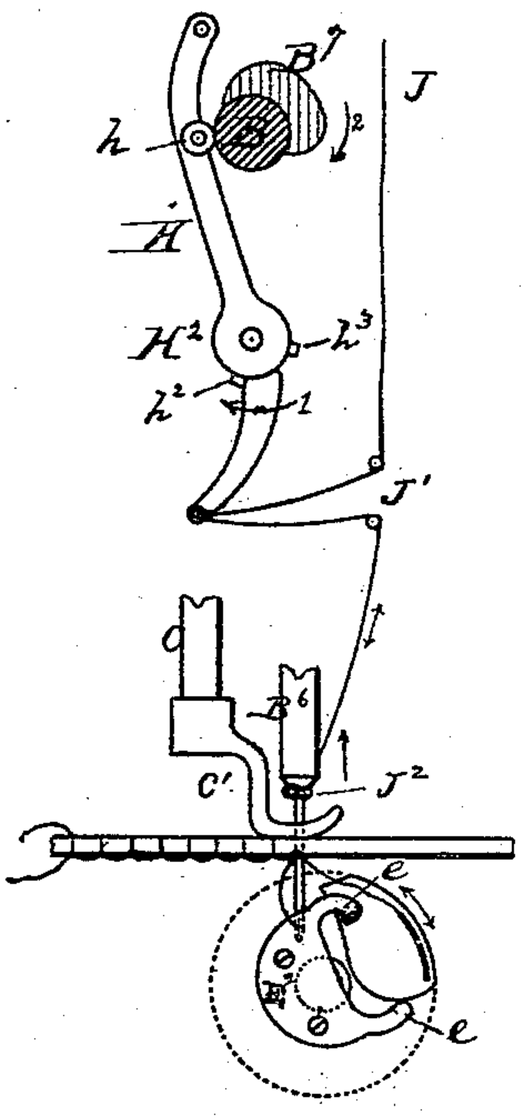


Fig. 6.

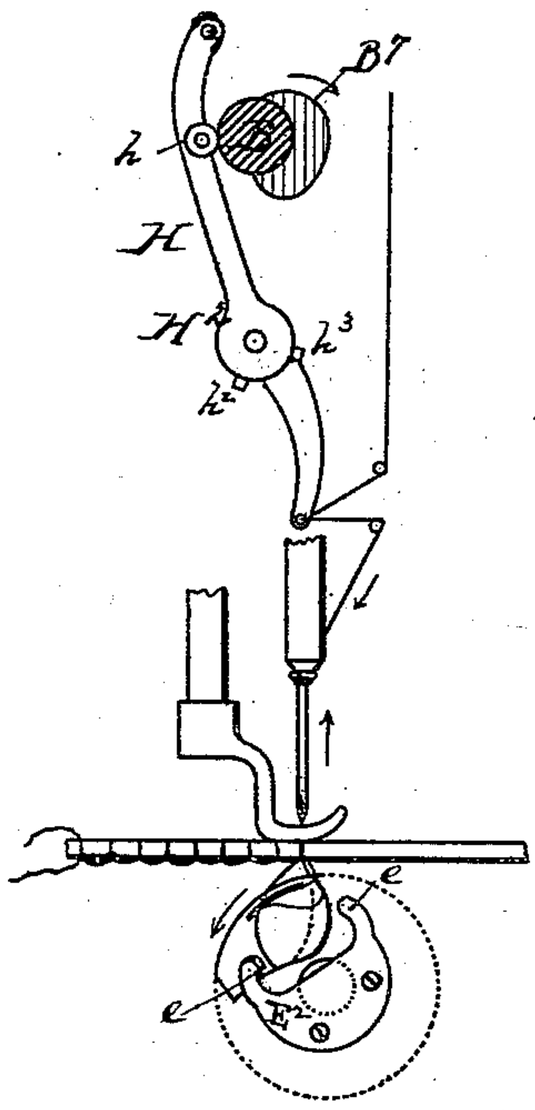


Fig. 7.

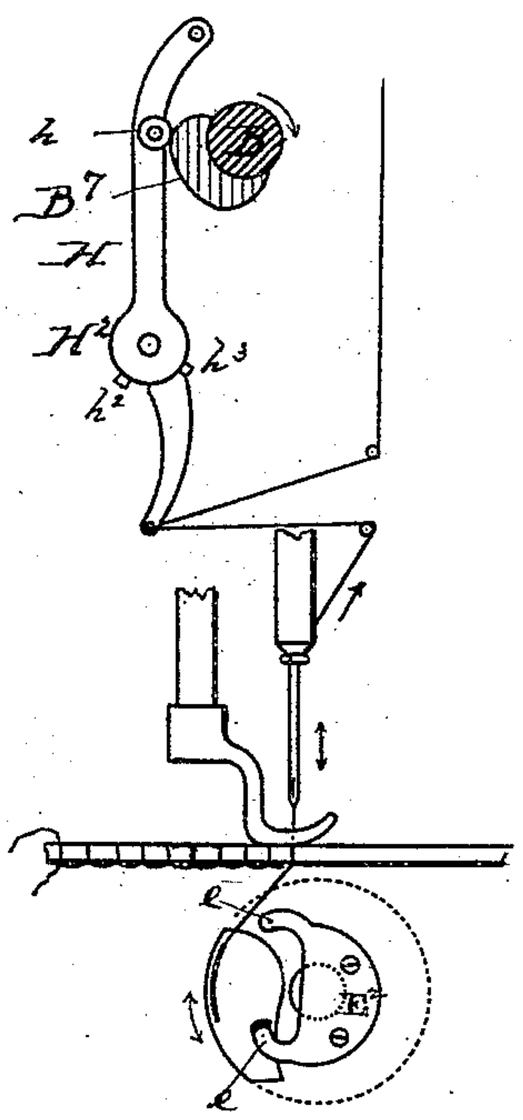


Fig. 8.

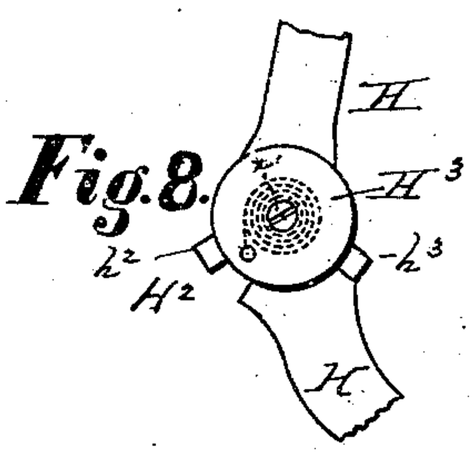
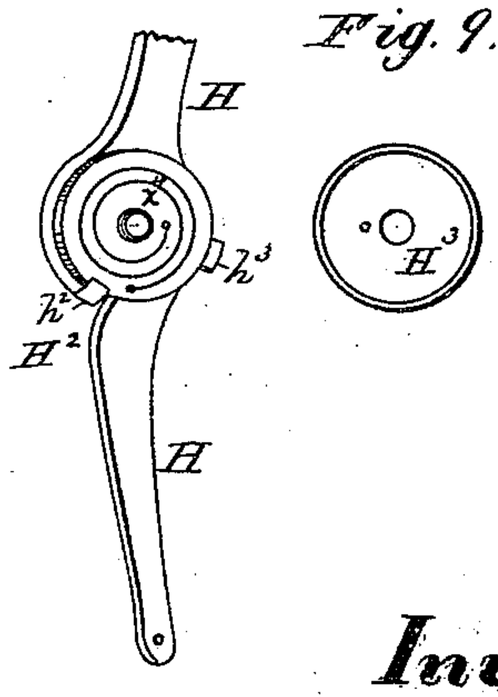


Fig. 9.



Witnesses:

Ford R. Smith

W. W. Munday

Inventor:

Geo. S. Darling

by Munday, Evarts

Attorneys.

5 Sheets—Sheet 5.

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Fig. 10

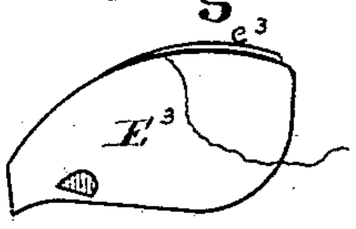


Fig. 11

Fig. 12.

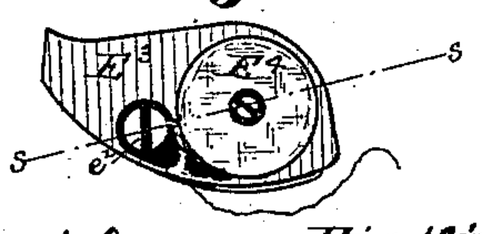


Fig. 13

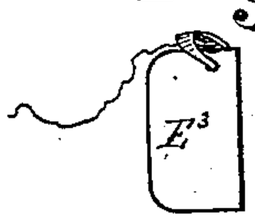


Fig. 14

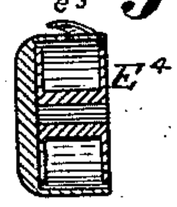


Fig. 12½

Fig. 17

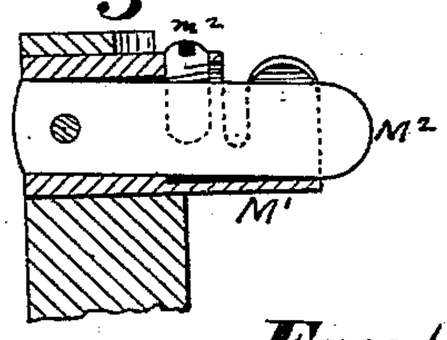


Fig. 15

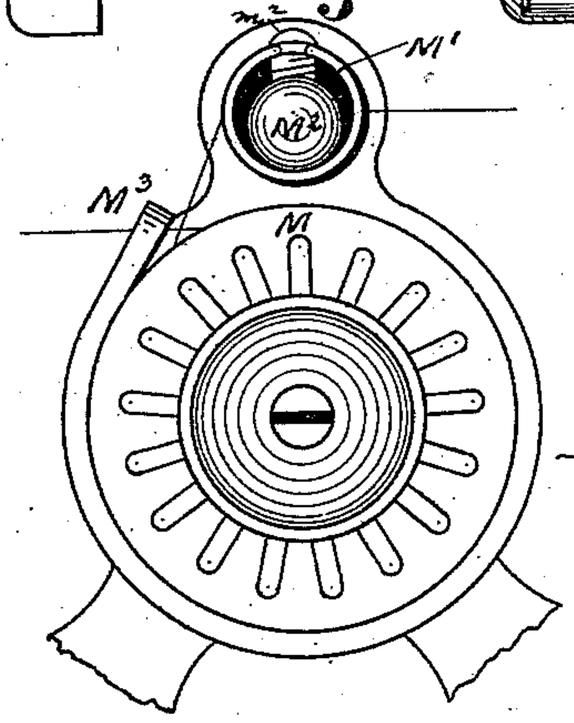


Fig. 16

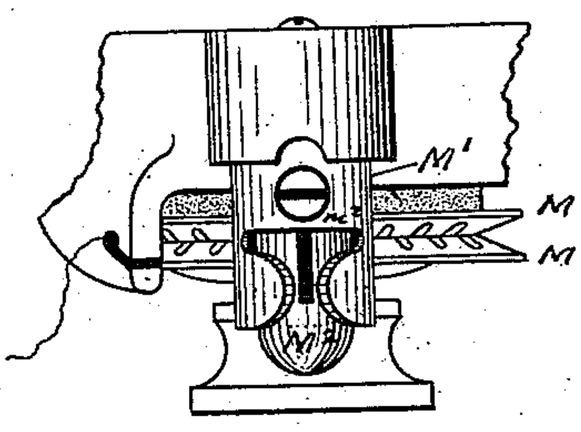


Fig. 18

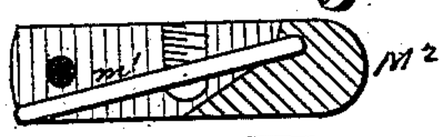


Fig. 19

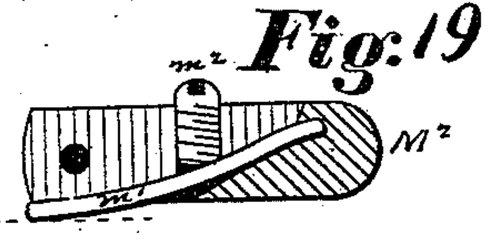


Fig. 20

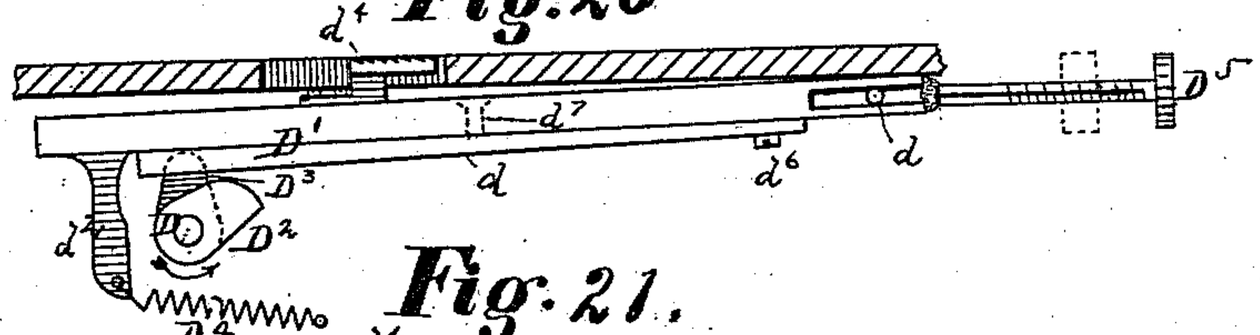


Fig. 21.

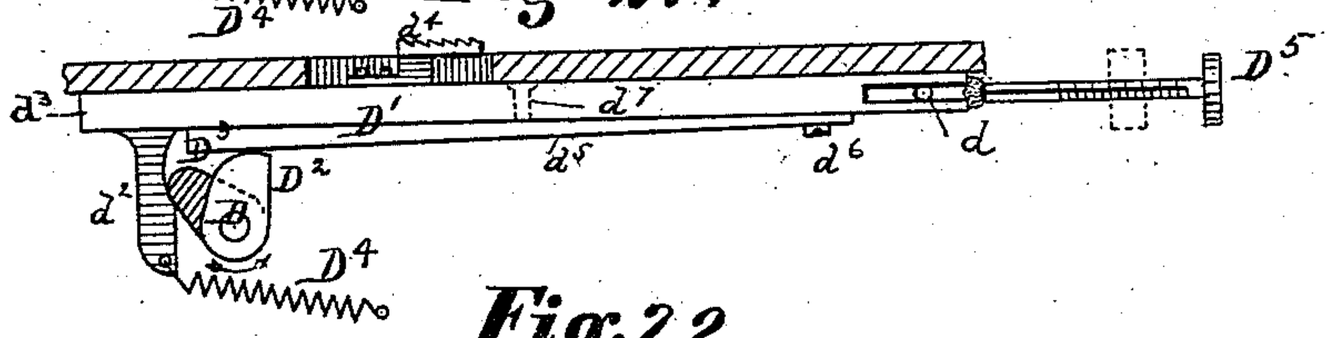
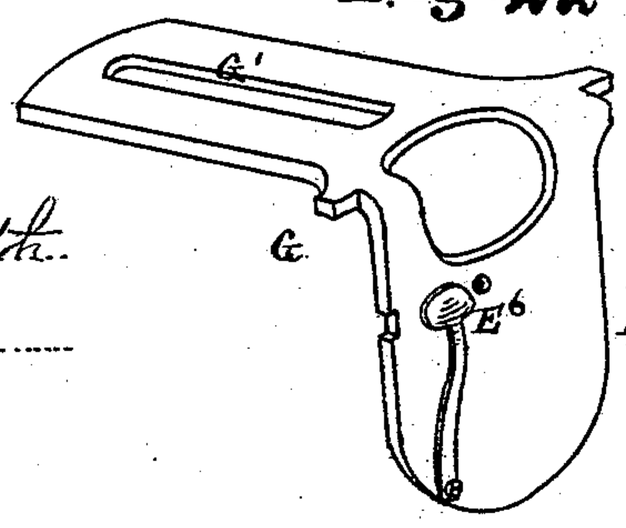


Fig. 22



Witnesses:

Ford R. Smith

A. W. Munday

Inventor:

Geo. S. Darling

by Munday, Evarts & Adcock

Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE S. DARLING, OF CHICAGO, ILLINOIS, ASSIGNOR TO WILSON SEWING MACHINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **213,038**, dated March 11, 1879; application filed July 22, 1878.

To all whom it may concern:

Be it known that I, GEORGE S. DARLING, of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Sewing-Machine; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation with the band and balance-wheel broken off. Fig. 2 is a vertical section, taken through the casing in front of the needle-bar and presser-bar, showing those parts, and also the shuttle and its carrier below the bed-plate. Fig. 3 is a similar section, taken through the upright standard at the line *x x* of Fig. 1, showing the mechanism for communicating motion from the main shaft to the two shafts below the bed-plate. Fig. 4 is a bottom view of the machine. Figs. 5, 6, and 7 are skeleton views illustrating the movement and timing of the needle-shuttle and take-up. Fig. 8 is an enlarged view of the joint of the take-up. Fig. 9 is another view of the same parts. Figs. 10, 11, 12, 12½, 13, 14 are various views of the shuttle detached from the machine, the last figure (14) being a section across the same at the axis of the bobbin, and 12½ being a section through the line *s s* of Fig. 12. Fig. 15 is an enlarged view of the tension device for the upper thread detached from the machine. Fig. 16 is a top view of the same. Figs. 17, 18, and 19 are sectional views of the same. Figs. 20 and 21 are sectional diagrams of the feed apparatus. Fig. 22 is a view of the sliding plate or shuttle-guard detached from the machine.

Like letters of reference in the various figures denote the same parts.

My invention consists in the peculiar construction and arrangement of the shuttle and its carrier, the means for regulating the tension of the flexible section of a jointed take-up, the particular construction and arrangement of a tension-check for the upper thread, the means for imparting the requisite motion to the shuttle-driving shaft and feed-shaft, and in the means for insuring the passage of the shuttle through the loop, as hereinafter more fully described.

In the drawings, Fig. 1, A A^1 A^2 A^3 represent, respectively, the bed-plate, standard, arm, and head of the ordinary form of sewing-machine. In the arm A^2 there revolves a shaft, B, driven by band-pulley B^1, and at the extreme left-hand or needle end of the machine the shaft B is provided with a disk or crank-plate, B^3, Fig. 2, which is furnished with a wrist-pin and friction-roller, B^4, playing in a grooved cross-head, B^5, attached to the needle-bar B^6. This groove in the cross-head is shown in dotted lines, and is made of the form shown, in order to give the proper timing to the needle. C is the presser-bar, C^1 the presser-foot, and C^2 a cam-head lever for raising and locking the same, while C^4 is an adjustable screw for varying the tension of the spring which holds the presser-foot down.

Now, referring to Fig. 4, E D represent two parallel shafts below the bed-plate. One of these shafts, D, is for operating the feed, and it moves with a continuous rotary motion imparted to it from the main shaft, by means hereinafter to be described. Above this shaft lies the feed-bar D^1, (see Figs. 20 and 21,) which is made of two pieces of metal, connected rigidly at d^6, the upper one of which carries the roughened surface d^4, to which different vertical adjustments may be given by springing apart the two sections of the feed-bar by a screw, d^7. One end of this feed-bar is slotted and made to embrace a guide-pin, *d*, while the other end is provided with a pendent lug, d^2. The shaft D is provided with a double cam, D^2 D^3, and in the revolution of said shaft one of these cams strikes and lifts the feed-bar, while the other strikes the lug d^2, and gives the necessary longitudinal movement to produce the feed, the return of the bar being effected by the spring D^4. For increasing or lengthening the stitch an adjusting-screw, D^5, projects the lug d^2 of the feed-bar farther away from the driving-cams or draws it closer to the same to increase or diminish the time of contact between the two. The other one, E, of the two parallel shafts below the bed-plate is for operating the shuttle. This shaft simply oscillates back and forth without revolving. Its end next to the needle terminates in a shuttle-carrier, E^2, provided with horns *e e*. This carrier is fast-

ened upon the end of the shaft E, which protrudes through the shuttle-plate E^1, so that the shuttle-plate, which has a marginal ring, E^5, forms a race for the shuttle E^3 in its oscillation. This shuttle is constructed, as shown in Figs. 10, 11, 12, 12½, 13, and 14, with a bobbin, E^4, retained in place by a spring, *t*, from which bobbin the thread is led first to a tension device, e^2, and then out beneath the spring e^3 to the needle. Said shuttle is made to move in its oscillation the least possible distance, or only a little more than twice its length, so as to pass through and clear the loop of the upper thread. In its movement it is sustained upon the horns *e e* of its carrier for the greater portion of its throw, but toward the end of its forward stroke its heel is thrown up and away from the rear horn of its carrier, and the shuttle is sustained upon the forward horn of its carrier and the ring E^5. This gives a free clearance at the heel of the shuttle for the loop.

With respect to the feature just described, I do not claim, broadly, the general arrangement of the rock-shaft with shuttle-carrier and a rotary oscillating shuttle, but only the peculiar construction of the carrier in combination with the shuttle and race, whereby the shuttle is sustained upon the two bearing-points of the carrier during the greatest part of its travel, and at the end of its forward stroke has its heel thrown away from its support to give greater clearance to the loop in casting off the same.

To permit the shuttle to be inserted and removed an L-shaped sliding plate, G, (shown in detail in Fig. 22,) is provided. This plate, which is shown applied in Figs. 1 and 2, is secured to the bed-plate (in an opening covered by a slide, G^2,) by a screw which passes through the slot G^1, the loosening of which screw will permit the plate G to be slid away. The plate G is furnished with a spring, E^6, which bears against the shuttle when the latter is at the back end of its stroke in order to cause it to lie close against the face of the race while the shuttle-point is entering the thread-loop.

I am aware that an L-shaped plate having a pressing-spring has been employed in connection with a revolving hook-machine to hold the bobbin in. When combined with a loose and rotary oscillating shuttle, as in my case, it has a different function, the spring serving to press the shuttle tightly against the flat face of the race just as the point of the shuttle enters the loop. This reduces the liability of the shuttle to miss the loop when the parts become worn.

The take-up devices will now be described. On the main shaft B, just back of the crank-plate which drives the needle-bar, is fixed a cam, B^7. (See Figs. 5, 6, and 7.)

H is the take-up bar, which is pivoted at its upper end, inside of the head A^3 of the machine, in position to be struck by the cam B^7 in the revolution of shaft B. This take-up bar H is jointed at H^2, and is provided with a bearing-roller, *h*, against which the cam B^7 bears. The joint H^2 conceals a spring, x^4, which acts upon the lower portion of the arm with a tendency to throw it in the direction of the loaded arrow, Fig. 5. Stops h^2 h^3 limit the motion or yield of this arm, causing it, at this limit in either direction, to become rigid with the upper portion of the arm. At this joint H^2 (shown enlarged at Figs. 8 and 9) a regulating-disk, H^3, is applied. One end of the concealed spring is secured to this disk and the other to the lower portion of the arm. As this disk is turned and set by a small screw, x^3, the tension of the spring is regulated.

I am aware that a flexibly-jointed take-up having a limited movement is not new, and I only claim it when combined with a set-screw, spring, and regulating-disk, whereby the tension of the spring for said take-up may be regulated. This adjustment is important in this connection for the purpose of increasing the tension of the spring, to adapt it to take up heavy and coarse threads quickly from the heel of the shuttle, and to decrease said tension for fine thread. A non-adjustable spring in this connection is liable to be too stiff for fine threads, and thus break the same, and not stiff enough for coarse threads, thus allowing the latter to hang in the heel of the shuttle.

Figs. 15, 16, 17, 18, 19 illustrate the tension device for the upper thread. This consists of a pair of corrugated plates or wheels, M M, such as are in common use, (or they may be plain,) in combination with a peculiar contrivance acting as a check on the thread between said plates or wheels and the spool. This check consists of a hollow tube, M^1, within which lies pivoted at the rear end a bar, M^2. The upper part of the tube M^1 is slotted with a T-shaped slot. The stem of the T comes out to the mouth of the tube, while the arms of the T are cut down at each side to about half the diameter of the tube. The thread from the spool passes into the tube through this slot at one of the arms of the T under the bar and out at the other arm of the T, thence around between the corrugated plates or revolving tension-wheel, and through an eye, M^3, whence it is led to the needle. The weight of the bar resting upon the thread affords the necessary check between the plates or wheel and the spool to cause the thread to be griped sufficiently by the plates or wheel to cause the wheel to turn when tension is applied to the same by a nut or screw. (Not shown.) But, in order to increase the pressure of the bar beyond its weight, and to afford a means of adjusting the pressure, I apply to the said bar, in a slot in the same, a spring, m^1, extending back of the point at which the bar is pivoted to the tube, and affix to the bar a set-screw, m^2, bearing against the spring, whereby its tension may be adjusted. This spring, acting from the bar against the tube back of the pivot, serves to

force the bar down upon the thread with more or less pressure, according to the adjustment of the screw. Other kinds of springs besides that shown may, of course, be employed with like effect.

The means for transmitting the motion of shaft B to the two parallel shafts E D beneath the work-plate will now be described. It will be remembered that D is the feed-shaft, which is required to have a continuous rotary motion, while E is the shuttle-driving shaft, which has an oscillating movement. Upon the main shaft, B, within the hollow enlargement at the head of the upright standard A^1, is an eccentric cam, F, (see Fig. 3,) surrounded by a strap, F^1, connecting it to a pitman, F^2. The lower end of this pitman F^2 is attached to the wrist-pin of a crank, F^3, on the shaft D. (See Figs. 1 and 3.) About midway of the length of the pitman F^2 is a pin, F^4, which passes entirely through and is furnished by preference at the back with a roller, which plays in a guide, F^5, attached to the frame-work of the machine. To this same pin, at the other side, is connected a short pitman, F^6, the lower end of which is attached to the wrist-pin of a crank, F^7, on the shaft E. The pitman F^2, acting also as a lever, has a compound movement, and both reciprocates and oscillates, while pitman F^6 partakes only of a part of the movement of pitman F^2, thus producing the desired motion in both shafts D and E, as will be readily understood.

The amount of oscillation in the shaft E may be varied as desired by varying the throw of the crank, the length of the short pitman, or the position of the upper attachment of said short pitman.

Having thus described my invention, what I claim as new is—

1. The combination, with the circular shuttle-race and oscillating shuttle-driver arranged upon the end of a rock-shaft, and having two supporting-horns, *e e*, of the shuttle E^3, these parts being constructed and relatively arranged as described, whereby the shuttle is sustained upon the horns for the main portion of its travel, and is thrown at the end of its forward stroke to bearing contact with the race and lower horn only, leaving a free space at its heel for the clearance of the loop, substantially as described.

2. The combination, with the jointed sections of a take-up, of a regulating-disk, H^3, and a central set-screw surrounded by a coiled spring, the latter being attached at one end to the regulating-disk and at the other to the flexible section of the jointed take-up, substantially as shown and described.

3. The tension-check composed of two principal parts—a tube and a bolt—the tube being slotted across its diameter down to near the center, and from the mouth longitudinally to the cross-slot, and the bolt consisting of a bar free at one end and pivoted at the other, combined and operating substantially as described.

4. The tension-check consisting of the slotted tube, pivoted bar or bolt, and an adjustable spring, the parts being combined and operating substantially as specified.

5. The mechanism for imparting a continuously-revolving motion to the shaft D and an oscillating motion to shaft E, which consists in the combination, with the driving-shaft B, of a lever-pitman, F^2, having an eccentric or crank connection with both the driving-shaft and shaft D, and a rectilinearly-sliding fulcrum, together with a simple pitman, F^6, pivoted to the pitman F^2, and partaking of a portion of its movement for oscillating shaft E, substantially as shown and described.

6. The combination of the shuttle-retaining plate G, having a spring, E^6, the circular shuttle-race, and oscillating shuttle, the said spring serving to force the shuttle close against the race just before the point enters the loop, substantially as and for the purpose described.

GEO. S. DARLING.

Witnesses:
W. G. WILSON,
JOHN W. MUNDAY.