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I. M. SINGER.

SEWING MACHINE.

No. 61,270. Patented Jan. 15, 1867.

Fig. 5.

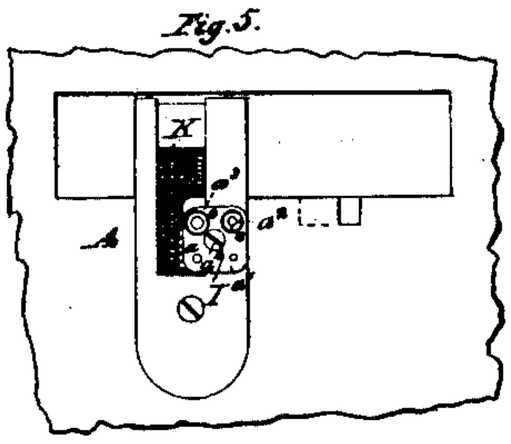

Fig. 8a

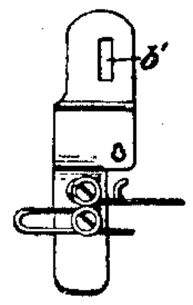

Fig. 8.

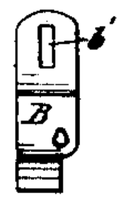

Fig. 1.

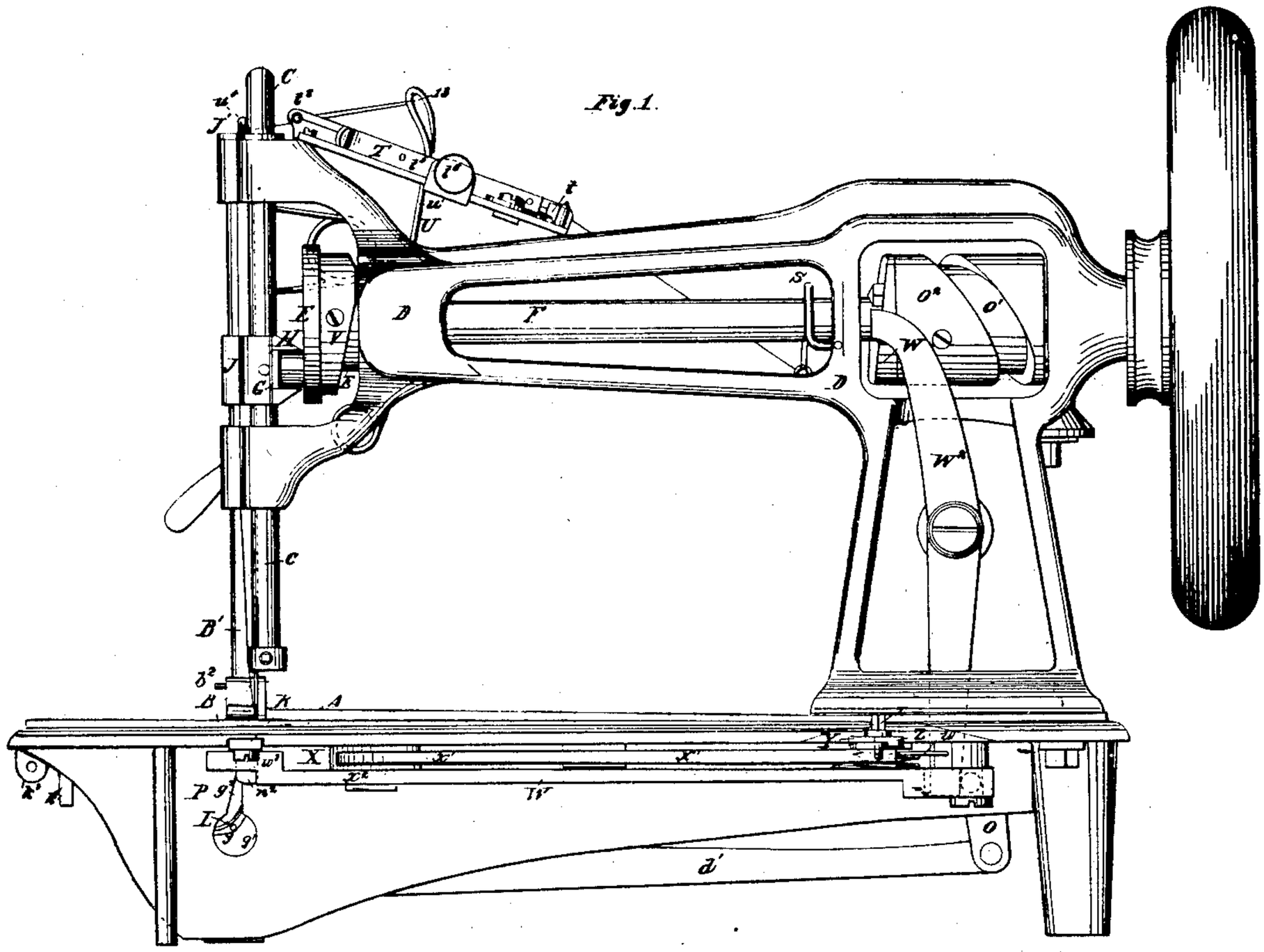

Fig. 9.

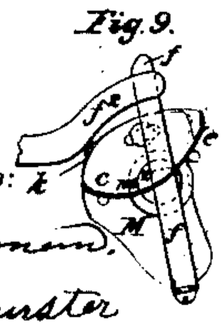

Fig. 10

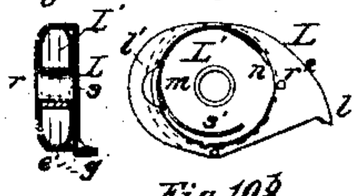

Fig. 10a

Fig. 10b

Fig. 10c

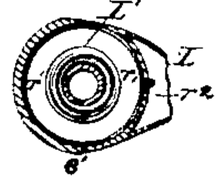

Fig. 11.

Fig. 12.

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Inventor:
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by his Attorney
E. S. Renwick

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I. M. SINGER.

SEWING MACHINE.

No. 61,270. Patented Jan. 15, 1867.

Fig. 3.

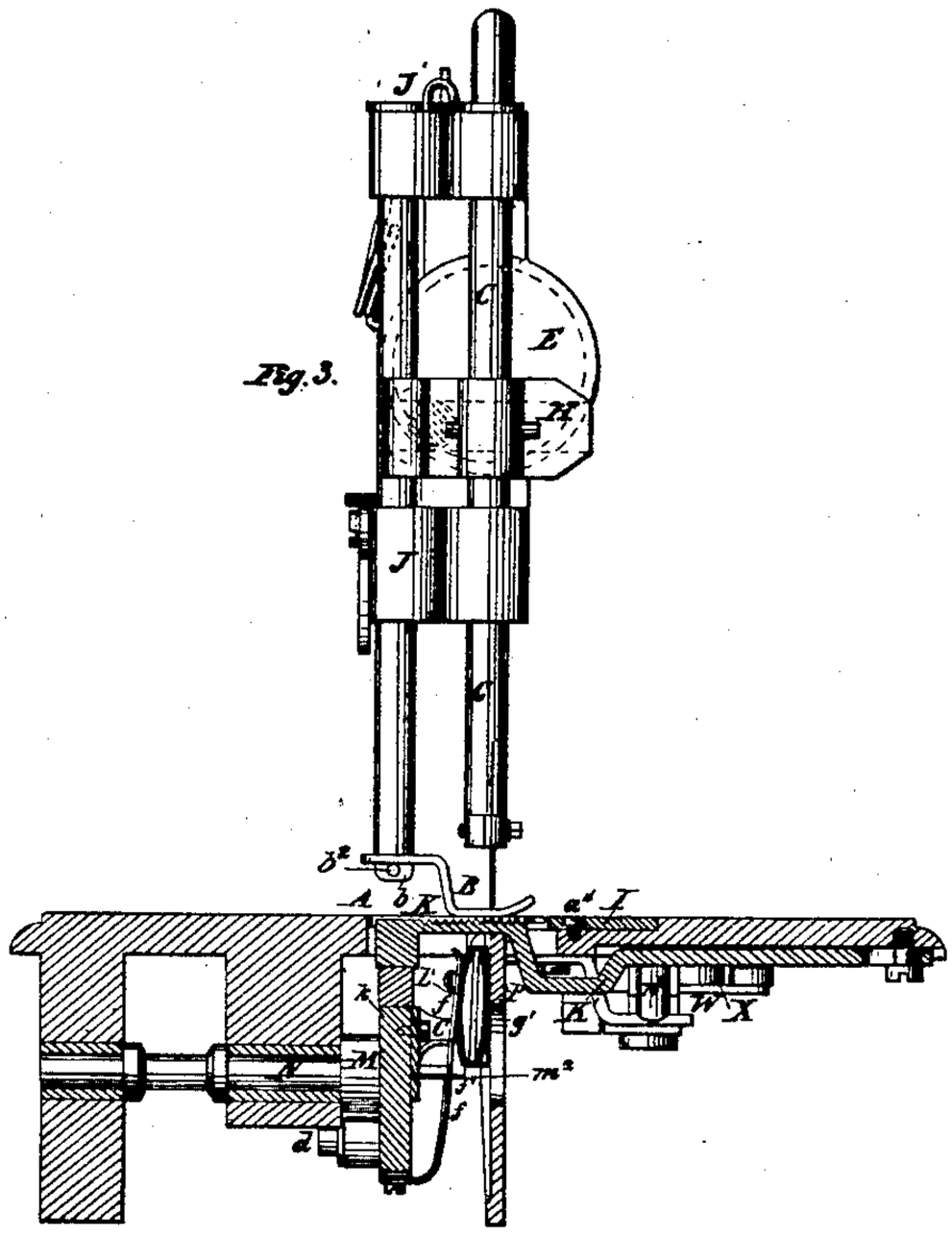

Fig. 4.

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I. M. SINGER.

SEWING MACHINE.

No. 61,270. Patented Jan. 15, 1867

Fig. 7

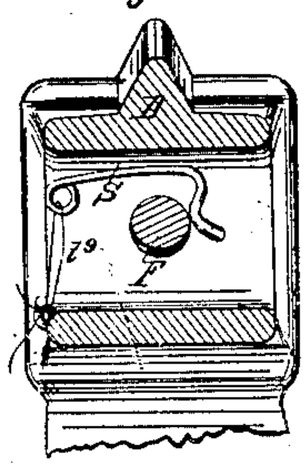


Fig. 6.

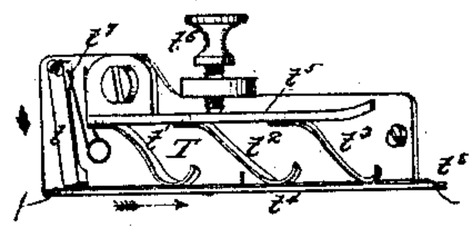


Fig. 2.

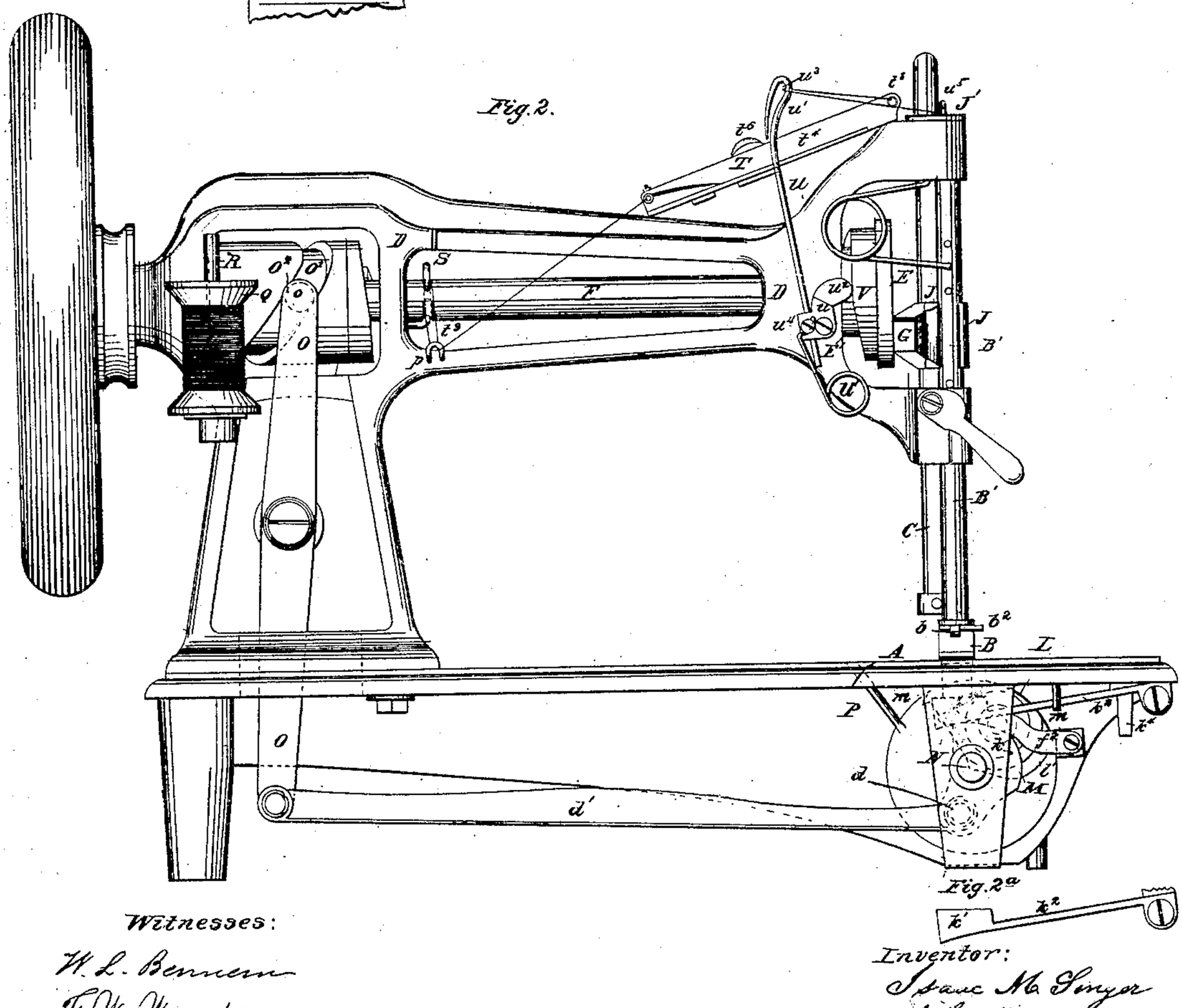
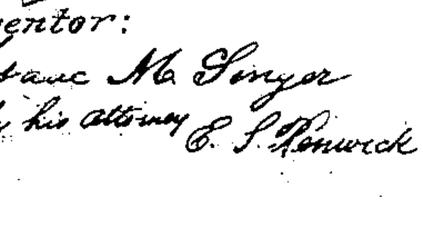


Fig. 2a



Witnesses:

W. L. Bennem

F. W. Hunster

Inventor:

Isaac M. Singer

by his attorney E. S. Renwick.

UNITED STATES PATENT OFFICE.

ISAAC MERRITT SINGER, OF YONKERS, NEW YORK.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 61,270, *dated January* 15, 1867.

To all whom it may concern:

Be it known that I, ISAAC MERRITT SINGER, of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Sewing-Machines; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a sewing-machine embodying my improvements. Fig. 2 represents an elevation of the opposite side of the machine. Fig. 3 represents an elevation of one end of the same, with certain portions removed. Fig. 4 represents a plan of the members of the machine beneath the table-plate. Fig. 5 represents a plan of a portion of the table-plate. Fig. 6 represents a plan of the thread-tension and adjacent parts. Fig. 7 represents a cross-section of the needle-arm at the position of the thread-slackener, and Figs. 8 to 12 represent views of detached parts of the machine denoted by the same letters as the corresponding parts in the other figures.

The improvements which constitute the subject-matter of this patent have reference to the sewing mechanism, thread controlling and tension mechanism, and feed mechanism of sewing-machines, and particularly of the central-delivery oscillating-shuttle machine described in my previous patent, dated the 11th day of December, A. D. 1866; and although I believe the best result will be attained when all my improvements are combined in the same machine, some of them may be used separately from the others when such separate use may be expedient.

The object of the first improvement or part of my invention is to enable the needle-bar and the stem of the presser-foot to be made round, that being the least costly form of construction, and nevertheless to be prevented from turning in their bearings. This part of my invention consists in combining a round needle-bar and a round presser-foot stem by means of sliding brackets, in such manner that the bar forms a guide which prevents the stem from turning, and the stem forms a similar guide for the needle-bar.

The object of the second part of the invention is to guide the shuttle while it is entering the loop of needle-thread without subjecting it to the rubbing action of a shuttle-guide. This part of my invention consists of the combination of a reciprocating spring shuttle-holder with a shuttle-guide, in such manner that the former, while moving with the shuttle, is caused to bear strongly against the shuttle by the action of the shuttle-guide at the time the shuttle-point is entering the loop, so that the shuttle is relieved of the rubbing of the shuttle-guide by the interposition between the two of an instrument (the shuttle-holder) which moves along with the shuttle, and consequently does not rub it.

The object of the third part of the invention is to enable an oscillating shuttle to be constructed with its point in the same plane, or thereabout, as one of its sides, and nevertheless permit the shuttle-thread to diverge from that plane as it extends from the point of sewing to the delivery-eye of the shuttle. This part of the invention consists of the combination of the shuttle with a projecting thread-guide at its flat side, so that the delivery-eye, by which the shuttle-thread leaves the shuttle, and which is the eye at the end of the projecting thread-guide, is held out at some distance from the flat side of the shuttle.

The object of the fourth part of the invention is to permit the use in the sewing-machine of an oscillating shuttle with a projecting thread-guide; and it consists in the construction of the support or guide-block for the flat side of the shuttle with a central opening, and a slot extending from that opening toward the throat for the needle, so that the projecting shuttle-guide may oscillate in the central opening, and that the shuttle-thread may extend from the throat in a line diverging from the track of the needle-point.

The object of the fifth part of the invention is to obtain a broad wearing-surface at the butt of the oscillating shuttle; and consists of the construction of the shuttle with an ear projecting at its butt beyond the socket for the bobbin.

The object of the sixth part of the invention is to hold the shuttle-bobbin in its place in the shuttle and permit its ready removal and replacement. This part of the invention consists of the combination of the shuttle with a spring-ring fitted to an annular groove in the mouth of the bobbin-socket.

The object of the seventh part of the inven-

tion is to produce tension uopn the shuttle-thread by the same instrument that holds the bobbin in place; and consists of the combination of the shuttle with a spring-ring fitted to an annular groove in the mouth of the bobbin-socket, and provided with a branch which bears against the bobbin, so that the spring-ring both holds the bobbin and makes pressure upon it.

The object of the eighth part of the invention is to prevent the contact of the metallic surface of the bobbin with the metallic surface of the side of the shuttle; and consists of the combination of the shuttle with a lining of paper, cloth, or similar material in the bottom of its bobbin-socket, so that the said lining is interposed between the surfaces of the bobbin and bobbin-socket.

The object of the ninth part of the invention is to prevent the contact or the edge or periphery of the bobbin with the rim of the bobbin-socket of the shuttle; and consists of the combination of the shuttle with a hoop-lining of paper, cloth, or similar material, in the rim of the bobbin-socket, so that the said hoop-lining is interposed between the edge or periphery of the bobbin and the rim of the bobbin-socket.

The object of the tenth part of the invention is to enable the several sections of a sectional thread-tension to be quickly adjusted; and consists of the combination of two or more such sections with one movable bar or stock, so that the movement of that one bar varies the pressure of the several sections simultaneously.

The eleventh part of the invention has reference to the take-up for taking up the slack needle-thread left by the passage of the shuttle; and consists of the combination of the arm of the take-up with the stock thereof by an adjustable connection, which permits the effective length of the arm to be readily adjusted.

The object of the twelfth part of the invention is to permit the extent to which the material is fed when it is to be sewed in opposite directions to be easily determined; and consists of the combination of the regulating-lever of a reversible-feed mechanism with a stop carried by said lever, so that the adjustment of a single stop determines the extent of feed in reverse directions.

The thirteenth part of the invention consists of the combination of a turning regulating-plate (for reversing the feed of the sewing-machine) and the feeding-instrument by means of a reciprocating bar bent in such manner that the pins or parts upon which the strain of feeding is borne are at or about the same level, whereby the tendency to rock the reciprocating bar is prevented.

The sewing-machine which I have represented in the accompanying drawings as an exemplification of a convenient mode of embodying my improvements is like, in its general arrangement, many sewing-machines now in use. It has a horizontal table-plate, A, to support the material to be sewed, a yielding presser-foot, B, pressed toward the table-plate by a spring, so as to hold the material with a yielding pressure, a vertical reciprocating needle-bar, C, to carry an eye-pointed needle, to thrust it downward through the material, and to withdraw it therefrom, and it is provided beneath the table-plate with a shuttle to interloop a second thread with the thread thrust through the work by the needle. The needle bar or carrier C is supported in guides at the end of the needle-arm D, which is mounted upon the bed-plate of the machine, and this needle-bar is driven by a revolving crank-wrist which projects from the face of a disk, E, secured to the revolving shaft F, is covered with a friction-roller, G, to reduce the friction, and works in the groove of a transverse block, H, secured to the needle-bar, so that the revolution of the shaft F causes the needle-bar to rise and descend in alternate succession, thereby thrusting the needle downward through a passage or throat, *a*, formed in a throat-plate, I, (secured to the table-plate of the machine,) and raising it therefrom. The needle-bar C is a round bar, and the stem B′ of the presser-foot B is also round, bars of round cross-section being more readily formed (by turning) than bars of any other cross-section. Each of these round bars is combined with the other in such manner that the other acts as a guide to prevent it from turning on its axis, and thereby misplacing the needle or the presser-foot. The combination is effected by means of a bracket, J, secured to the needle-bar, and fitted to slide upon the stem B′ of the presser-foot, and a second bracket, J′, secured to the stem B′ of the presser-foot, and fitted to slide upon the needle-bar, so that the stem B′ of the presser-foot B holds the needle-bar from turning through its bracket J, and the needle-bar holds the presser-foot from turning through its bracket J′.

The presser-foot B is made removable, so that it may be readily removed and replaced by a foot specially adapted to the particular kind of work to be done—as, for example, a hemmer-foot or a corder-foot, such as is represented at Fig. 8ª. To this end the opposite sides of the lower extremity of the stem B′ are flattened, so as to form a flat tenon, *b*, and the shank of the presser-foot is perforated with a slot, b^1, to fit upon this tenon. The tenon also is perforated transversely to admit a tapering pin, b^2, which, being driven into the tenon below the shank of the presser-foot, secures it firmly to the stem. The pin may be readily removed when the presser-foot is to be changed, and the different presser-feet provided for the machine are each perforated with a slot of uniform size to fit the tenon of the stem.

The throat-plate I is fitted into a recess in the table-plate, and is perforated with several throats, *a* a^1 a^2 a^3, of different diameters, all with their centers equidistant from a central

screw, a^4, which passes through a center hole in the throat-plate and secures it to the table-plate. A throat-plate of this construction permits the operator of the machine to change the throat operating with the needle, and thus adapt the throat to the size of the needle to be used, whereby the material is supported more closely to the needle when a fine needle is used than is possible in machines having a single throat, which must of necessity be large enough to permit the operation of the largest needle which may be used in the machine. The throat is surrounded by one or more raised concentric rings or circular ridges, *e*, which indent themselves into the under surface of the material to be sewed when it is lowered by the sinking of the feed-plate K, and form a hollow center, upon which the material may be turned, whether the needle be in or out of it. The ridge also acts as a holder to prevent the material from slipping when the feeding-instrument is retrograding, and relieves the needle of transverse strain during that period.

The shuttle L is situated beneath the table-plate of the machine. It is thin and broad, is supported edgewise in its place, and is provided with a flat spool or bobbin, L′, upon which the shuttle-thread is wound. The shuttle, when the machine is at rest, is supported by a curved plate, m^2, whose ends form two drivers, *c* and *c′*, which project from the face of a disk or hub, M, that is secured to a shaft, N. This shaft is caused to rock by connecting a wrist-pin, *d*, projecting from the driver-hub M, with the lower end of a lever, O, which is pivoted in a recess in the needle-arm, and is provided at its upper end with a pin, *o*, that runs in a cam-groove, O^1, formed in a cam, O^2, secured to the needle-shaft F. (The connection between the lower end of the lever O and the driver wrist-pin *d* is a connecting-rod, *d′*,) Hence, when the shaft F is caused to revolve and operate the needle, the driver-disk M is caused to rock and move the shuttle to and fro in harmony with the needle by the alternate action of the drivers *c c′*, and the motions of the needle and shuttle are so timed (by the form and set of the groove of the shuttle-cam O^2) that the needle rises slightly before the point of the shuttle is caused to pass its line of motion, so that the needle-thread is caused to spread laterally from the needle for the entrance of the point of the shuttle, as is customary with shuttle-machines. The shuttle is so broad that its lower edge extends down to the axis of the rock-shaft or thereabout, so that the shuttle, when moved by the drivers, is caused to oscillate, and the axis upon which it oscillates (which is the axial line of the rock-shaft N) is at or near its lower edge. The shuttle is guided vertically in its oscillation by a shuttle-race, consisting of a curb, *m*, projecting from a block, P, which is arranged opposite to the face of the hub M of the shuttle-drivers, and maintains the shuttle erect upon one side; and in practice the movement of the shuttle is so rapid, and the radius of the curb is so small, that a sufficient amount of centrifugal force is generated to cause the shuttle to rise and bear against the curb, thereby keeping its front and rear alternately out of contact with the driver, which precedes it in its movement, and leaving a narrow space between that driver and the shuttle open for the passage of the needle-thread.

The shuttle is held edgewise in its place during the greater part of its movement by means of a spring, *f*, which is secured to the hub of the shuttle-drivers and oscillates with them; but the range of motion of this spring toward the adjacent side of the shuttle is limited by arranging it to pass through a hole in the plate m^2, a part of which thus forms a stop, f^1, so that the face of this spring-holder is not permitted to move nearer to the face of the block P at the opposite side of the shuttle than a distance predetermined by the position of the stop, and the stop is so set that this distance is a little greater than the thickness of the shuttle added to twice the thickness of the coarsest needle-thread the machine is adapted to use. Hence the shuttle is left loose in its place during the greater part of its movement for its ready passage through the loop of needle-thread, but is held from escaping laterally by the full force of the spring-holder *f* whenever it tends to move beyond its proper bound. In order that the shuttle-point may occupy precisely the same position relatively to the needle whenever it enters the loop of needle-thread, a shuttle-guide, f^2, is provided to bear the shuttle closely against the face of the block P at that period. This shuttle-guide is secured to the block P with its point in such a position relatively to the shuttle-holder *f* that the shuttle-holder enters between the shuttle and shuttle-guide when the shuttle is completing its backward movement, and the face of the guide is at such a distance from the face of the block P that the shuttle-holder is borne by the shuttle-guide toward the block P, and is thus caused to press the shuttle closely to the block during the latter part of its retrograde movement, and the first of its forward movement when the shuttle-point is passing the needle. As soon as the shuttle-point has passed the needle the short distance requisite to insure the seizure of the needle-thread, the shuttle-holder *f* passes out from between the shuttle-guide and the shuttle, and leaves the shuttle loose. This mode of combining the shuttle-guide with the shuttle-holder relieves the shuttle of the wear produced by rubbing directly against the shuttle-guide, because the shuttle-holder moves with the shuttle, and is interposed between the shuttle and the shuttle-guide.

The shuttle is provided at its center of oscillation, or thereabout, with an eye-guide for the passage of the shuttle-thread from it to the

material, so that the length of thread extending from the shuttle to the material is practically always the same, whatever be the position of the shuttle, and consequently no slack shuttle-thread is formed. It is important that the shuttle-thread extending from the material to the shuttle should diverge from the track or line of movement of the needle, and also from the plane of oscillation of the shuttle-point, so as not to be split by the former, or to be in the way of the latter. It is desirable, also, that the shuttle should have a broad wearing-surface at the side which is brought in contact with the block P by the action of the shuttle-guide. In order that these two requirements may be obtained in the machine, the delivery-eye of the shuttle is formed in a projection, *g*, that extends laterally from that side of it which is nearest the block P, and constitutes a projecting thread-guide for the shuttle. An opening, g^1, is formed in the block P to permit this projecting thread-guide to oscillate in, and a slot, g^2, is made from this opening to the table-plate above for the passage of the shuttle-thread; hence the shuttle-point *l* may be located in the plane of that side of the shuttle which is nearest the guide-block P, and yet the shuttle-thread (extending to the projecting thread-guide of the shuttle) diverges sufficiently from the plane of oscillation of the shuttle-point and the track of the needle-point to be out of the way of both. This arrangement of the shuttle-point permits that portion of the side of the shuttle which is in advance of the bobbin-socket and faces the guide-block P to be made flat, so that it forms a broad wearing-surface where the shuttle rubs against the guide-block or side support P. In order to obtain a similar wearing-surface at the butt of the shuttle, an ear, *l'*, is formed upon it, so that the wearing-surface of the shuttle is enlarged by the addition of the surface of the ear.

The bobbin L′ is held in its place in the socket of the shuttle by means of an open spring-ring, *n*, which is fitted in a shallow annular groove formed in the mouth of the socket. This spring-ring bobbin-holder is also employed to press one or more disks of packing (denoted by the line *s*, Fig. 10^b) against the side of the bobbin, and thereby retards its revolution, so as to make tension upon the shuttle-thread. For this purpose the spring-ring holder is formed with one or more branches, *s'*, which project over the side of the bobbin; or it may be formed in an open coil, as shown at Fig. 12, with single branch, *s'*. The tension may be varied by varying the number of thicknesses of paper interposed between the side of the bobbin and the branch of the spring *n*. In order that the friction may be equable, and that there may be no surfaces of metal in rubbing contact, the bottom of the bobbin-socket in the shuttle is lined with one or more disks, (denoted by the line *r*, Figs. 10 and 10^b,) and the rim of the socket is lined with a hoop of the same material, as denoted by the line r^1, Fig. 10^c. This hoop-lining is conveniently held in its place by introducing its ends through a slit into a hole, r^2, drilled transversely through the shuttle, and securing them there by the insertion of a wooden peg between them.

The method above described of packing the sides of the bobbin in its socket in the shuttle enables the operator to use bobbins of different sizes, as the difference in size may be made up by the insertion of a greater or less number of thicknesses of paper or other packing material. The operator can thus use a thin bobbin for fine thread in a shuttle adapted to receive a thick bobbin for coarser thread, thereby maintaining the thread at a more uniform distance from the eye *e'*, by which the thread passes from the bobbin-socket. If found expedient, one or more of the thicknesses of paper may be slightly greased to reduce the friction somewhat.

The needle-thread is drawn from a spool, Q, which is applied to a standard, R, secured to the needle-arm D. It is so drawn from the spool by means of a thread-slackener, and passes from it to a thread-tension, whence it passes to a take-up mechanism before being conducted to the needle-eye. The thread-slackener consists of a lever, S, which is pivoted to the needle-arm D, extends tranversely over the needle-shaft F, and has an eye in its end, through which the needle-thread is passed. The needle-shaft immediately beneath the lever S is partially cut away on one side, so that it forms a cam, which alternately permits the lever to descend and compels it to rise. The thread from the spool is passed through a fixed eye, *p*, secured to the needle-arm below the end of the lever S; thence it is passed upward to and through the eye of the lever S, and is returned downward through the same fixed eye upon the needle-arm. The needle-thread, after passing the second time through the fixed eye, is inserted in the thread-tension T. This apparatus is composed of a series of springs, t^1 t^2 t^5, pressed toward a fixed plate, t^4, by means of a hinged bar, t^5, to which the springs are secured, and which is moved by a thumb-screw, t^6, so that the pressure of the springs may be adjusted simultaneously by turning the screw t^6. There is also a swinging gate or nipper-jaw, *t*, at the end of the tension at which the thread enters, and it is pressed toward the fixed plate or jaw t^4 by a slight spring, t^7, so as to nip the thread and prevent it from being pulled backward out of the thread-tension, while it permits the thread to be drawn easily forward toward the eye t^8, at which it issues from thread-tension. The thread is introduced between the swinging gate *t* and springs t^1 t^2 t^3 on one side, and the fixed plate t^4 on the other, so that the drawing of it through the apparatus in the forward direction, as indicated by the arrow in Fig. 6, is resisted by the friction due to the pressure of the swinging-gate and of the springs, each of which resists its

movement, and thereby makes tension upon it. As the thread is thus subjected to the action of a number of tension-instruments, which constitute sections of the thread-tension, and which operate upon it successively and at a distance from each other, and are each of slight force, the passage of a thickened portion of the thread, or even of a knot, through such a tension does not materially change the aggregate resistance of all the tension-instruments, and consequently does not materially change the tension at the sewing-point, because the knot affects but one section of the tension at a time, and the difference in the pressure of that one is but a small fraction of the entire pressure. As the springs or sectional tension-instruments t^1 t^2 t^3 are all connected with one movable bar, t^5, they may all be adjusted at one operation by the turning of the screw t^6, which is a very convenient arrangement.

The swinging nipper-jaw t prevents the withdrawal of the thread in a backward direction from the thread-tension; hence, whenever the loop of thread t^9, extending through the eye of the lever S, is made too short, by the passage of the thread to the thread-tension, to permit the rise of the lever S, such rise extends the loop by pulling an additional quantity from the spool. The rise of the lever is so timed (by the form of the lever-cam) relatively to the movement of the needle that the lever is left down when the needle is drawing thread through the tension; hence the lever then permits the thread to hang loose and slack for the thread-tension, and is a vibrating thread-slackener.

The take-up, for taking up the slack needle-thread left by the passage of the shuttle through the loop carried through the cloth by the needle, consists of a lever, U, to which a vibrating motion is imparted by a cam, V, secured to the hub E′ of the needle-shaft, and a spring, U′, which acts antagonistically to that cam V. The lever is made adjustable in length by constructing it of two parts—viz., the stock u and the arm u^1. The former is pivoted to the needle-arm, and is provided with the projection u^2, upon which the cam operates. The arm has an eye, u^3, formed at its upper end for the thread. Its lower end is inserted into a perforation in the stock, and is secured there, with its eye u^3 at any desired position from the pivot, by a clamp-screw, u^4, which also forms the bearing of the spring U′. The thread, passing from an eye, t^8, at the end of the thread-tension, is conducted backward to and through the eye u^3 of the take-up, and thence is returned in a forward direction and passed through an eye-guide, u^5, secured to the upper forward end of the needle-arm, whence it passes down to the eye of the needle. A loop of needle-thread is thus held by the take-up, which gives it up as the needle descends, and as the shuttle enters and extends the loop of thread presented to it by the needle, and takes it up after the shuttle has passed through the loop. The form of the cam V is such as to permit the forward movement of the take-up lever, and to effect its backward movement for these purposes at the proper times.

The material to be sewed is moved forward at intervals (when the needle is not in it) by means of a toothed feed-bar, K′, whose toothed head K moves in an opening in the table-plate of the machine, and is pressed upward against the under side of the material sufficiently to indent its teeth in it, and to raise it above the circular ridge e of the throat-plate I by means of a cam, k, formed upon the rim of the disk or hub M of the shuttle-drivers. After the material has been moved forward the cam, passing by the feed-bar, permits it to descend in its opening and lower the material upon the throat-plate, where it re-engages with the circular-ridge e when the ridge is used. Materials of different character require the feed-bar to rise different distances to be fed to the best advantage. In order that the present machine may be adapted to feeding to the best advantage every material it is adapted to sew, a wedge-formed block, k^1, is introduced between the cam k and the feed-bar K′, and means are provided to move the block in the direction of its length, so as to introduce a thicker or a thinner part of it between the cam and the feed-bar, and there, by cause the feed-bar to rise more or less, depending upon the position of the wedge-block which thus regulates the rise of the feed-bar. The wedge-block is secured to a link, k^2, which is pivoted to a bracket, k^3, that is secured by a screw, k^4, to the under side of the table-plate of the machine. The screw passes through a slot in the bracket, so that when the screw is slacked the bracket may be moved to move the wedge-block lengthwise to the required position, and then it may be clamped fast by retightening the screw. For convenience of operation, the screw is formed with a square head, so that a socket key or wrench can be applied to it.

The feed-bar is caused to move horizontally, for the purpose of feeding the material and returning to take a new hold of it, by the lateral movement of a bar, W, to which a reciprocating movement in the direction of its length is imparted by means of a cam, W^1, and a spring, w. The cam W^1 is formed upon one end of the shuttle-driver cam O^2, and it operates upon the reciprocating bar W through the intervention of an upright lever, W^2, whose lower end bears against a pin, n, projecting from the side of the reciprocating bar. The spring w operates directly upon the reciprocating-bar W, and antagonistically to the cam W^1. One end of the reciprocating bar is guided longitudinally by means of a guide-pin, n^1, that is received in a longitudinal slot in the reciprocating-bar. The other end of the reciprocating bar is forked to embrace a pin, n^2, projecting downward from the feed-bar K′, so that the movement of the

bar in the direction of its length alone does not affect the feed-bar. The lateral movement of the feed-bar is effected, as described in my patent dated the 11th day of December, 1866, by a regulating-plate, X, which is arranged to turn on its center in a socket in the table-plate, and is perforated with a slot, x, in which a pin, n^3, projecting upward from the reciprocating bar W works, the slot x being set at a greater or less inclination to the length of the reciprocating bar W by turning the regulating-plate on its center, so as to vary the lateral movement of the reciprocating bar, and consequently the extent of feed, and the direction of the feed being reversed by turning the regulating-plate sufficiently to change the direction in which its slot crosses the central longitudinal line of the reciprocating bar W. The regulating-plate is turned by means of a regulating-lever, Y, which is connected with the regulating-plate X by means of a link, x^1, that is pivoted at one end to the lever, and at the other to an ear, x^2, projecting from one side of the regulating-plate. When this lever is placed perpendicularly to the line of the link x^1, the slot of the regulating-plate X is in line with the reciprocating bar W. Then the latter has no lateral motion imparted to it, and consequently the feeding bar is not moved longitudinally, and does not feed the material. When the lever Y is moved to one side of that perpendicular position, the regulating-plate is turned, and its slot crosses the central line of the reciprocating bar in one direction, thereby causing that bar and the feeding-instrument to feed the material in one direction, and when the lever Y is moved to the other side of its perpendicular position, the regulating-plate X is turned to present its slot crosswise to the central line of the reciprocating bar W, but in the opposite direction to the previous one, so that the feed is reversed. The distance to which the lever Y is moved in either direction from its perpendicular or central position determines the extent of feed by setting the regulating-plate at a greater or less inclination to the central line of the reciprocating bar, and thereby causing the latter to move laterally to a greater or less extent. It is frequently desirable that the extent of feed in opposite directions should be the same when the direction is reversed, and that the feed mechanism may be readily set for this purpose. In order that the feed mechanism of the machine I am describing may be so set, a sliding stop, Z, is applied to the regulating and reversing lever Y, and is connected with it by a clamp-screw, z, which may be slackened and tightened to loosen and clamp the stop. This stop, when set in any position, limits the extent of feed by striking the edge of the table-plate A of the machine, and limiting the movement of the lever Y; and as the stop is attached to the lever, it is carried by it in whichever direction it is moved, so that one stop limits the movement of the lever in both directions from its central position, and consequently determines the extent of feed in both directions. As the lever Y has a long radius in the present machine, the edge of the table-plate in the vicinity of the lever is made V-formed, as shown in dotted lines at Fig. 4, so that the stop must be moved a greater distance than it otherwise would have to be to permit a given extent of feed, and consequently less accuracy is required in setting the stop.

The pins n^2 n^3 of the feed-bar and of the reciprocating bar constitute bearings upon which the strain of the feed is sustained. In order that these pins n^2 n^3 may be at about the same level, notwithstanding the attachment of one to the feed-bar and the other to the reciprocating bar, the end of the reciprocating bar W is bent upward, as seen at w^3 in Fig. 1, so that the strains upon the two pins n^2 n^3 are at equal distances from the reciprocating bar, and consequently there is no material tendency to rock it.

Having thus described a machine embodying all my improvements, what I claim as my invention in sewing-machines, and desire to secure by Letters Patent, is—

1. The combination of a round needle-bar and a round presser-foot stem by means of sliding brackets, substantially as set forth.

2. The combination of a reciprocating spring shuttle-holder with a shuttle-guide in such manner that the former, while moving with the shuttle, is caused, during a part of its movement, to press strongly against the shuttle by the action of the shuttle-guide, substantially as set forth.

3. The combination of a shuttle constructed to oscillate in a sewing-machine with a projecting thread-guide for the delivery of thread, substantially as set forth.

4. The construction, in a sewing-machine, of the lateral support for the oscillating shuttle with a central opening, substantially as set forth.

5. The shuttle constructed with an ear projecting at its butt beyond the bobbin-socket, substantially as set forth.

6. The combination of the shuttle with a spring-ring so arranged as to hold the bobbin in its socket in the shuttle, substantially as set forth.

7. The combination of the shuttle with a spring-ring provided with a branch to make pressure upon the bobbin, substantially as set forth.

8. The combination of the shuttle with a lining in the bottom of its bobbin-socket, substantially as set forth.

9. The combination of the shuttle with a hoop-lining in its bobbin-socket, substantially as set forth.

10. The combination of several sections of a sectional thread-tension with one movable stock, substantially as set forth.

11. The combination of the arm of the thread

take-up with its stock by means of an adjustable connection, substantially as set forth.

12. The combination of the regulating lever of a reversible-feed mechanism with a stop carried by said lever, substantially as set forth.

13. The combination of the turning regulating-plate and feeding-instrument of a sewing-machine by means of a bent reciprocating bar, substantially as set forth.

In testimony whereof I have hereunto set my hand this 3d day of November, 1865.

ISAAC MERRITT SINGER.

Witnesses:
BENAJAH LEFFINGWELL,
INSLEE A. HOPPER.