3 Sheets—Sheet 1.

J. E. A. GIBBS.

Sewing-Machines.

No. 196,116. **Patented Oct. 16, 1877.**

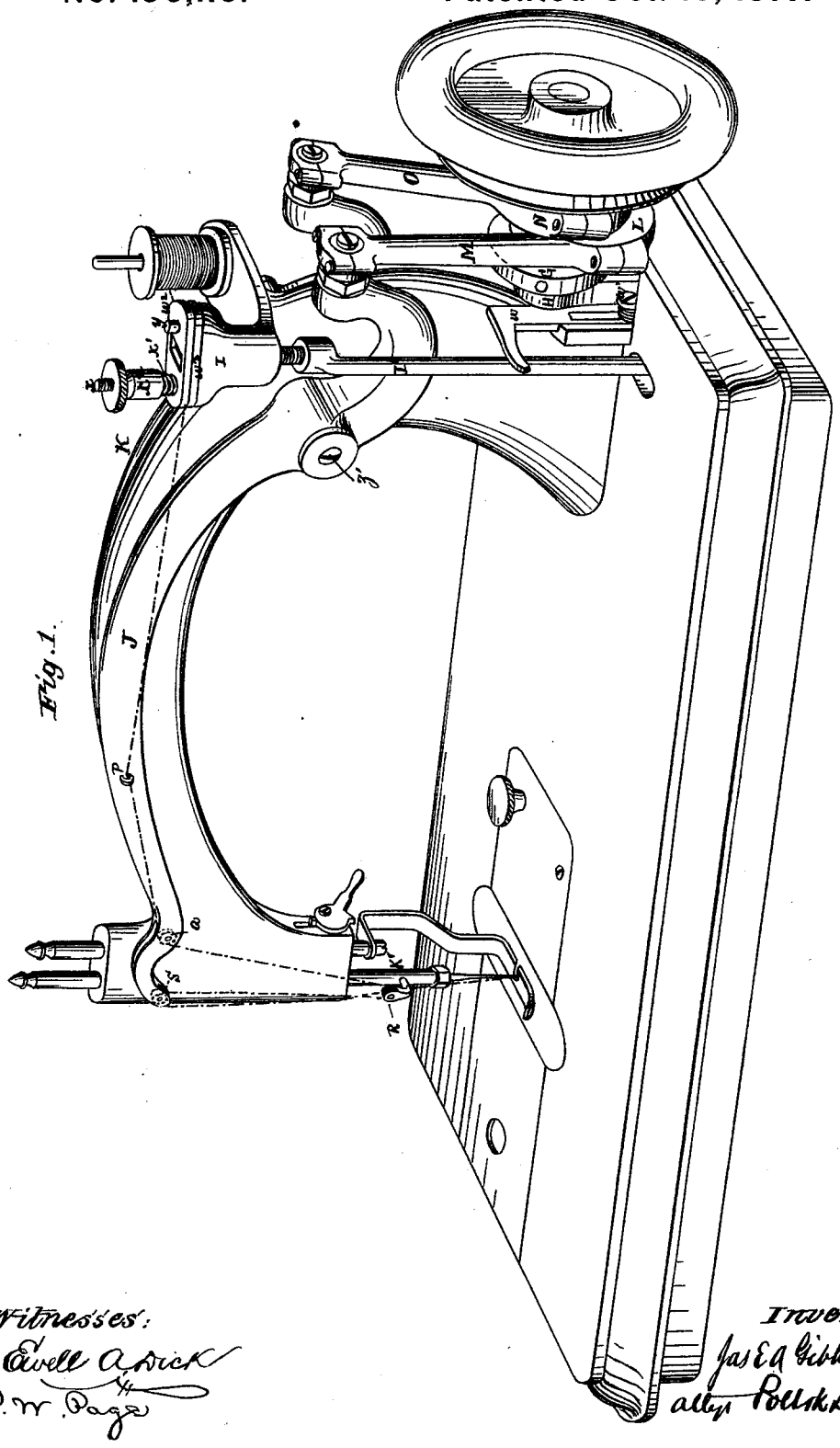

Fig. 1.

Witnesses:
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3 Sheets—Sheet 2.

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Sewing-Machines.

No. 196,116. **Patented Oct. 16, 1877.**

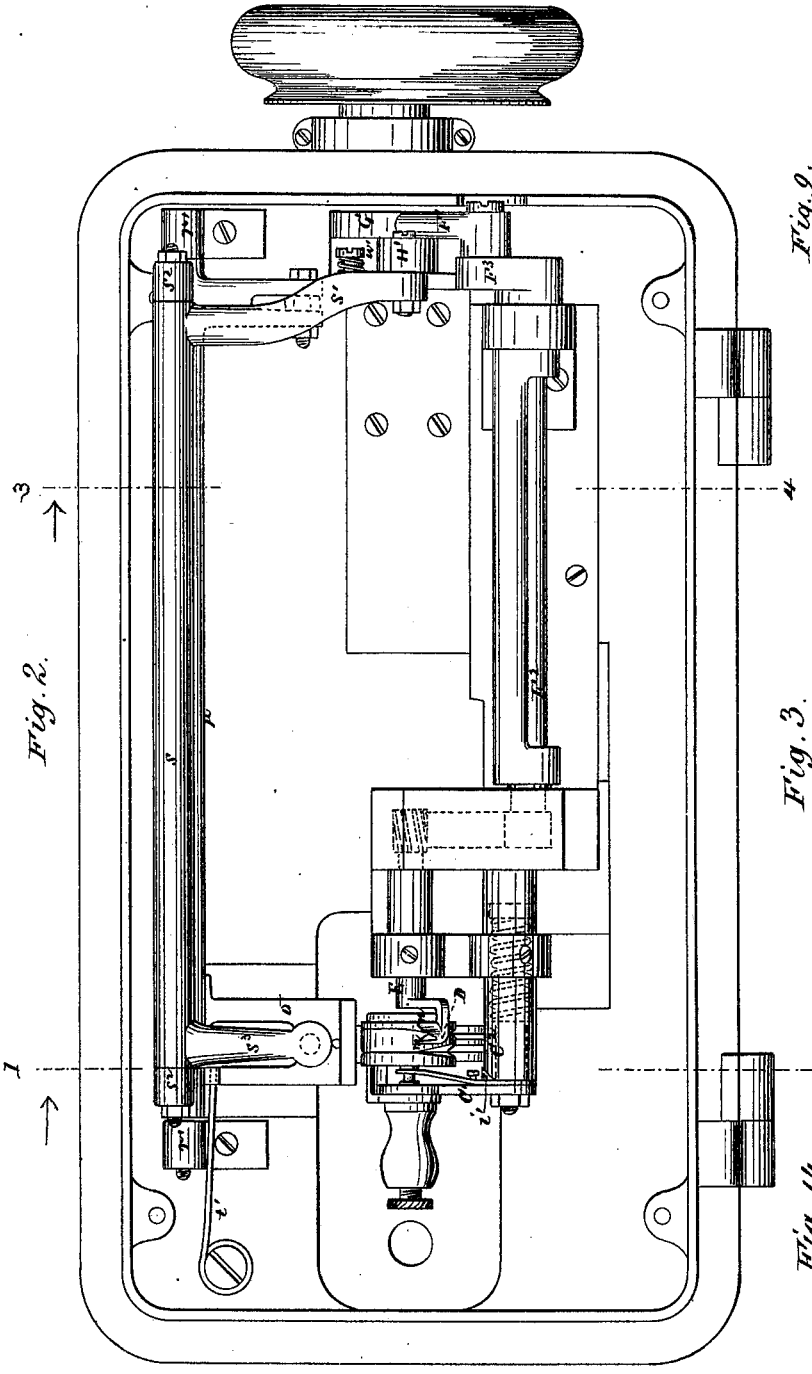

Fig. 2.

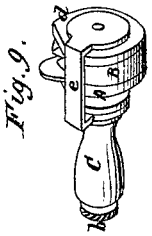

Fig. 9.

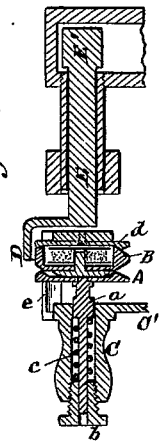

Fig. 3.

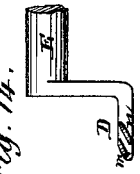

Fig. 14.

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3 Sheets—Sheet 3.

J. E. A. GIBBS.

Sewing-Machines.

No. 196,116. Patented Oct. 16, 1877.

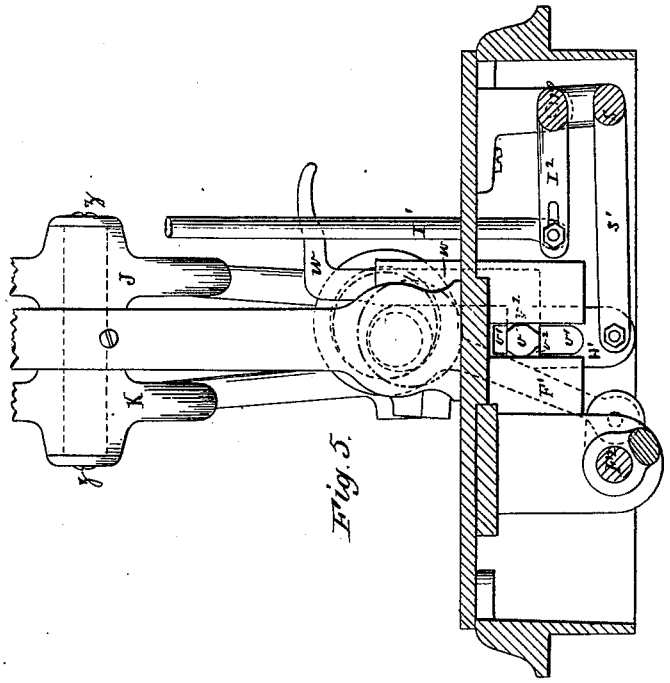

Fig. 5.

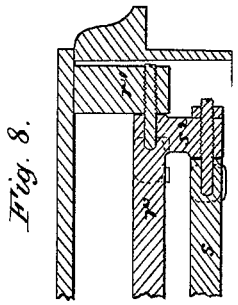

Fig. 8.

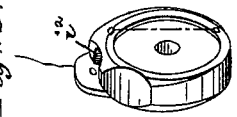

Fig. 13.

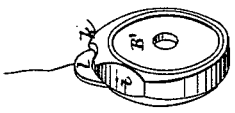

Fig. 12.

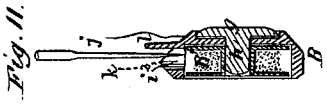

Fig. 11.

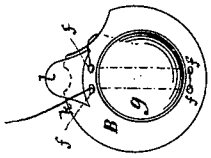

Fig. 10.

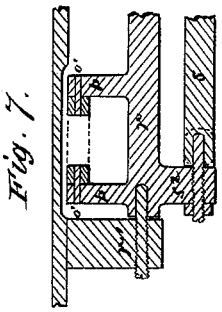

Fig. 7.

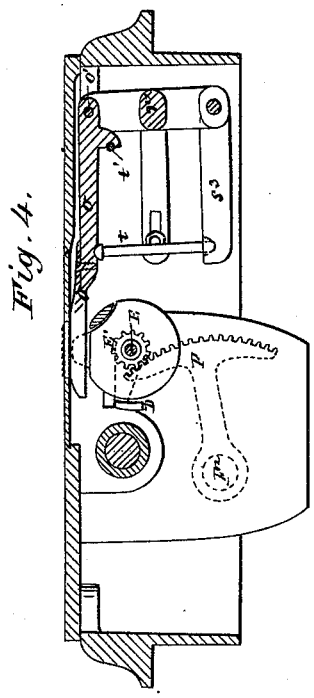

Fig. 4.

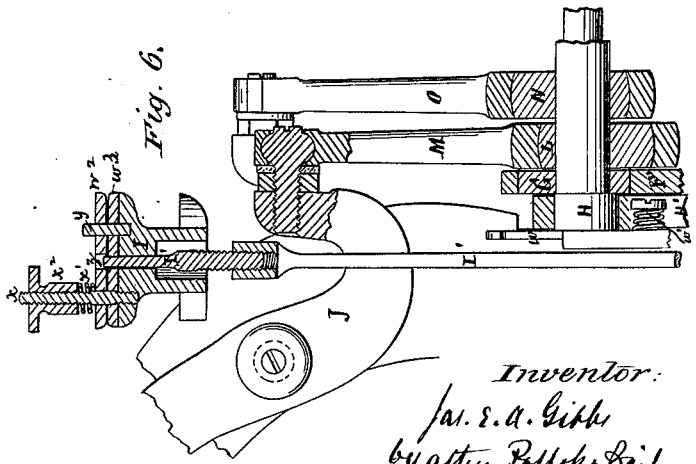

Fig. 6.

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UNITED STATES PATENT OFFICE.

JAMES E. A. GIBBS, OF STEEL'S TAVERN, VIRGINIA.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **196,116**, dated October 16, 1877; application filed July 1, 1876.

To all whom it may concern:

Be it known that I, JAMES E. A. GIBBS, of Steel's Tavern, Virginia, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification:

The improvements which constitute the subject-matter of this specification may be classed under the following heads, viz:

I. The under or bobbin thread tension and the holder and carrier for the bobbin-case.

II. The construction, arrangement, and combination of the bobbin-case and the hook.

III. The feed mechanism.

IV. The tension for the upper or needle thread, and the combination therewith of a pull-off adapted to deliver a length of thread that varies with the length of stitch.

These improvements I shall describe in the order named.

I. *The under or bobbin thread tension and the holder and carrier for the bobbin-case.*—It is my object to obtain a tension which can be adjusted and regulated while the machine is in motion. To this end I pass the bobbin-thread between the bobbin-case and an external yielding independent presser, which bears upon or against the bobbin-case. This presser may act either directly upon the thread itself or upon an intermediate disk or disks, and it is adapted to be adjusted at any time, so that the tension may be regulated at will without necessitating the stoppage of the machine.

This portion of my invention is illustrated in Figures 2, 3, 9, 10, 11, 12 of the accompanying drawings. Fig. 2 is a plan of the under side of a sewing-machine embodying my improvements. Fig. 3 is a longitudinal central section of the tension-producing devices and the hook. Fig. 9 is a perspective view of the preferred form of bobbin-case that I use. Fig. 11 is a transverse vertical central section of the same. Fig. 12 is a perspective view of the same on the side opposite that shown in Fig. 10.

The particular device by which the tension is produced is a yielding presser, A, which, in this instance, acts also as the bobbin-case holder. The part A consists of a disk with a cup or recess on its outer face to receive the correspondingly-shaped face of the bobbin-case B, which disk is carried by a shouldered stem or rod, *a*, that extends into and is supported by a tubular bearing, C, in the outer internally screw-threaded end of which is a nut, *b*, between which and the shoulder on stem *a* is confined a spiral spring, *c*. The presser and holder is thus enabled to yield, the degree of pressure that it exerts on the bobbin-case being determined by compressing the spring *c* more or less, by means of nut *b*. In the nut is an axial hole of sufficient size to permit the play in and through it of the outer end of stem *a*. This presser is designed to bear with a yielding pressure against the bobbin-case, which, on the other side, is supported by any suitable means—in this instance by a recessed disk, *d*, which is fixed to an arm, *e*, projecting from the bearing C, as indicated in Figs. 3 and 9.

In order to obtain the desired tension on the bobbin-thread, I may lead the thread from the bobbin once, twice, or more times across that face of the bobbin-case which is next to the presser; or the thread may be led entirely around the bobbin-case diametrically, and through proper thread-eyes in the periphery, so as to pass across and between both faces of the bobbin-case and disks of the bobbin-holder, in which case the intermediate disk hereinafter referred to will not be needed.

The preferred way in which I carry out my invention is indicated in Figs. 10, 11, and 12. The bobbin-case B is provided with a receptacle for the bobbin B′, as shown. On that face of the case which comes next to the presser are formed four thread-eyes, *f*, two at top and two at bottom. The thread passes first out through the top of the bobbin-case, thence through one of the upper eyes, *f*, thence across the face of the case, through the two lower eyes, and again across the face, thence through the other upper eye. The thread is thus extended twice across the face of the case. If the presser be formed to fit against this face of the bobbin-case, it will be seen that it will bear upon the thread extended across the face, thus producing tension, and the degree of pressure it exerts upon that thread will determine the degree of tension. This pressure being easily regulated by the nut, and both bobbin-case and presser having no rotary

movement, (although the bobbin contained by the case is, of course, free to revolve,) it follows that I have here a bobbin-thread tension which answers all required conditions. In this case I prefer that the presser shall not be in direct contact with the bobbin-thread, and therefore interpose between the bobbin-case and presser a disk, *g*, which fits in a recess in the bobbin-case and over the thread stretched across its face, and is provided with a central stem, *h*, which not only assures the disk in position, but also serves as the axis on which the bobbin B′ may move.

The bobbin-case is readily inserted in and withdrawn from its holder. When inserted in place a depression, *i*, in its periphery fits against the arm *e*, thereby assuring the bobbin-case in position, and preventing it from turning.

The recessed disk *d* and yielding presser A constitute the bobbin-case holder and carrier, and are both attached to the bearing C.

In order to give the bobbin-case holder and carrier the capacity of moving to and from the hook, and to any position desired, for adjusting the bobbin or bobbin-thread, or for other purposes, I fix the bearing C to an arm, C^1, pivoted to the frame of the machine, in substantially the same manner and by the same means as is the self adjusting and holding bobbin-holder in my Letters Patent No. 171,557, of December 28, 1875.

The shoulder of the cam i^1 on the arm assures the bobbin holder and carrier in position for sewing, when the arm is turned on its pivot so as to move the parts away from the hook, and the cam i^1 rides over the corresponding incline on the bearing C^2 that receives the axis of the arm and the spring, compresses the spring, and gives the bobbin holder and carrier a movement bodily away from the hook. In other words, the devices here act precisely as in my patent aforesaid, save that now the parts are constructed to carry with them the bobbin and bobbin-case. This is advantageous, among other reasons, because by swinging the bobbin holder and carrier far enough around I can, by providing, at a proper point in the cloth-plate, a slide or removable portion, and removing this part, bring the holder and carrier above the cloth-plate in such position that the bobbin, bobbin-case, or bobbin-thread may be adjusted readily and easily.

II. *The construction, arrangement, and combination of the bobbin-case and the hook.*—It is my object to use a simple hook, without disk or periphery, with a view of obtaining simplicity of construction and lightness of running. To use such a hook, however, so as to carry the loop over the bobbin-case, it is necessary that the outer edge of the bobbin-case should be in a line with the path of the hook, and consequently on the same side of the needle that the hook is. On the other hand, to avoid the use of disk or periphery on the hook, it is necessary that the bobbin-thread should escape from the bobbin-case out of the path of the hook, and on the opposite side of the needle from that on which the hook operates. Hence it is necessary that a part of the bobbin-case should be on one side of the needle in order to be in the path of the hook, and that another portion of the bobbin-case should be on the other side of the needle to be out of the path of the hook. I therefore provide a bobbin-case that has a needle-passage formed in its periphery intermediate between its sides, and I combine with the bobbin-case a needle which moves in a path intermediate between the faces or sides of the case. I also make use of an oscillating hook which describes somewhat more than a complete revolution alternately in opposite directions. The oscillating hook is used in preference to one rotating continuously in one direction, because I can give it a regular movement from a plain eccentric, which is impracticable with the rotary hook, and because it will shed the loop better, backing out of it with less liability of becoming entangled when there are loose loops, &c.

Figs. 2, 3, 4, 10, 11, 12, and 14 represent these portions of my improvements. Fig. 4 is a section on line 1 2, Fig. 2. Fig. 14 is a view of the hook detached, looking toward the point of the same.

The bobbin-case B has already been referred to. It will be seen by reference to Figs. 11 and 12 that it has a needle passage or hole, i^2, in its periphery intermediate between its sides, and that the needle *j* is arranged to play up and down in a similar path, so as to enter the passage. The outer edge of the bobbin-case is indicated at *k*. The hook passes to the left of the needle in Fig. 11. The bobbin-thread leaves the bobbin-case on the right of the needle beyond the thread-guard *l*. The needle passes down closely along the side of this guard, which is arranged as shown to serve the double purpose of protecting the under thread from interference with the needle and of throwing out the loop from the needle.

The hook D is a simple hook, without disk, carried by a radial arm on a shaft, E, supported in proper bearing, as shown in Figs. 2 and 4. The shaft E has on its inner end a pinion, E′, which meshes with a toothed sector, F, on a rock-shaft, F^2, extending the length of the machine, and having a rocking movement imparted to it by a crank-arm, F^3, on its rear end that is connected with the pitman F^1 of an eccentric, G, Figs. 1 and 5. The sector and pinion are so proportioned that each movement of the former will cause the latter to make somewhat more than one revolution. The hook, therefore, describes somewhat more than one revolution each time the needle rises or descends, its revolution being alternately in opposite directions. It takes the loop from the needle, carries it far enough around the bobbin-case to insure that it will be drawn therefrom and its slack taken up by the take-up, and then, reversing its movement, backs out of the loop, and returns to position to take a fresh loop.

To enable the hook to act in this way, it must be constructed to turn or twist the loop before the latter passes over the bobbin-case. The drawings show such a construction. (See Figs. 2 and 14.) The hook consists of a loop-taking point, *m*, and a guard, *n*, with an intermediate inclined or slanting passage between the two. The loop-taking point slants on the inside from its outer end, back or away from the needle, and the guard slants on the outside from its outer end toward the needle. When the loop is taken by the loop-taking point, it will gradually be turned as the hook revolves, the inclined edges of the guard and point giving the loop a twist as it passes over the bobbin-case, thus enabling the hook to back out of or shed the loop at the proper time.

III. *The feed mechanism.*—The principle feature of this portion of my invention relates to novel means for regulating the throw of the feed, which in this instance is the ordinary four-motion feed.

This part of my invention is illustrated more particularly in Figs. 2, 4, 5, 6, 7, 8. Figs. 2 and 4 have already been referred to. Fig. 5 is a section on line 3 4, Fig. 2. Fig. 6 is a longitudinal vertical section of the rear part of the machine, the plane of section passing through the axis of revolution of the driving stud or shaft, on which are mounted the several eccentrics for imparting movement to the various parts of the machine. Fig. 7 is a vertical longitudinal section through the axis of oscillation of the front part of the feed-frame. Fig. 8 is a like section of the rear part of said frame.

The feed-bar, carrying a suitable serrated feed-surface, is shown at *o*. It is pivoted at *o'* between arms *p*, projecting from and above the longitudinal rocking-bar *r*, hung in fixed bearings *r'*, and obtaining a rocking movement from an eccentric, H, by a pitman-rod, H', jointed at its lower end to a radial arm, s^1, projecting from a rock-shaft, *s*, supported in bearings formed in arms s^2, projecting from and below the bar *r*. At the forward end of the shaft *s* is another radial arm, s^3, which projects under the feed-bar, and upholds the latter through the intermediary of the upright rod *t*, having a ball and socket in connection with both bar and arm. A spring, *t'*, is provided, which tends to push the feed-bar down and back.

Under the arrangement described, the feed, owing to the action of the rocking feed-frame and the spring, has imparted to it the usual up-and-down and to-and-fro movement. The extent of the to-and-fro movement which gives the length of feed is determined by the extent the rocking frame is oscillated by the pitman H'. To regulate the throw of the pitman I provide for it, intermediate between its eccentric and its point of connection with the arms s^1, a pivot, *v*, mounted on a slide, v^2, adjustable in a slot, v^1, formed in and extending longitudinally of the pitman, which pivot constitutes the axis of oscillation of the pitman. The nearer this pivot is brought to the eccentric, the greater will be the throw of the lower end of the pitman, and consequently the more movement will the rocking frame have. Therefore, by adjusting this pivot up or down the length of feed can be regulated at pleasure. The movement of the pivot may be effected in any convenient way. In this instance it is provided for by connecting the pivot-slide v^2 to a handle, *w*, movable up and down in guides in the frame, with which handle may be combined, if desired, a spring-pressure pad, w^1, for the purpose of holding it in any position to which it may be adjusted.

IV. *The needle-thread tension and pull-off.*—Under this head of my invention I provide a compound tension formed in two parts, of which the one that first receives the thread exerts less tension than the other, and I combine therewith a pull-off, which acts on the thread intermediate between the two parts.

The effect of this arrangement is that the pull-off, naturally drawing the thread through that part of the tension offering the least resistance, takes the thread from the spool. The resistance to the delivery to the needle of the thread thus taken by the pull-off from the one part of the tension is, of course, confined to the other part of the tension. When this supply of thread is taken, then the thread, becoming taut, is acted on by both parts of the tension, which now offers the needed resistance to enable the take-up to operate properly to complete the stitch.

I prefer to provide a pull-off which is adjustable to regulate the amount of thread delivered for the stitch; and I also prefer to combine this pull-off with the feed mechanism in such manner that the adjustment of the feed shall cause a corresponding adjustment of the pull-off, for the purpose of varying the delivery of thread to correspond with variations in the length of stitch.

This portion of my improvements is illustrated in Figs. 1, 5, and 6. Fig. 1 is a perspective view of a machine embodying my improvements. Figs. 5 and 6 have already been referred to.

The compound tension is mounted on a bracket or shelf, I, on the rear part of the goose-neck of the machine.

I would remark at the outset that each part of the tension may be distinct and independent of the other, and may be of any suitable construction. For the sake of simplicity and convenience and economy of construction, I prefer, however, to make them in one piece, and it is this form of tension that I have shown in the drawing.

The tension consists of a single movable elongated plate, w^2, that is placed on a like stationary plate, w^3, which rests on the shelf. The plates are held in place by pins *x y*, which project from the shelf; and surrounding one pin is a spiral spring, x^1, which is pressed down on the upper plate by a nut, x^2, that

screws onto the screw-threaded upper end of guide-pin x. In the plate, midway between the two pins, are formed coinciding apertures z, which register with a like aperture extending vertically through the shelf I. Up through the passage thus formed works the pull-off rod I^1, which is jointed at its lower end, by a pin-and-slot connection, to a horizontal radial arm, I^2, extending from the rocking bar r of the feed-frame. The rocking movement of the bar gives an up-and-down movement to the pull-off rod. The thread from the spool passes between the plates w^2 w^3, entering the tension at the end nearest pin y, leaving the tension at the opposite end, and in its passage through the tension extending across the passage up through which the pull-off rod works.

It is manifest that the pressure of the plates is least at the point farthest removed from the spring x^1, and consequently that the portion of the tension to the right of the pull-off, Fig. 1, will not take so firm a hold on the thread as will the portion to the left of the pull-off. Consequently, when the pull-off rises it will, when it meets the thread stretched across the passage, push up the thread, and the yield will come from the side of the spool which will deliver up as much thread as required by the rise of the pull-off. When the pull-off descends there will thus be slack thread between the two parts of the tension, which slack, being the amount required for the stitch, will be drawn through the tension and delivered to the needle. After, however, the slack has been exhausted and the thread stretched taut in the tension, the weaker portion of the tension supplements the action of the stronger portion, and the united pressure of both presents sufficient resistance to the passage of the thread to enable the take-up to perform its functions properly.

The pull-off, as will be seen by examining the drawing, rises and acts on the thread while the feed-surface is moving down and back preparatory to taking a fresh hold on the goods.

It is manifest that the extent to which the pull-off rises above the normal level of the stretched thread will determine the amount of thread delivered for the stitch. It is therefore desirable to make the pull-off adjustable, so that any desired length of thread may be delivered. The adjustment manifestly may be effected in various ways. I prefer, however, to connect it with the feed-frame, as above specified, and to make the throw of that feed-frame adjustable, in the manner already stated, so that the act of adjusting the feed will cause a like adjustment of the pull-off, thus causing the amount of thread pulled off always to correspond to the length of stitch.

I claim—

1. The method of obtaining tension on the under or bobbin thread, which consists in passing the same between the bobbin-containing case and an external independent yielding presser which bears upon or against the bobbin-case, whether the presser acts directly upon the thread itself or upon an intermediate disk or disks, substantially as set forth.

2. The combination, substantially as set forth, of the bobbin-containing case and the tension-producing presser, adjustable while the machine is in operation, for the purpose of regulating the tension.

3. The freely-revolving bobbin and the bobbin-containing case, in combination with an external independent bobbin case-holder, which exerts a yielding and adjustable pressure upon the bobbin-case, both to produce tension on the bobbin-thread and to permit the free passage of the needle-thread over or around the bobbin-case, substantially as set forth.

4. The recessed bobbin-case, and tension washer or disk, fitting said recess, in combination with the external yielding presser, substantially as and for the purposes set forth.

5. The combination, with the tension-producing presser, of the bobbin-containing case, formed with threading-eyes, or their equivalent, for holding in position across the face or side of the case the thread to be subjected to the action of said tension-producing presser.

6. The combination, substantially as set forth, of these elements, viz: the bobbin-case holder, the bobbin-containing case, the thread-guard on said case, the needle and the hook arranged to work on the one side of said guard, and the guide or eye arranged for the passage of the under thread to the goods on the other side of said guard, the combination being and acting substantially as described.

7. A self-holding and self-adjusting bobbin-case holder and carrier pivoted to the body of the machine, and adapted to carry the bobbin and bobbin-case toward and away from the hook and needle, and to any position desired, in order to adjust the bobbin or bobbin-thread, substantially as set forth.

8. The two-part tension and intermediate pull-off, in combination with the feed-operating mechanism connected with the pull-off, so that the adjustment of the feed shall cause a corresponding adjustment of the pull-off for the purpose of varying the delivery of thread to correspond with variations in the length of stitch.

In testimony whereof I have hereunto signed my name this 26th day of June, A. D. 1876.

JAS. E. A. GIBBS.

Witnesses:
JNO. A. SPENCER,
S. T. MCCLURE.