(Model.)

3 Sheets—Sheet 1.

T. L. MELONE.

SEWING MACHINE.

No. 383,748. Patented May 29, 1888.

Fig 1.

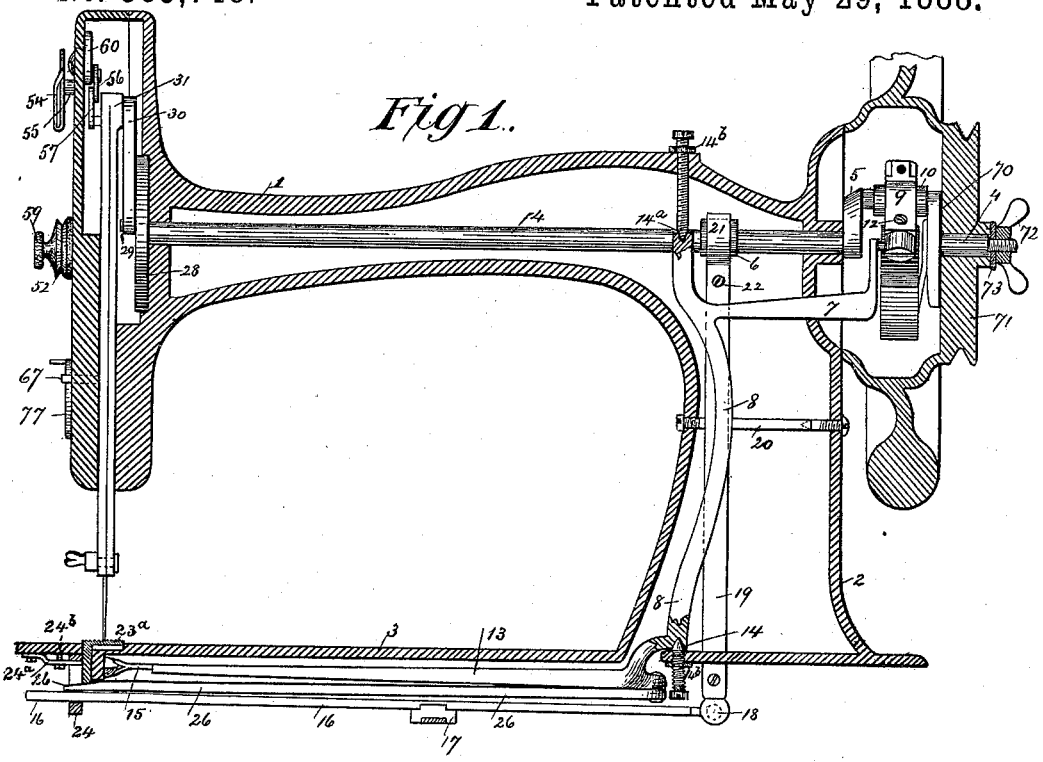


Fig 2

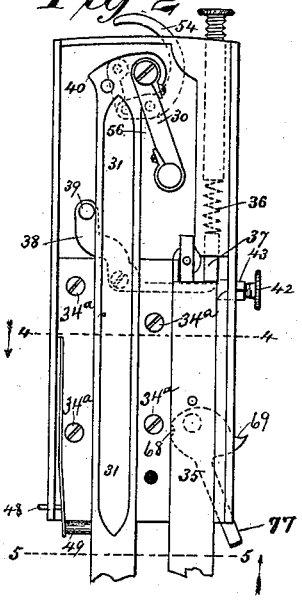


Fig 4.

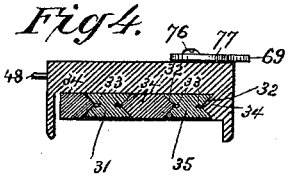


Fig 5.

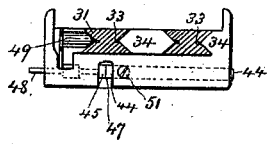


Fig 3.

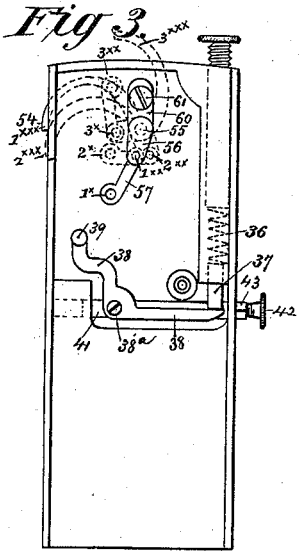
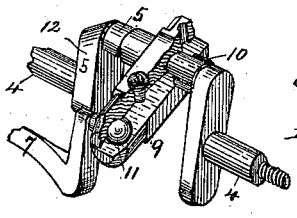


Fig 6.



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(Model.) 3 Sheets—Sheet 2.

T. L. MELONE.

SEWING MACHINE.

No. 383,748. Patented May 29, 1888.

Fig 10.

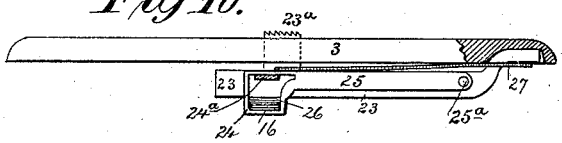


Fig 7.

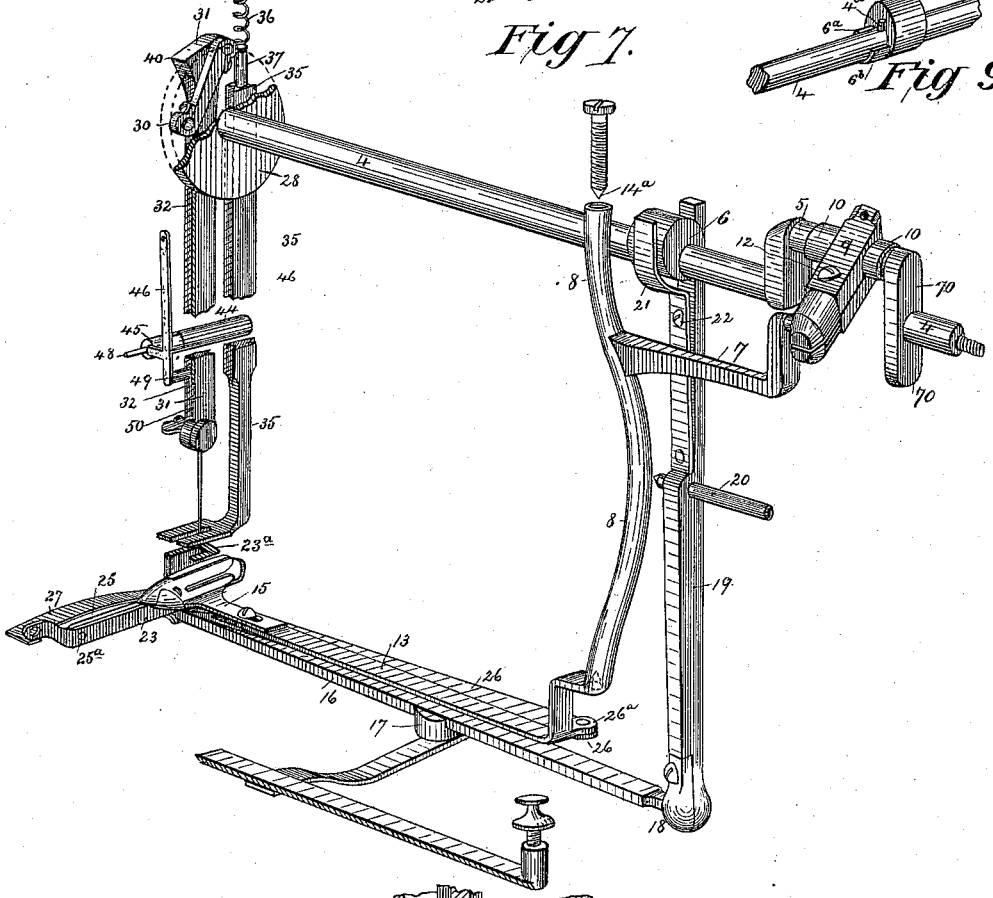
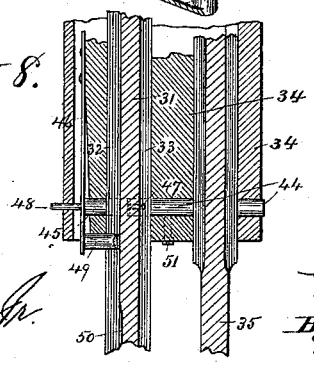


Fig 9.

Fig 8.



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3 Sheets—Sheet 3.

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SEWING MACHINE.

No. 383,748. Patented May 29, 1888.

Fig 14.

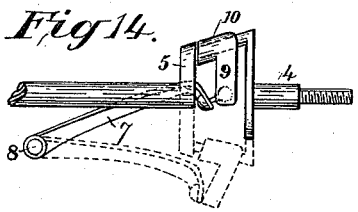


Fig 11.

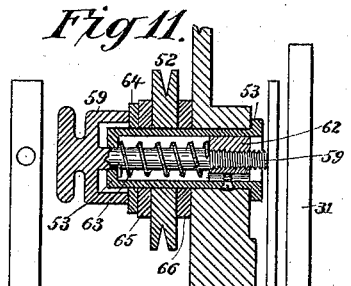


Fig 11a.

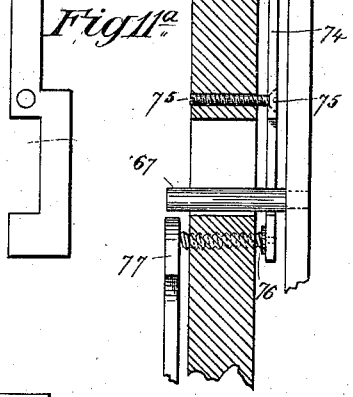


Fig 12.

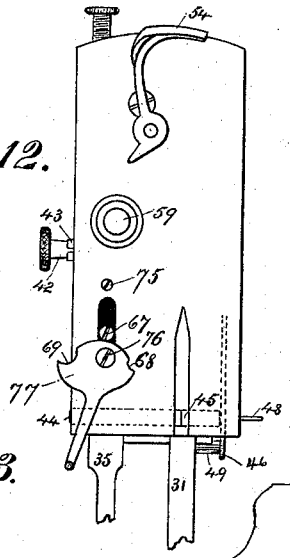
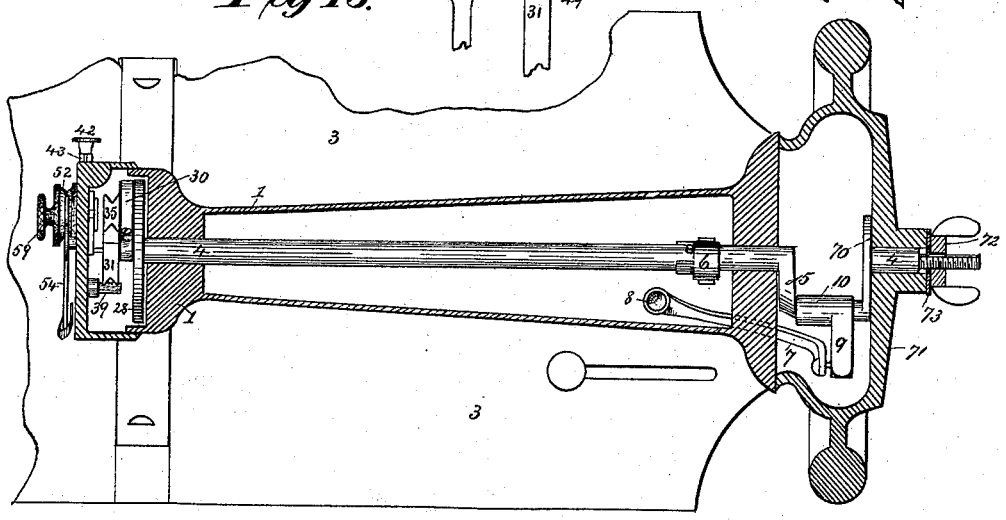


Fig 13.



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UNITED STATES PATENT OFFICE.

THOMAS L. MELONE, OF CHILLICOTHE, OHIO.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 383,748, dated May 29, 1888.

Application filed October 20, 1881. Renewed February 14, 1884. Serial No. 120,769. (Model.)

To all whom it may concern:

Be it known that I, THOMAS L. MELONE, a citizen of the United States, residing at Chillicothe, in the county of Ross and State of Ohio, have invented Improvements in Sewing-Machines, of which the following is a specification.

My improved machine is constructed with a hollow arm and standard and a driving-wheel provided with a hollow hub inclosing crank-and-pitman mechanism by which motion is communicated from a driving-shaft running in the horizontal hollow arm to a vertical rock-shaft carrying the shuttle-driving arm. The driving-wheel, with a hollow hub inclosing the crank mechanism, is described in Letters Patent No. 140,787, granted to me the 15th day of July, 1873. I prefer to form my shuttle-lever or arm and the rock-shaft by which it is operated in one piece. The shuttle-arm occupies a horizontal position under the bed or cloth plate of the machine, and the vertical rock-shaft is contained in the hollow standard. Said rock-shaft is curved in form and oscillates on a vertical axis outside of itself and at the front of the hollow standard in which the said rock-shaft is contained. By a pitman-connection between the driving-shaft crank and the arm of the vertical rock-shaft a differential motion is imparted to the shuttle-lever, causing the shuttle to move rapidly in passing through the loop of the needle-thread and slowly while the needle is out of the cloth. The pitman is fitted to the end of the rock-shaft arm by a ball-and-socket or other universal joint and to the driving-shaft crank by a sleeve, said pitman and its joints being divided longitudinally into two parts, so that by a single central screw the joints may be tightened by clamping the two ends of the divided pitman on their respective wrists. The feed-lever works on an adjustable fulcrum, and is operated by a vertical lever fulcrumed within the hollow standard and actuated by an eccentric or cam on the main driving-shaft, through the medium of a yoke made elastic to adapt it to keep in close contact with both sides of the eccentric at all points in the revolution, a set-screw being provided to limit the elasticity of the yoke to the greatest diameter of the eccentric, so as to prevent lost motion and to make the movement positive in the backward as well as the forward stroke of the feed-lever. Said set-screw also serves to take up the wear. The feed-bar derives its longitudinal movement from its operating-lever through the medium of a connecting-bar jointed to the feed-bar and provided with a yoke or stirrup to receive the end of said operating-lever. The end of the feed-bar carrying the feed-points or roughened surface is depressed by a spring and raised by the wedge-shaped end of a longitudinally-sliding bar actuated by connection with a lug on the heel of the shuttle-lever and resting on the feed-lever within the yoke. A suitable bracket attached adjustably beneath the bed-plate supports the yoke-bar at any required height to regulate the upward projection of the feed-points. The needle-bar is supported and guided by V-shaped gibs working in corresponding grooves in the edges of the bar, or vice versa, a small groove being cut beyond the apex of the V so as to lead the edge of the V on the gib or guide constantly to the center of the V-groove in the needle-bar, and thus confine and guide the needle in the same plane relatively to the shuttle under all conditions of wear and adjustment. The presser-bar is guided by similar V gibs and grooves. The needle-bar does not project above the head of the machine. It is driven, through the medium of a link, from a crank-wrist at the extremity of the main shaft, and operates the take-up through the medium of a link-and-toggle connection arranged to produce the required lull in the motion of the thread while the shuttle passes through the loop, while the needle moves continuously, though at varying speed. The pitman by which it is driven and the toggle-link by means of which it operates the take-up lever are attached on opposite sides—that is to say, one to each face of the needle-bar. An adjustable lever-connection between the needle-bar and presser-bar spring, for the purpose of relieving the foot of pressure while the needle is down, facilitates the turning of the goods at the moment when the feed is not in operation. Nippers are provided to regulate the amount of thread which is let down to form the shuttle-loop and to clamp the thread while the needle is out of the cloth. One of these nippers is held in proper position adjustably by a set-screw. The other is pressed

against the face of the first by a spring, which is retracted by the action of the needle-bar at the instant the needle enters the cloth-plate and released again, so as to apply the pressure when the needle rises out of the plate. The nippers being thus automatically relieved of pressure while the needle is down permit the thread to render freely while the shuttle is passing through the loop. To hold the thread between the nippers, the spring-nipper is provided with a dowel entering an aperture in the face of the fixed nipper, and it has also a projecting lug by which it may be retracted by hand to open the nippers for the purpose of introducing or removing the thread. A pulley-tension is used, having a thumb-screw for changing its resistance, arranged to be relieved of pressure by the raising of the presser-bar, so that the goods may be withdrawn without first pulling a surplus of thread from the spool.

In order that the machine may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of the operating parts of the machine. Fig. 2 is a view of the inner face of the removable head-plate with the needle and presser bars and their accessories in position therein, the needle-bar being shown at the upper extremity of its stroke. Fig. 3 is a view of the same without the needle and presser bars, the position of the take-up connections when the needle-bar is at the lower extremity of its stroke being shown in full lines and their positions when the needle-bar is at half-stroke and at the upper extremity, respectively, in dotted lines. Fig. 4 is a horizontal section of the head on the line 4 4, Fig. 2. Fig. 5 is a section on the line 5 5, Fig. 2, looking upward. Fig. 6 is a perspective view of the crank-and-pitman mechanism for driving the shuttle-lever from the main crank-shaft, the upper half of the divided pitman being shown in longitudinal section to expose the set-screw and the ball-and-socket joint. Fig. 7 is a perspective view of the principal working parts of the machine without the frame. Fig. 8 is a vertical longitudinal section of the needle-bar and presser-bar and their accessories, showing the thread-check and the springs for controlling the same in elevation. Fig. 9 is a detached view of a portion of the main shaft with the cam which actuates the feed-bar, as hereinafter described. Fig. 10 is a front elevation of the feed mechanism. Fig. 11 is a vertical section of the automatic tension-relief on a larger scale. Fig. 11^a is a side view of lever for relieving tension. Fig. 12 is a front view of the head of the machine. Fig. 13 is a plan with the hollow arm in section to expose the horizontal driving-shaft and its accessories. Fig. 14 is a diagram illustrating the relative positions of the crank and rock-shaft arm at various points in the revolution of the former.

The hollow arm 1 and standard 2 may be cast together, and are mounted in customary manner on the bed 3. The main driving-shaft is shown at 4 within the hollow arm 1. It is provided with a crank, 5, for operating the shuttle, as hereinafter described, and with an eccentric or cam, 6, for operating the feed.

The wrist of the crank 5 may be either parallel with the shaft (see Figs. 1, 7, and 13) or at such an angle thereto that in every part of its revolution it will be parallel, or nearly so, with the arm 7 of the vertical rock-shaft 8 illustrated in Fig. 14. The said rock-shaft is mounted on pivots 14 14^a, and is driven from the crank 5 through the medium of a short pitman, 9, jointed to the crank-wrist by a sleeve, 10, and to the end of the rock-shaft arm by a ball-socket, 11. When the crank-wrist is parallel with the axis of the driving-shaft, the sleeve 10 is made so much shorter than the crank-wrist as to permit it to slide longitudinally thereon, so as to compensate for the curved motion of the extremity of the rock-shaft arm 7; but in order that this curved or angular movement relatively to the driving-shaft may be reduced as much as possible I mount the pivots 14 14^a of the vertical rock-shaft as far as the shape of the arm and standard will permit from the axis of the driving-shaft 4, in order that the vibration of the rock-shaft arm may be equally on both sides of a line parallel with the said axis.

The pitman 9 and its sleeve 10 and socket 11 (see Fig. 6) are divided longitudinally, as shown, and connected in the center by a set-screw, 12, by the turning up of which the sleeve at one extremity and the ball-socket at the other extremity of the pitman are tightened on the crank-wrist and the rock-shaft arm respectively. My driving mechanism above described enables me to impart an ample throw to the rock-shaft arm 7, which constitutes in effect the rear arm of the shuttle-lever, and in order to increase the length of said arm relatively to the shuttle-driving arm 13 I give to the rock-shaft 8 the curved shape shown in Fig. 1, bringing its extremities forward toward the head of the machine, so that the axis of oscillation of the rock-shaft may be at the front of the standard 2, or even beyond it. The pivots 14 14^a of the rock-shaft are conical-pointed screws, threaded, respectively, in the top of the arm 1 and in the bed-plate 3 for adjustment, and provided with jam-nuts 14^b, as shown, to lock them in position. By raising and lowering the rock-shaft by means of the screws the ball-joint 11 is raised and lowered. The ball-joint should move in a horizontal plane coincident with the axis of the driving-shaft, and be in line therewith at one extremity of the stroke if the wrist-pin 29 is exactly at a right angle to the crank 5. In this case the loop thrown down for the shuttle to pass through will be the same size and timed the same, whether the machine is running backward or forward.

Any deviation from exact harmony in mov-

ing backward or forward, whether caused by wear or otherwise, may be corrected by moving the points on which the vertical rock-shaft works up or down, as the case may require. Without this provision of adjustment a slight wear taken up at one point only, or not taken up at all, would throw the ball-joint below the plane of the driving-shaft, causing a variation in the size of the loop at the exact time when the shuttle enters it, making it too small when the driving-wheel is running forward and too large when it is running backward. Any error in setting the wrist-pin 29, or any wear upon it, may be compensated for by moving the shaft-bearings up or down. The motions of all parts of the machine may be timed in harmony by this vertical adjustment of the rock-shaft bearings, so that the shuttle will always enter the loop at the same time, and the loop will always be of the same size, whether the machine is run forward or backward. For want of this provision machines heretofore made to run both forward and backward are liable after a little wear to break the thread when running one way and drop stitches when running the other way. I prefer to cast the rock-shaft 8 with its arm 7 and the shuttle-operating arm 13 all in one piece of metal.

The shuttle-driver 15 is connected adjustably to the extremity of the arm 13 in customary manner. The feed-lever is shown at 16 oscillating on a fulcrum, 17, which is adjustable endwise of the lever in order to regulate the length of the stitch. This lever is jointed at 18 to a vertical lever, 19, fulcrumed at 20 within the standard 2 and provided at top with an elastic yoke, 21, embracing the eccentric or cam 6, the elasticity of the yoke adapting it to compensate for variations in the horizontal diameter of the eccentric, or the radial distance of the bearing-points from the axis of oscillation 20, so that both faces of the yoke will be at all times in contact with the eccentric, making the movements positive on both the backward and forward strokes of the feed-lever.

A set-screw, 22, is provided to limit the elasticity of the yoke to the greatest horizontal diameter of the eccentric, so as to prevent all lost motion and make the movements positive, as before stated. The eccentric or cam 6 is not fixed to the shaft, but adapted to turn relatively thereto to an extent limited by a stud, 4^a, working between the extremities 6^a 6^b of a segment-collar on the said eccentric or cam 6. (See Fig. 9.) The cam is thus set loosely on the main shaft, so that when the shaft is turned in one direction the stud 4^a engages the stop 6^a on the cam and turns it with the shaft. In reversing the shaft the cam remains stationary until the stud 4^a engages the other stop, 6^b, when the cam again revolves with the shaft. This device prevents the feed from reversing or feeding backward when the crank motion which operates the needle-bar and shuttle is reversed, and allows it to remain stationary until the proper moment for it to be moved forward, timed in harmony with the other parts.

The sliding feed-bar 23 receives a horizontal motion from the end of the lever 16 through the medium of a connecting-bar, 25, formed with a stirrup, 24, to receive the end of the lever 16 and the attaching-bracket 24^a, by which the connected bars 23 25 and the lever 16 are all suspended beneath the bed-plate 3, the upper portion of the opening in the stirrup 24 being of sufficient length to permit the horizontal sliding movement.

The bar 25 is connected to the feed-bar 23 by a pivot, 25^a, which imparts a sliding motion to the feed-bar 23, while permitting the latter to rise and fall relatively to the connecting-bar 25, which is guided in a horizontal path by the bracket 24^a and by the stirrup 24, formed on the extremity of said bar 25. The feed-points are shown at 23^a projecting up through the bed-plate 3. The bracket 24^a is fastened to the bed-plate by a screw, 24^b, which serves to temper the height of the feed-points 23^a and to compensate for wear.

The vertical motion of the feed-points 23^a, carried by the bar 23, is imparted by the wedge-shaped end of a bar, 26, which rests on the feed-lever 16, is carried thereby in its oscillations, and is pivoted at its rear end to a short arm or lug, 26^a, projecting from the heel of the shuttle-lever 13, so as to impart the required longitudinal motion to the wedge-shaped bar 26 to raise the feed. The feed-bar is thrown down by a spring, 27, as the lever 26 recedes.

On the extremity of the driving shaft 4 is a crank-wheel, 28, the wrist 29 of which is connected by a link or pitman, 30, to the needle-bar 31, so as to impart the required vertical movement thereto. The said needle-bar is formed in its edges with V-shaped grooves 32 and slides between gibs or guides 34 34, having corresponding V-shaped edges. Grooves 33 are cut beyond the depth or apex of said V grooves, to lead the edges of the gib to the center of the V-grooves in the bar, so that the needle-bar may be accurately guided in a fixed and unchanged plane in all conditions of wear and adjustment.

Adjustment of the gibs 34 for taking up wear is provided by making two or all of such gibs separate from the head and holding them to the head by means of screws 34^a, which pass through holes in the gibs of such dimensions as to allow a slight lateral movement to the gibs on the loosening of such screws. The presser-bar 35 is guided in the same manner.

It is manifest that the grooves 32 33 may be formed in the gibs or guides 34, and the projecting V-edges on the needle-bar 31 and presser bar 35, if preferred. This mode of mounting and guiding the needle-bar and presser-bar saves much costly labor in fitting the joints, these joints being self-fitting by reason of their shape.

The spring 36, for holding down the presser-bar, acts through a rod, 37, retracted on the downward movement of the needle-bar 31 by

means of an L-shaped lever, 38, having a stud, 39, which is engaged by a shoulder, 40, on the upper end of the needle-bar in the lowest position of the latter. The effect of this device is to relieve the foot of pressure when the needle is down, thus permitting the goods to be turned freely in any direction. The lever 38 is fulcrumed at 38^a on a horizontally-sliding bar, 41, so that the said lever may be moved bodily in a lateral direction by means of a conical thumb-screw, 42, occupying a split socket, 43, on the end of the bar 41, so that by turning the thumb-screw 42 back the said bar is released by the contraction of the screw-socket, to permit of its adjustment in either direction, and when the thumb-screw is again turned in, the said bar is locked securely in any position in which it may have been set by the expansion of the split screw socket against the sides of the aperture through which it projects. This lateral adjustment of the bar 41, carrying with it the lever 38, regulates and determines the extent of movement imparted to the rod 37, which applies the spring-pressure to the presser-bar, and thus regulates and modifies the withdrawal of pressure from said bar, or the height to which it may move before encountering the pressure of its spring. The customary lifter for the presser consists of a cam-lever, 77. A thread check or clamp for taking care of the slack while the needle is up, and clamping the thread while the stitch is being drawn, is provided by a pair of nippers, 44 45, Fig. 8, the former of which is fixed in any position of adjustment by a set screw, 51. The nipper 45 is pressed against the face of the first by a spring, 46. (See Figs. 8 and 12.) Between these nippers the thread is passed behind a dowel, 47, extending from the face of one nipper into the other. A stud, 48, on the nipper 45 projects laterally from the head of the machine, so that it may be taken hold of for drawing the nippers apart. In the descent of the needle bar its edge presses laterally against a stud, 49, attached to the spring of the nipper 45, so as to retract said spring and relieve the thread, thus permitting it to render while the needle is descending through the cloth. On the ascent of the needle bar a cavity, 50, Fig. 8, in its edge, near the lower end of the bar, releases the stud 49, so as to permit the nippers to be forced together by the spring 46 and clamp the thread. These nippers perform a function which is discharged by the take-up (so called) in many machines—that is to say, they take care of the slack thread while the needle descends to the goods, regulating the quantity of thread which is let down by the needle to form the loop for the shuttle to pass through. The withdrawal of pressure from the thread by the descent of the needle-bar is timed exactly to where the point of the needle enters the thinnest goods, and its restoration, consequently, to the time the point of the needle leaves the thinnest goods on its upward stroke. Thus adjusted the nippers offer no resistance sufficient to prevent the thread from drawing into the thickest goods that can be placed under the presser-foot. The adjustment of the fixed nipper 44, afforded by the set-screw 51, compensates for wear between the stud 49 and needle bar 31, so as to maintain the required pressure on the thread. This pressure is so slight that it offers no resistance to pulling out the goods.

54 represents a take-up lever constructed with an open spring-holder to receive the thread, and fixed rigidly to a shaft, 55, on the inner end of which is also fixed an arm, 56, to the extremity of which is jointed a link, 57, pivoted to the front of the needle-bar at or near the top. The shaft 55 is mounted in a bracket, 60, having an angular adjustment on its attaching-screw 61, so as to vary the effect on the take-up lever 54. The arm 56 and link 57 will be seen to constitute a toggle-joint, and the parts are so constructed and arranged as to impart the required intermittent and differential movement to the thread. The movement of the needle-bar is continuous. While it has a differential movement it has no lull. The office of the toggle 56 57 is to provide for the lull in the movement of the thread, which is necessary in order to get the shuttle through the loop. When the needle starts on the downward stroke it carries with it, by means of the toggle 56 57, the outer end of the take-up 54, and thereby lets down a sufficient amount of thread to pass around the shuttle. The take-up 54 reaches its lowest position when the toggle-link 57 is at right angles with the needle-bar and the needle itself a little more than half-way down. The further descent of the needle-bar to its lowest point carries the toggle with it and lifts the outer end of the take-up 54 slightly and continuously until the needle is at its lowest position and 57 and 56 are nearly in a straight line, as seen in full lines in Fig. 3. The positions of the respective ends of the toggle-link at this point are shown at $1^{\times}$ and $1^{\times\times}$, and that of the take-up at $1^{\times\times\times}$. The needle-bar now commences its ascent, the shuttle starts forward, and the take up 54 moves downward until the needle-bar is nearly half-way up, and the toggle-link 57 is again at right angles to the needle-bar and the shuttle nearly passed through the loop. This horizontal position of the toggle link is shown at $2^{\times}$ $2^{\times\times}$, and the corresponding lowermost position of the take-up at $2^{\times\times\times}$. The further ascent of the needle-bar continues to lift the toggle-link, and thereby the lever 54, until the stitch is tightened at the top of the stroke of the needle-bar, when the parts occupy the positions shown in Fig. 2 and in dotted lines at $3^{\times}$ $3^{\times\times}$ $3^{\times\times\times}$ in Fig. 3. The differential movement of the needle-bar is slowest when, down by reason of the link-connection, and at the same instant the shuttle is at its highest speed, by reason of the movement of the pitman 9 and crank-connections.

The tension device proper is shown at 52 59 in Figs. 1 and 13, and more fully in the enlarged sectional view, Fig. 11. It is con-

structed with a pulley, 52, mounted on a hollow cylindrical stud, 53, fitted rigidly in the head-plate of the machine and receiving a thumb-screw, 59, which extends completely through the hollow stud 53, projects within the head and is threaded in a nut, 62, which is adapted to slide within the hollow stud 53, but held against rotation by a pin fixed in the hollow stud 53 and projecting into a longitudinal groove in the nut. A space is left between the extremity of the stud 53 and the head of the thumb screw 59, and a spiral or other spring, 63, surrounds the shank of the thumb-screw 59 within the hollow stud 53, having its bearings against the inner end of the hollow stud and the sliding nut 62. The head of the thumb screw 59 is formed with an annular flange, as shown, and bears against the non-rotating washer 64, by which the pulley 52 is confined between felt or other friction-washers 65 66, so that the thumb-screw 59 applies the pressure of the spring 63 to the pulley 52, and this tension is varied and regulated by the turning of the thumb-screw 59, thus producing more or less pressure on the tension-pulley 52. The shank of the thumb screw 59 projects within the head of the machine in position to receive outward pressure from a lever, 74, fulcrumed at 75. The cam-lever 77 is adjustably attached to the head of the machine by a steep-threaded screw, 76, the inner extremity of which bears against the lower extremity of the tension-relief lever 74. The object of this construction is to have the tension under control of the presser-bar-operating cam 77, so that upon the raising of the said bar the screw 76 will bear upon and force the lower extremity of lever 74 inward, and consequently the upper extremity outward, thus taking up the pressure of spring 63 and releasing pulley 52, and thereby relieving the tension upon the thread.

The presser-bar 35 is lifted by the cam of cam-lever 77 acting on a stud, 67, Figs. 11 and 12, in the customary manner. Said cam is formed with an irregular periphery and a notch at each end at different radial distances from the axis. When the presser-foot is lifted to the first notch, 68, in the cam, the tension is undisturbed. When the presser is raised to the second notch, 69, the screw 76 presses the lower extremity of lever 74 outward, thus transferring the pressure of the spiral spring 63 from the tension-pulley to the lever 74, leaving the pulley free to revolve, and allowing the thread to be drawn freely from the spool as the goods are withdrawn from the machine without resistance of the tension.

This device avoids the necessity of the preliminary drawing of a surplus thread from the spool before taking out the goods, and a great advantage gained is that the tension-relief is entirely independent of the presser-bar and will allow any thickness of goods to be under the presser-foot without disturbing the tension.

The main shaft is formed with a shoulder, 70, Fig. 13, against which the hollow-hubbed balance-wheel 71 is pressed by the thumb-nut 72, so as to lock said wheel to the shaft for driving it. When the thumb-nut 72 is turned back, the wheel is loosened for use in winding bobbins. A washer, 73, fitting a flat place on the shaft, and thereby kept from rotation, prevents the turning off of the nut by the rotation of the wheel.

It will be observed that all the movements in my machine—the lateral motion of the feed alone excepted—are imparted by two cranks situated at opposite ends of the main driving-shaft, one running the needle-bar and its accessories and the other the shuttle mechanism and imparting the proper motion to the feed.

The reversing of the driving-wheel, starting from the dead-points on the cranks, has no effect whatever on the movements of the parts attached to them. All the parts of the machine being attached directly or indirectly to the cranks, changing the direction of rotation of the shaft has no effect. The operating parts will run the same, in whichever direction the wheel may be started.

Some parts of the invention herein shown, described, and claimed, are also shown and described in my contemporaneous application, filed December 19, 1883, Serial No. 115,081.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a sewing-machine, the combination, with the stitch-forming mechanism thereof, of a hollow standard and arm, a horizontal crank-shaft contained in the latter, a vertical rock-shaft contained in the former, and a pitman jointed at its respective ends to a crank on the driving-shaft and an arm on the rock-shaft, as and for the purpose set forth.

2. The combination of the driving-shaft 4, the vertical rock-shaft 8 actuated thereby through the medium of the pitman 9, and carrying the shuttle-driving arm 13, the screws 14 14^a, and the frame in which said screws have bearings for setting said vertical rock-shaft up or down for timing the movements of the various parts of the machine, as explained.

3. The combination of the feed-bar 23, carrying the roughened feed-plate 23^a, the stirrup-bar 24 25, pivoted to the feed-bar at 25^a, the lever 16, inserted in the stirrup 24 and actuating the feed-bar through the medium of the connecting-bar 25, and means for imparting to the feed-bar the necessary vertical movement, as explained.

4. The combination, with the stirrup-bar 24 25, supporting-bracket 24^a, feed-bar 23, and means for imparting to said feed-bar the necessary horizontal reciprocating motion, of the lever 16 and wedge-shaped bar 26, operating the feed in the manner described.

5. The combination of the skeleton needle-bar 31, having V-shaped grooves in its sides and longitudinal grooves in the apexes of said V-shaped grooves, with adjustable gibs 34, having V-shaped ridges corresponding with said

V-grooves, and so arranged as to permit the taking up of wear of the needle-bar longitudinally of the line of shuttle movement, substantially as set forth.

6. The combination, with the needle-bar 31 and the take-up 54, of the pendent arm 56, fixed to the rock-shaft of the take-up, and the link 57, connecting said arm to the needle-bar, and arranged to impart to said arm a vibratory motion on both sides of a vertical line, said arm 56 and link 57 constituting a toggle-joint folding on itself and imparting a differential and compound movement to the take-up arm from the continuously-moving needle-bar, as explained.

7. The combination, with the presser-foot bar and a spring for holding it down, of the needle-bar having a shoulder, 40, and a lever engaged at one end by said shoulder and engaging at the other with said spring for relieving its pressure upon the presser-foot bar when the needle is down, as set forth.

8. In combination with the head having a recess in its front, as shown, for the reception of the thread, the thread-check within said recess having fixed jaw 44 and movable jaw 45, controlled by a spring, and the needle-bar 31, having inclined portion, as shown, and acting to relieve the thread-check and release the thread, substantially as and for the purpose set forth.

9. In a thread-check in a sewing-machine, substantially as herein described, the combination of a pair of rods placed end to end and nipping the thread between their ends, means for adjusting one of said rods in position, and a spring for pressing the other against it, as set forth.

10. In a sewing-machine, substantially as herein described, the combination of the nippers 44 45 with a lug or handle for opening them for the insertion of the thread, and a dowel or pin, 47, for retaining the thread between them, as explained.

11. The combination, with the face-plate, the tension device secured thereto, and the presser-foot bar, of the lifting-lever having a screw-threaded pivot engaging a correspondingly screw-threaded aperture, and a lever engaged at one end by said pivot-screw, and engaging at the other with said tension device, for the purpose set forth.

12. The main driving-shaft carrying at its forward end a crank or crank-wheel operating the needle-bar, and at its rear end a crank to operate the shuttle-carrier, in combination with a vertical shaft carrying the shuttle-driving arm, means for adjusting said shaft in a vertical direction, and a pitman connecting the rear crank of the driving-shaft with the arm of the vertical rock-shaft, whereby the vertical adjustment of said rock-shaft is made to time the movements of the various parts.

13. The combination, with the presser-foot mechanism, the needle-bar, and the lever engaging at one end with said presser-foot mechanism and engaged at the other by said needle-bar when depressed, of the sliding bar 41, to which said lever is fulcrumed, the split socket 43 on the end of said bar, the conical set-screw 42, and the head of the machine having a perforation through which said socket projects, as set forth.

14. The combination, with the presser-foot bar 35, its spring 36, and the rod 37, interposed between the said spring and presser-foot bar, of the needle-bar 31, having the lateral projection or shoulder 40, and the L-shaped lever 38, engaged at one end by said shoulder and engaging at the other with said rod 37, relieving the pressure of the spring 36 upon the presser-foot bar when the needle is down, as explained.

15. The combination, with the apertured face-plate, of a tension-pulley, a stem projecting through the aperture in the face-plate and having an enlarged head or flange bearing against said pulley, a spring for forcing said head or flange against said pulley, a lever engaging the inner end of said stem, and the lifting-lever engaging the other end of the aforesaid lever, as set forth.

THOMAS L. MELONE.

Witnesses:
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