(No Model.) 3 Sheets—Sheet 1.

T. A. MACAULAY.

SEWING MACHINE.

No. 567,603. Patented Sept. 15, 1896.

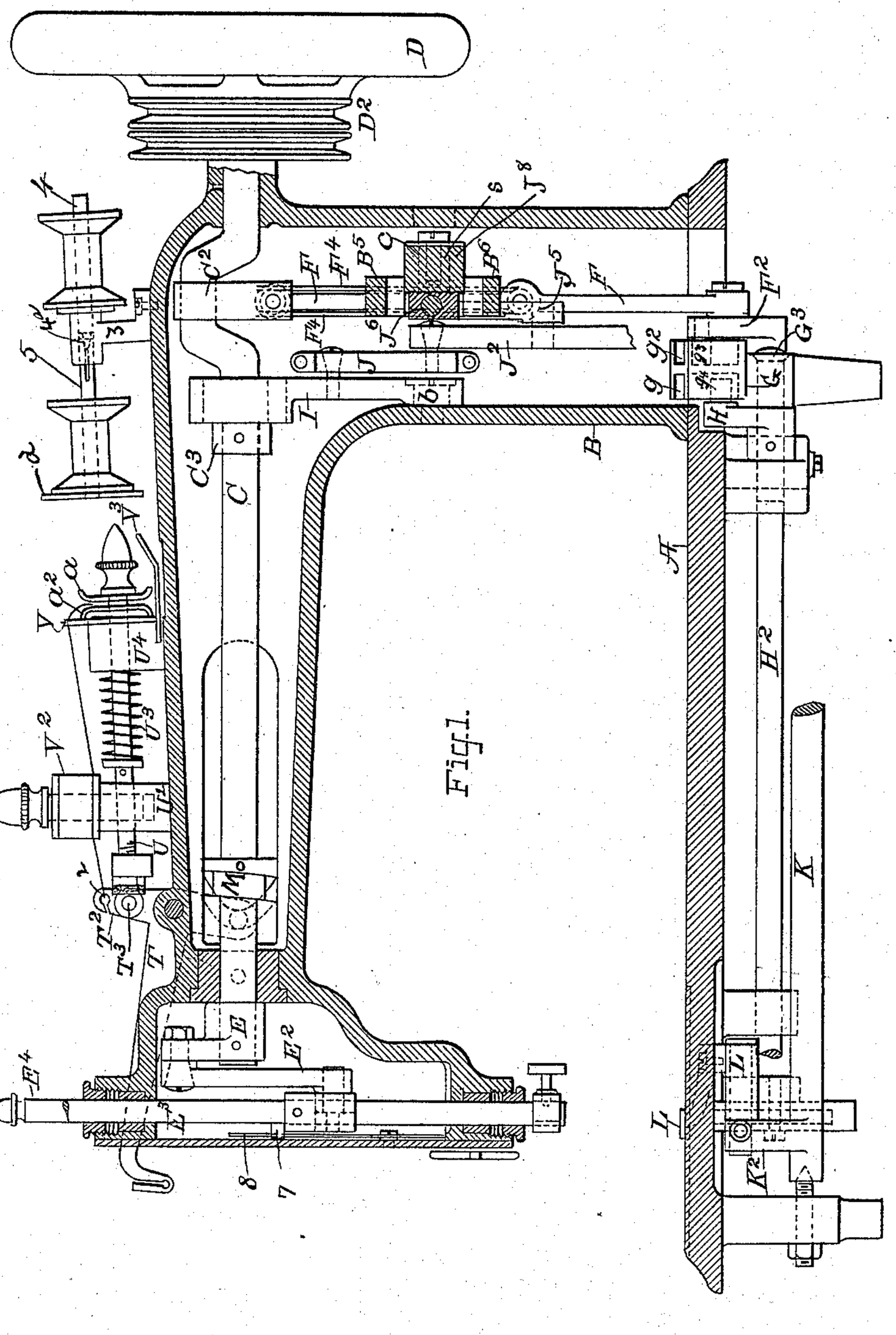

Fig. 1.

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INVENTOR:
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Fig. 10.

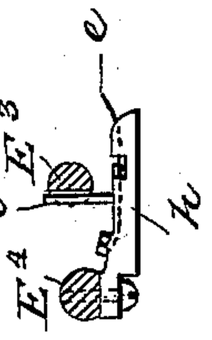
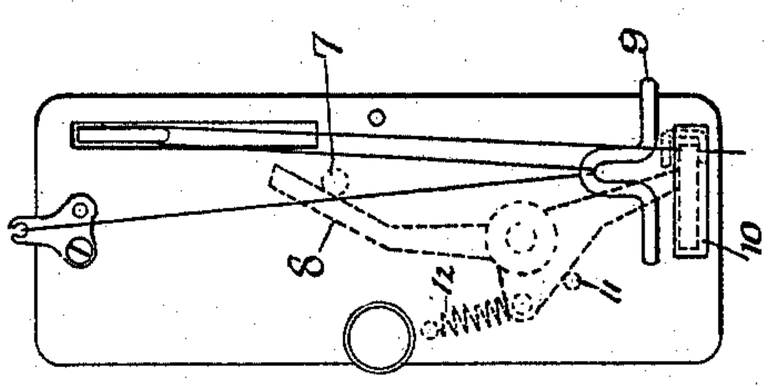


Fig. 4.



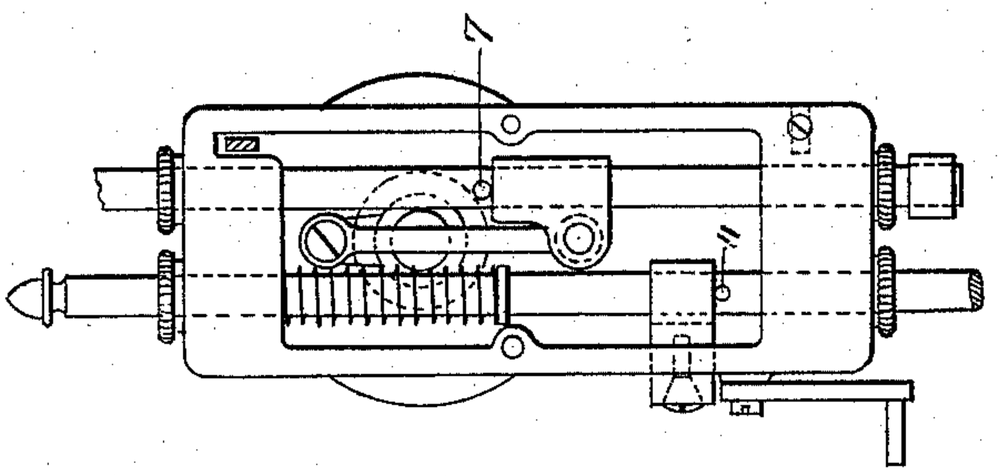


Fig. 3.

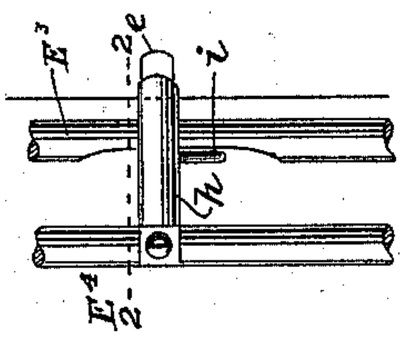
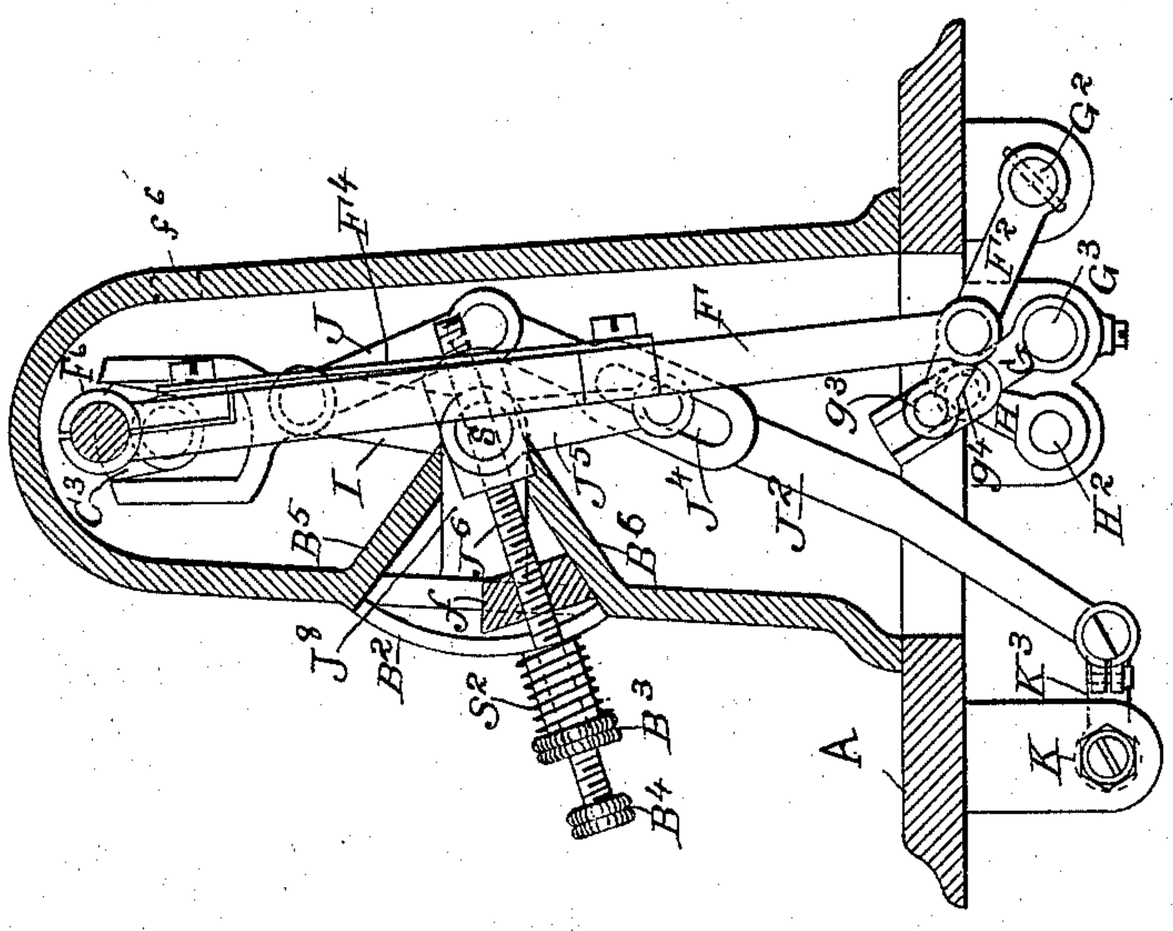


Fig. 9.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

T. A. MACAULAY.

SEWING MACHINE.

No. 567,603. Patented Sept. 15, 1896.

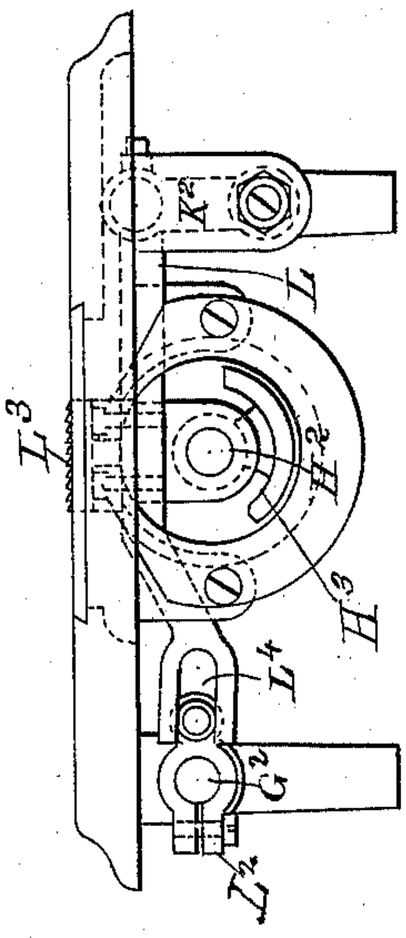

Fig. 6.

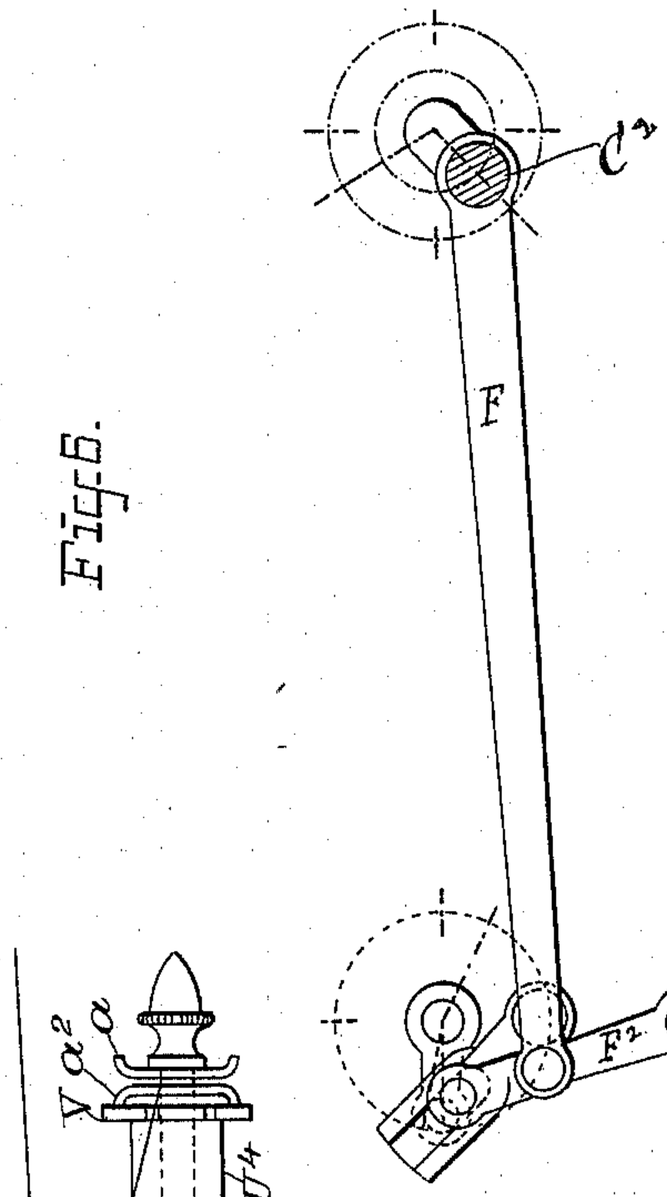

Fig. 7.

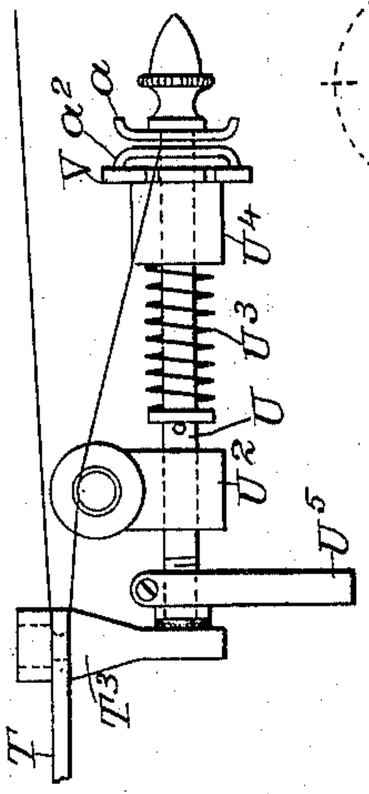

Fig. 5.

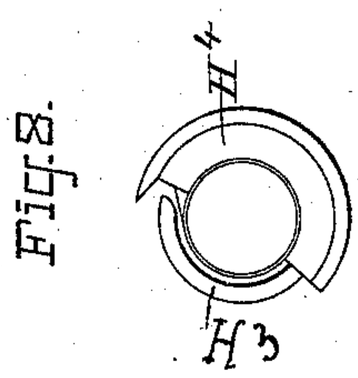

Fig. 8.

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Frank L. Ober.

INVENTOR:

Thos. A. Macaulay

UNITED STATES PATENT OFFICE.

THOMAS A. MACAULAY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SINGER MANUFACTURING COMPANY, OF NEW JERSEY.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 567,603, dated September 15, 1896.

Application filed October 5, 1892. Serial No. 447,918. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. MACAULAY, of the city, county, and State of New York, 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.

My invention relates to that class of lock-stitch sewing-machines in which the lower or locking thread is carried by an oscillating shuttle; and it comprises certain improvements in this class of sewing-machines, as indicated in the claims appended to this specification.

In the accompanying drawings, Figure 1 is a sectional side view of a sewing-machine embodying my invention. Fig. 2 is a view, partly in section, through the vertical portion of the bracket-arm. Fig. 3 is a front end view of the head of the machine with the face-plate removed. Fig. 4 is a front view of the face-plate. Fig. 5 is a top view of the thread-controlling devices shown in side view in Fig. 1. Fig. 6 is a partial front end view of the machine, showing the bed-plate and parts below the same. Fig. 7 is a detail view of a portion of the shuttle-operating mechanism. Fig. 8 is a detail view of the shuttle and shuttle-driver. Fig. 9 is a detail view illustrating an auxiliary thread-controlling device, and Fig. 10 is a section of the same on line 2 2 of Fig. 9.

A denotes the bed-plate of the machine, and B the bracket-arm thereof. Journaled in the upper portion of the bracket-arm is the driving-shaft C, provided at its rear end, as usual, with the fly-wheel D and with driving-pulleys D^2. The said driving-shaft is provided at its forward end with a crank E, connected by a pitman E^2 with the needle-bar E^3, so that said needle-bar receives its vertical reciprocating movements from said crank. The driving-shaft C is provided near its rear end with a crank C^2, connected by a pitman F to an arm F^2 of a rock-shaft G^2, journaled beneath the work-plate of the machine, said arm F^2 having a pin g^3 engaging a slot g^2 in the lever G, pivoted at G^3, said lever having a second slot g, entered by a pin g^4 on the arm H at the rear end of the shuttle-operating rock-shaft H^2, journaled centrally of the machine in suitable hangers beneath the work-plate, and having at its forward end a driver H^3 for operating the oscillating shuttle H^4. The pitman F is preferably connected to the crank C^2 by a cap F^6, provided with a U-shaped wire spring attached to the pitman and the cap. This construction permits the parts to be easily applied or assembled.

Secured to the driving-shaft C is a cam C^3, embraced by a feed-operating lever I, pivoted at its lower end at *b* to the bracket-arm B, said lever being connected by a link J to a second link J^2, the lower end of which is jointed to an arm K^3 of the feed-operating rock-shaft K, having at its forward end an arm K^2, to which the feed-bar L, carrying the feed-dog L^3, is jointed, so that said feed-bar receives its horizontal movements from the said rock-shaft. The vertical movements of the said feed-bar are imparted thereto by the rock-shaft G^2, provided at its forward end with the arm L^2, having a pin or roller-stud received in a slot L^4 in the said feed-bar. The arm L^2 is clamped to the shaft G^2, so that it is axially adjustable thereon to vary the height of the feed-dog L^3, as may be required.

The feed is regulated by means of a bell-crank lever, consisting of two rigidly-connected arms J^5 J^6, the former of which is provided with the pin entering a slot J^4 in the link J^2, said link J^2, together with the link J, constituting a toggle, the position of the parts of which relative to the laterally-vibrating feed-operating lever I determines the extent of rocking movements imparted to the feed-operating rock-shaft K, the said bell-crank feed-operating lever having a pivot stud or bolt *s*, supported by a fixed lug or bracket J^8 inside of the vertical portion of the bracket-arm B. The arm J^6 of the feed-regulating bell-crank lever is threaded and screwed into the hub of the arm J^5, and said arm J^6 is provided with a block *f*, having inclined end faces for engagement with the faces of inclines B^5 B^6, formed on the bracket-arm B, the latter being provided with a slotted segmental por-

tion B^2, outward through which the said arm J^6 extends, and said arm is provided at its outer end with a milled head B^4, by which it may be turned, and with a nut B^3, between which and the segmental portion B^2 of the bracket-arm is interposed a friction-spring S^2, which serves to hold said arm in any position in which it may be adjusted. By turning the screw-arm J^6 by means of its milled head B^4 the block *f* will be caused to travel in or out relative to the inclined portions B^5 B^6 of the bracket-arm B, thereby varying the position of the feed-regulating lever, consisting of the arms J^5 J^6, and thus changing the position of the toggle J J^2 relative to the feed-operating lever I so as to vary the vertical movements of the link J^2 and thus regulate the movement of the feed-operating rock-shaft K.

In finishing off the ends of a seam it is frequently desirable to reverse the feed, so as to sew a few stitches backward, and this can be done by simply raising the arm J of the feed-regulating lever, so that the block *f*, which had formerly been in contact with the incline B^6 of the arm B, will be brought in contact with the incline B^5 of said arm, thus throwing the toggle over its center and causing the feeding movements of the feed-bar to be reversed, the reverse feeding movements being the same in length as the forward feeding movements in any position of adjustment of the block *f* relative to the inclined stops B^5 B^6. The feed is shortened by turning the screw-arm J^6 so as to move the block *f* inward and thereby raise said arm toward a horizontal position, in which position the feed is entirely suspended, the length of the feed being greatest when the said arm J^6 is raised or lowered to its fullest extent, and being lesser as it is brought nearer to a horizontal position, as will be readily understood by those familiar with feeding mechanisms actuated by toggles operated on the principle of the feed mechanism herein shown.

The driving-shaft C is provided with a cam M, which operates the take-up lever T, provided with an upward extension T^2, having a thread-eye 2, serving as a pull-off, and to said extension or arm T^2 is jointed by a pin or bolt T^3 a push-rod U, sliding in bearings afforded by posts U^2 U^4, formed on the bracket-arm B, the said push-rod being held forward by a spring U^3, interposed between the posts U^4 and a collar or pin on said rod, so as to hold the lower or shorter arm of the bell-crank lever T in contact with the cam M, the said spring U^3 serving also to press the clamping tension-disks *a* and a^2, mounted on said rod rearward of said post U^4, into yielding contact with each other at proper times. Between the post U^4 and the tension-disks *a* and a^2 is a washer V, having thread-guide slots, and mounted on the post U^2 is a check-weight V^2, beneath which the thread runs in passing forward to the pull-off and take-up. V^3 is a thread-guide pin.

Attached to the arm B is the bracket 3, which supports the spool-pins 4 5. The spool-pin 4 has a tapered forward portion 4^a, fitting in a tapered hole formed in the rear split end of the spool-pin 5, so that said pins can be readily secured in the socket at the upper end of the bracket 3 by inserting one into the other, and thus forcing the split sleeve at the rear end of the spool-pin 5 outward against the inner wall of said socket, so that said pins are thus held in place by outward pressure. The spool-pin 5 is provided at its forward end with a disk *d*, over which the thread running from the spool held by said pin passes.

Coöperating with the pull-off and the intermittent tension I preferably employ an auxiliary take-up or thread-controller consisting of a lever 8, pivoted to the face-plate and provided with an inclined upper portion against which a pin 7, carried by the needle-bar, engages at proper times, said lever being held in position to be engaged by said pin by a spring 12. The face-plate is provided with a thread-guide 9, and below said thread-guide is a slot 10, in which the lower or operating end of the auxiliary take-up or thread-controller works, the lower arm of the said take-up or controller being provided with an incline which is engaged by a pin 11, carried by the presser-bar, and which pin serves to limit the movement of the said lever under the action of the spring 12. The height of the said pin 11 is governed by the thickness of the work beneath the presser-foot, so that when the work is thick the said auxiliary take-up or controller 8 will be held in such position that the incline at the upper end thereof will be engaged later in the upward movement of the needle-bar than when the work is thin, and thus more slack will be drawn up by said take-up or controller when the work is thin than when it is thick.

Instead of using the auxiliary take-up or thread-controlling mechanism just described, and which is more clearly shown in Fig. 4, I might use the modified form of thread-controlling mechanism shown in Figs. 9 and 10, in which the presser-bar is shown as being provided with an arm or cross-bar *h*, carrying the thread-clamping spring *e*, having an arm *i* to be engaged by inclines on the needle-bar E^3 to force the said thread-clamping spring *e*, between which and the cross-bar *h* the thread runs, away from said bar at proper times. As the vertical position of the arm *h*, attached to the presser-bar, will be governed by the thickness of the work beneath the presser-foot, it is obvious that the thread pressed upon by the spring *e* will be released earlier or later in the movement of the needle-bar according to the thickness of the work beneath the presser-foot, so that the thread may always be left free or be slackened just as the needle is entering the work.

In the operation of my machine the thread will run from one of the thread-spools to the thread-guide V^3, thence between the thread-

clamping disks a and a^2, and through a slot in the thread-guide washer V, and then beneath the check-weight V^2, to the eye 2 in the pull-off arm T^2, and thence forward over the thread-guide at the top of the face-plate shown in Fig. 4 downward to the thread-guide 9, upward to the take-up lever T, and thence downward through the eye at the lower end of the auxiliary take-up or thread-controller 8 to the needle. When the take-up lever is performing the last part of its upward movement and the stitch has been tightened, the rod U will be forced backward by the upward extension T^2 of the take-up lever, releasing the clamping tension-disks a and a^2 from contact with each other and thus permitting the take-up to draw thread from the thread-spool, while in the downward movement of the take-up lever the thread-eye 2 at the upper end of the extension T^2 of the take-up lever may also act as a pull-off to draw thread from the thread-spool and through the tension-disks, if enough slack thread has not already been supplied.

The shuttle-operating mechanism herein described comprises two vibrating or rocking parts—to wit, the arm F^2 of the rock-shaft G^3 and the slotted lever G—which are interposed between the pitman F, operated from the crank C^2, and the rock-shaft H^2, by which the shuttle is oscillated. From this construction it is apparent that I am enabled to impart an oscillating movement in a large arc to the rocking shuttle-operating shaft from a rotating crank on the driving-shaft which is arranged centrally of the machine, and the shuttle can therefore be operated to cause it to pass quickly through the loops of needle-thread, and there will still remain ample time in the rotation of the driving-shaft for the operation of the feed and take-up.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a sewing-machine, the combination with the driving-shaft C arranged centrally of the machine and provided with the crank C^2 near its rear end and a needle-bar operatively connected to the forward end of said driving-shaft, of the rock-shaft G^2 provided with the arm F^2, the pitman F connecting said crank with said arm, the lever G provided with slots in its opposite sides, a pin g^3 carried by said arm F^2 and entering one of said slots and a shuttle-driving rock-shaft arranged centrally of the machine and having an arm H provided with a pin, as g^4, also entering the other slot in the said lever G.

2. In a sewing-machine, the combination with the driving-shaft C provided near its rear end with a crank C^2, of the needle-bar operatively connected with the forward end of the said shaft, the feed-lifting rock-shaft G^2 having at its rear end the arm F^2 provided with the pin g^3, and at its forward end the arm L^2 provided with a pin or roller-stud, the pitman F connecting the said crank C^2 with the said arm F^2, the lever G provided with the slots g and g^2, the latter entered by the said pin g^3, the shuttle-driving rock-shaft H^2 provided with the arm h having a pin g^3 entering the said slot g, the feed-bar L provided with a slot entered by the pin or roller-stud carried by the said arm L^2, and means for imparting backward and forward movements to the said feed-bar.

3. In a sewing-machine, the combination with the driving-shaft C provided with the cam C^3, of the feed-operating lever I having a yoke embracing said cam, the feed-operating rock-shaft K provided at its rear end with an arm K^3, the links J and J^2 connecting said feed-operating lever with said arm K^3, said link J^2 being provided with a slot, as J^4, and the feed-regulating bell-crank lever consisting of the arms J^5 and J^6, the former provided with a pin or stud entering the said slot J^4 in the said link J^2, the feed-bar L connected to the forward end of the said rock-shaft K, to be moved back and forth thereby, and means for raising and lowering the said feed-bar.

4. In a sewing-machine, the combination with the driving-shaft C provided with the cam C^3, of the feed-operating lever I having a yoke embracing said cam, the feed-operating rock-shaft K provided at its rear end with an arm K^3, the links J and J^2 connecting said feed-operating lever with said arm K^3, said link J^2 being provided with a slot, as J^4, and the feed-regulating bell-crank lever consisting of the arms J^5 and J^6, the former provided with a pin or stud entering the said slot J^4 in the said link J^2, the feed-bar L connected to the forward end of the said rock-shaft K, to be moved back and forth thereby, the feed-lifting rock-shaft G^2 provided with the arms F^2 and L^2, the latter having a pin or roller-stud engaging a slot in the said feed-bar, to raise and lower the same, and means for operating the said feed-lifting rock-shaft from the said driving-shaft.

5. In a sewing-machine, the combination with the driving-shaft thereof provided with a cam, as C^3, of the feed-operating lever I having a yoke embracing said cam, the feed-operating rock-shaft K provided with the arms K^3 and K^2, the links J and J^2 connecting said feed-operating lever with the said arm K^3, the feed-bar L connected with the said arm K^2 to be moved back and forth thereby, the feed-regulating bell-crank lever consisting of the arms J^5 and J^6, the former of which is connected with the said link J^2 and the latter of which is threaded, the bracket-arm B provided with the inclines B^5 and B^6 and with the curved portion B^2, the block f having inclined faces to engage with the said inclines, and threaded to embrace the threaded portion of the said arm J^6, a nut, as B^3, on the said arm J^6, a friction-spring interposed between the said nut and the said curved portion B^2, the feed-lifting rock-shaft G^2 operatively connected to the said feed-bar to raise

and lower the same, and means for operating said feed-lifting rock-shaft.

6. In a sewing-machine, the combination with the driving-shaft thereof, provided with a cam, as M, and a stitch-forming mechanism operated from said driving-shaft, of the take-up lever T operated by said cam and provided with the extension T^2, the push-rod U connected with the said extension T^2 to be operated thereby, suitable bearings in which said push-rod can slide, tension-disks mounted on said push-rod, and a spring, on said push-rod, for holding said disks in yielding contact with each other.

7. In a sewing-machine, the combination with the driving-shaft thereof provided with a cam, as M, and a stitch-forming mechanism operated from said driving-shaft, of the take-up lever T operated by said cam and provided with the extension T^2 having the pull-off thread-eye 2, the push-rod U connected with the said extension T^2 to be operated thereby, suitable bearings in which said push-rod can slide, tension-disks mounted on said push-rod, and a spring, on said push-rod, for holding said disks in yielding contact with each other.

8. In a sewing-machine, the combination with a standard as 3 having a socket, of a spool-pin 5 fitting into said socket and detachable therefrom, said pin being bored and split at one end, and an auxiliary spool-pin 4 one end having a tapered portion, as 4^a, entering the end of said detachable pin to expand it and fix it in said socket, substantially as set forth.

THOS. A. MACAULAY.

Witnesses:
M. E. GORDINNIER,
A. L. AUSTIN.