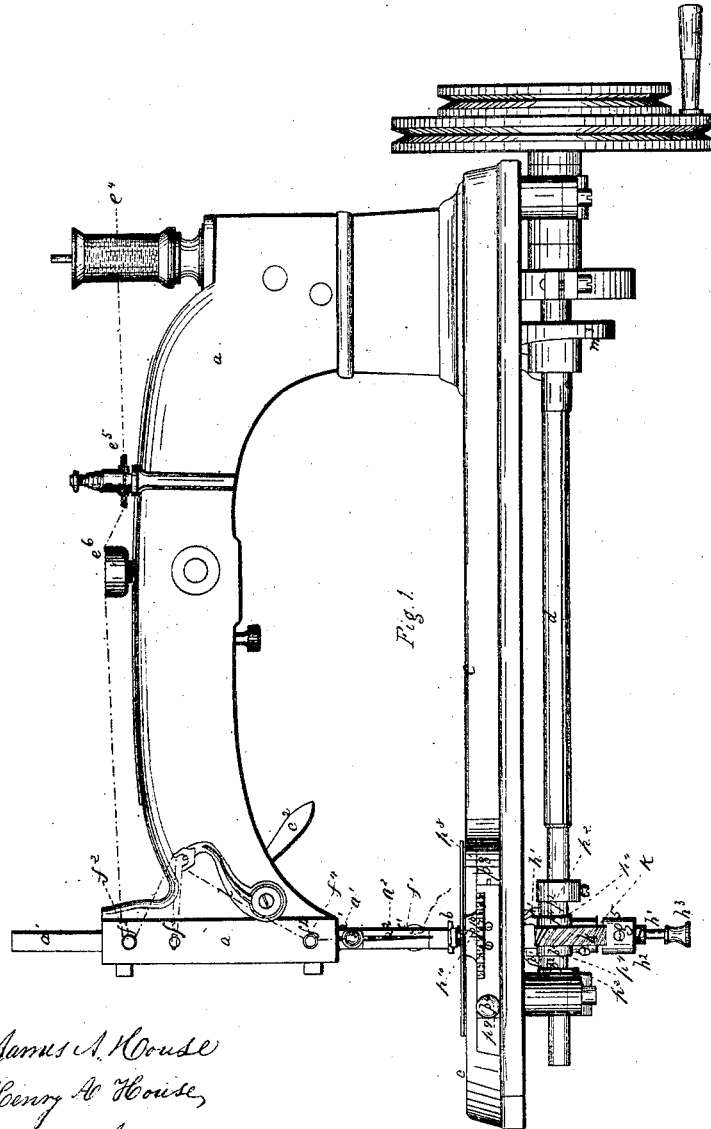


J. A. HOUSE & H. A. HOUSE.  
Improvement in Sewing-Machines.

No. 114,294.

Patented May 2, 1871.

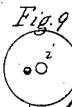
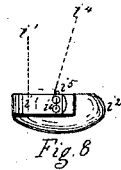
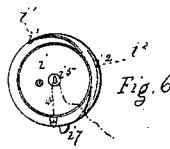
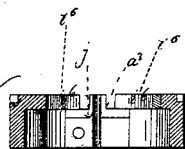
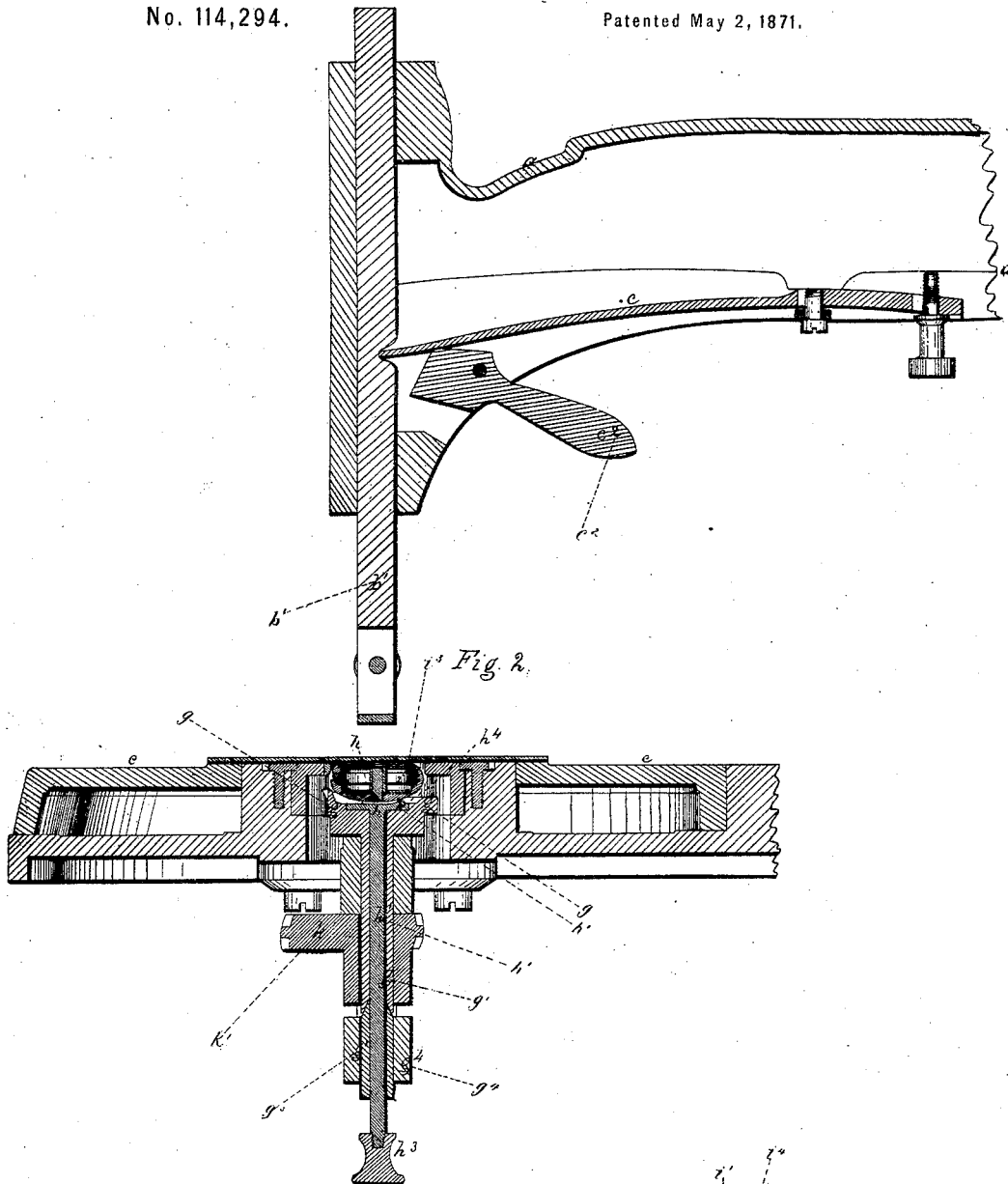


James A. House  
Henry A. House,  
Inventors

In presence of

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Charles H. Dimond

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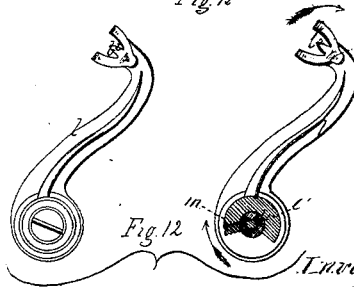
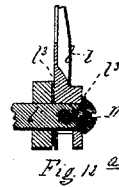
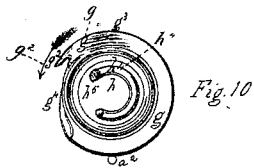
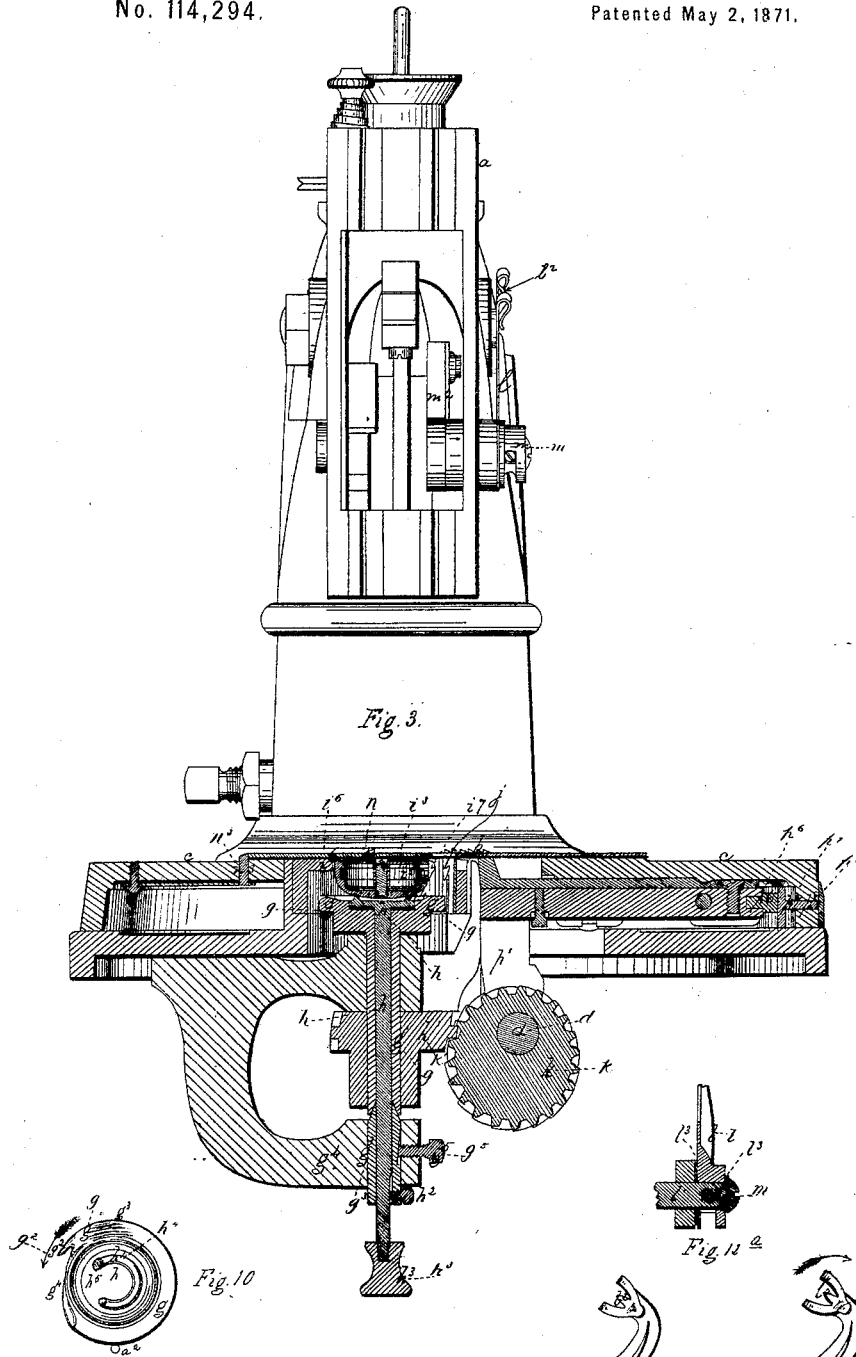
Witnesses  
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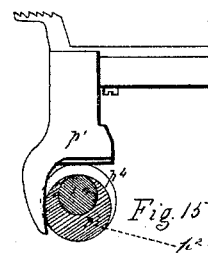
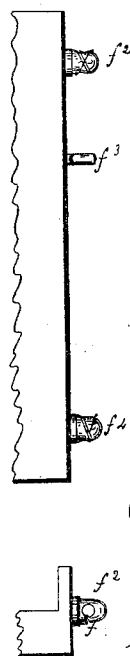
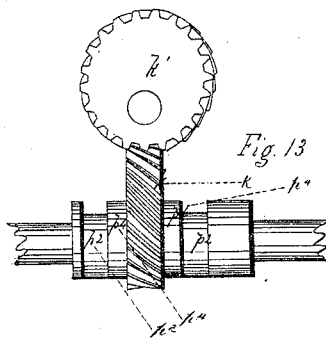
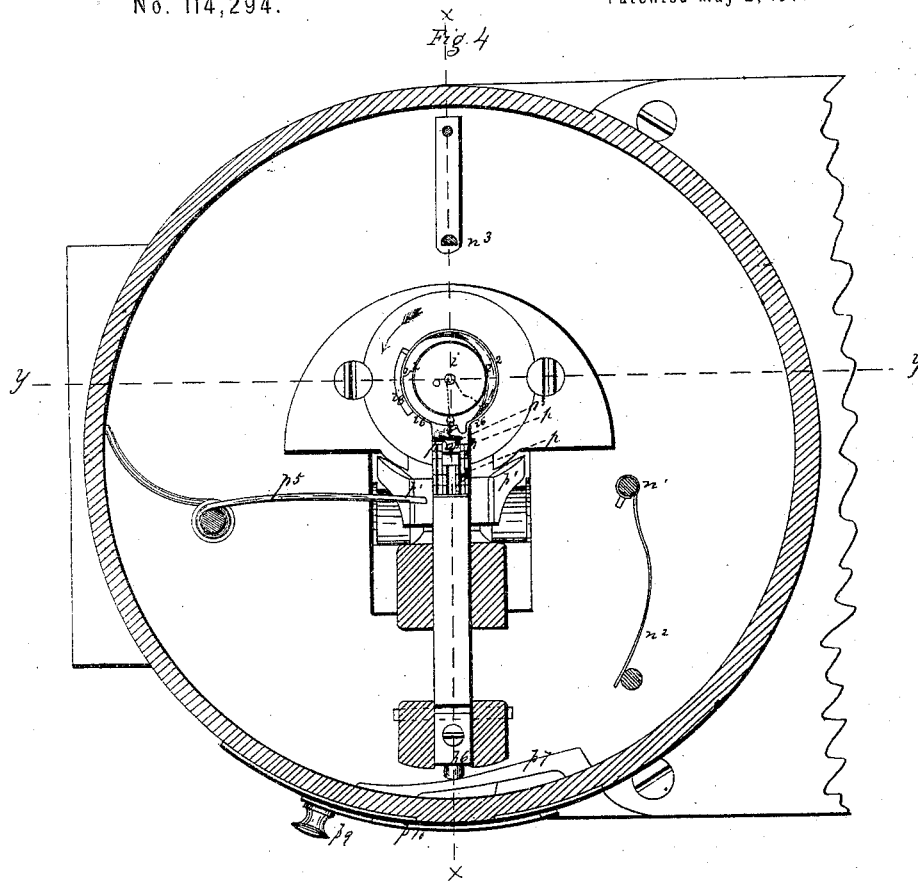
Witnesses.  
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*Witnesses.*

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Fig. 14

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# UNITED STATES PATENT OFFICE.

JAMES A. HOUSE AND HENRY A. HOUSE, OF BRIDGEPORT, CONNECTICUT,  
ASSIGNORS TO WHEELER & WILSON MANUFACTURING COMPANY, OF  
SAME PLACE.

## IMPROVEMENT IN SEWING-MACHINES.

*Specification forming part of Letters Patent No. 114,294, dated May 2, 1871.*

*To all whom it may concern :*

Be it known that we, JAMES A. HOUSE and HENRY A. HOUSE, both of Bridgeport, in the county of Fairfield, in the State of Connecticut, have invented certain new and useful Improvements in Sewing-Machines; and that the following, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings which represent a machine embodying our invention, Figure 1 is a side elevation of the machine on a scale one-half of that of the other figures. Fig. 2 is a vertical section through parts of the machine in the line *yy* of Fig. 4. Fig. 3 is a vertical section of the parts of the machine on the line *xx* of Fig. 4, and an elevation of other parts, with the face-plate, needle-carrier, and presser-foot carrier removed. Fig. 4 is a plan of parts of the machine with the plate which constitutes the supporting-table or platform removed. Fig. 5 contains two vertical sections at right angles to each other through the bobbin-container. Fig. 6 is a plan of the bobbin and bobbin-case. Fig. 7, a horizontal section through the same. Fig. 8 is an elevation of the bobbin-case. Fig. 9 is a plan of the bobbin. Fig. 10 is a plan of the hook and the bobbin-case supporter. Fig. 11 is an elevation of the hook. In Fig. 12 are shown two elevations of the take-up lever, one of them being partially in section, in order to exhibit the pin and shaft which actuate that lever. Fig. 12<sup>a</sup> is a partial section through the take-up lever and its driving-shaft in the line of the axis thereof. Fig. 13 is a plan of the preferred kind of cog-gearing and of the shaft and cams which actuate the feed-bar. Fig. 14 exhibits the thread-guides in plan and elevation, and Fig. 15 is an elevation of the feed-bar and one of its pendants.

These improvements all relate to that class of sewing-machines in which a loop of needle-thread is extended or expanded by a revolving hook and passed around a bobbin, one part of the bight or loop of upper or needle thread being passed between the bobbin and the hook; and we wish it distinctly understood that this class of machines is not to be con-

founded with that other class of machines in which a shuttle revolving upon its own axis is employed, such shuttle acting, by means of a hook making part thereof, to draw out loops of needle-thread and pass them around itself, and consequently around the bobbin contained in the shuttle, and such shuttle and its hook being of necessity separate from and not connected with a shaft or any other means for causing it to revolve.

The class of machines upon which our improvements are based are usually known as Wheeler & Wilson machines, and our improvements have been invented chiefly with a view of enabling revolving-hook machines to sew heavy material, thick cloth, leather, &c., and also to permit the use of a bobbin containing a much greater quantity of thread than can be wound upon the bobbins of machines of that class.

Some of our improvements are applicable to sewing-machines of other classes or varieties, and we intend to use them in such machines.

The machine shown in the drawings is one of the straight-needle variety; but a curved needle, mounted in an arm oscillating on a shaft or center, may be employed.

This machine has a bracket, *a*, for supporting the needle-carrier *a'*, presser-foot carrier *b'*, &c., and also a table or platform, *c*, beneath which the driving-shaft *d* may be arranged.

The needle *a*<sup>2</sup> may be driven from the main shaft through the intervention of any suitable train of mechanical devices. We prefer an eccentric on the driving-shaft, actuating, by means of a connecting-rod, a lever inclosed in the bracket, one end of which lever in its vibrations causes the needle-carrier to reciprocate.

A presser-foot or contrivance for holding the material to be sewn down upon the feeding-surface and the table may be arranged in any usual manner. We prefer to mount the presser-foot *b* upon a vertical sliding bar, *b'*, forced down by a spring, *c*, and lifted, when necessary, by a lever, *c'*, lying behind the bar *b'* and beneath the bracket. This lever may

act either upon the spring or upon the bar itself.

The bobbin for the upper thread may be mounted in any convenient place, as at  $e^4$ , with a tension apparatus, as at  $e^5$ , and an oil-vessel, if desired, as at  $e^6$ , the latter being useful when leather is sewn, and the thread being caused to pass through the oil in any usual or proper manner.

Any proper guides or eyes may be used between the tension and the needle-eye. We prefer to use such guides as are shown specially in Fig. 14. These guides are the usual eyes, with a diagonal slit,  $f$ , cut from the eye proper or orifice to the outside. It is cut into that side of the orifice against which the thread does not usually bear, and it furnishes a convenient means for threading the eye, while at the same time, owing to its diagonal position and the fact that it is on the inactive side of the orifice, it affords no facility for the accidental escape of the thread during the working of the machine.

The hook of the machine revolves continuously in the same direction, and is represented at  $g$ , and its shaft at  $g^1$ . This hook consists of a hook proper or seizing-point,  $g^2$ , making part of an irregular cylinder, having a depression at  $g^3$ , which permits the lower part of the bight of needle-thread to pass under the bobbin, and a depression and bevel at  $g^4$ , which facilitate the slipping off of the loop. In the operation of this hook the lower part of the bight of needle-thread passes under the bobbin, and the upper part of the same bight over the bobbin; and as this lower part leads from the needle-eye, and the upper part from the under side of the cloth, and the seizing part of the hook lies some distance below the cloth, (see Fig. 2,) it will be perceived that the loop has a wide throat or base, and that it is well suited for surrounding a thick bobbin. Owing to this peculiar conformation, and consequent peculiar action of the hook, the apex of the loop, or that part of it held on the hook proper, forms a round turn of needle-thread around the seizing part of the hook just prior to the time when the loop is cast off from the hook; but we find, in practice, that this turn slips freely off of the point of the hook when the hook and needle are about in the relative position shown in Fig. 10, and that the formation of this round turn is in no way objectionable.

The seizing, expanding, and casting-off functions and operations of the hook are the same as in former known rotary hooks of the machines of the Wheeler & Wilson system. So long as the hook is so formed as to pass the loop of needle-thread, as described, and seize, expand, and cast off such loops, its precise shape is immaterial.

This hook also differs in arrangement, with respect to the needle, from ordinary Wheeler & Wilson machines, inspection of the drawings showing that its shaft and axis of revo-

lution are in a plane parallel with that in which the needle reciprocates, or nearly so, whereas in former machines the shaft of the hook lies in a plane perpendicular to that in which the needle reciprocates.

This arrangement of the hook causes the loop to be drawn out in planes nearly parallel with the lower surface of the material being sewn, and with a side draft from the needle, instead of a downward one, as usual, and thus, as before described, much facilitates the formation of a wide loop, or one that will surround a thick bobbin.

The bobbin may lie upon the metal forming the hook and revolving with it, as would be the case if the piece  $h$ , which we call the bobbin-supporter, were made in one piece with the hook or so attached thereto as to rotate with it; but we prefer to use a hollow tube for the hook-shaft, and to place within it a rod,  $h^1$ , to which is attached the bobbin-supporter  $h$ .

This rod tends to revolve by the friction of the hook-shaft upon it and the friction of the hook upon the bottom of the bobbin-supporter, and is prevented from revolving by means of a set-screw,  $h^2$ , or other proper device; and we prefer to permit the set-screw to bear in such way upon the rod that the latter will be free to slide up and down.

By applying the finger to the button  $h^3$  the rod and bobbin-supporter may be lifted so that the latter rises level, or nearly so, with the table of the machine, and this sliding of the supporter much facilitates the removal and introduction of bobbins.

By supporting the bobbin on a non-rotating support we prevent the rubbing action between the hook and bobbin, and also all tendency of the hook to revolve the bobbin, and are enabled consequently to sew more regularly, with greater certainty of the same tightness of each stitch.

The upper and acting surface of the bobbin-supporter may be shaped as a flat or dished or irregular surface; but the best plan is to form it as a ring or annular elevation,  $h^4$ , the bobbin resting upon the ring, and thus affording free space for the needle-thread to pass under the bobbin, the thread being hampered only where the bobbin rests upon the ring; and we further prefer to cut away a part of the periphery of this ring, as at  $h^5$ , (see Fig. 10,) and to arrange the gap in such relation to the needle that the loop at the time when it is cast off by the hook is not nipped at all between the bobbin and the ring, and it therefore opposes no resistance when drawn up.

Upon the supporter or the center part of the hook any of the usual circular bobbins of this class of machines may be placed, and these bobbins may be made much thicker than usual at and near the centers thereof, so as to contain more thread; but we prefer to employ a bobbin,  $i$ , inclosed in a case,  $i^1$ .

When a case is used, one of its special offices is to shut up the slit between the upper

and lower heads of the bobbins, and thus prevent loops of needle-thread from entering and being caught in this slit, and a mere ring will serve this purpose, provided it be slightly flanged inward at bottom, so that the bobbin may rest in it; but we prefer to make the case with a bottom, and to round the bottom so as to present as little obstacle as possible to the passage of one part of the loop beneath it, and also to bevel the top on one side thereof, (see *i*<sup>2</sup>, Figs. 1, 6, and 8,) so as to permit the other part of the loop to slip freely over its edge.

Another special office of the bobbin is that it affords a support for a tension device for putting tension upon the lower thread, and we intend to use any proper usual device, such as holes, through which the thread is passed as in shuttles, but we prefer a spring-ring, *i*<sup>3</sup>. (See specially Fig. 7.) This spring tends to expand and bears against the inside of the bobbin-case, and a part of it projects through a slit in the periphery of the case.

The bobbin-thread is passed through a hole in the case, such as *i*<sup>4</sup>, and the spring is then, by means of the projection, revolved in the direction of arrow, Fig. 7. This turning of the spring nips the thread between the spring and the case, and a greater or lesser degree of tension may be attained by turning the end of the spring to a greater or lesser distance past the hole.

We sometimes intend to form a groove on the outside of the bobbin-case and locate in it a spring-ring, tending to diminish its diameter. By sliding this ring the nipping of the thread is produced in the same way and substantially by the same means.

The thread may lead directly from the exterior of the bobbin-case to the under side of the cloth when the machine is in operation, and good sewing effected, but as the bobbin-case tends to tip and oscillate under the action of the loop passing around it, thus disturbing the efficient tension on the bobbin-thread, and as we desire to attain as near as possible to perfection, we lead the thread back again toward the center of the bobbin through another hole just above *i*<sup>4</sup>, and hook it under a little hook, *i*<sup>5</sup>, attached to a spindle projecting upward from the center of the bobbin-piece. The thread then lies as in Fig. 6, and always leads from the center of the bobbin, and is not affected by any oscillation or tipping thereof.

The bobbin is made with a hollow axis as usual, and the spindle supporting the little hook *i*<sup>5</sup> passes up through this axis.

The bobbin or bobbin-case when used is held in place by the bobbin-container, which is the inner surface or bore *i*<sup>6</sup> of a short cylinder or ring; this ring may be supported and held in place in any proper or convenient manner so long as it surrounds the bobbin or bobbin-case, substantially as shown in the drawing.

In order to prevent oscillation or revolution of the bobbin-case upon its own axis there is applied to it a small nose or projection, *i*<sup>7</sup>, which (see specially Fig. 4) enters into a recess cut into the bore of the restraining-ring *i*<sup>8</sup>, and as the bobbin or bobbin-case sometimes, while the loop is being put over it, knocks noisily against one part of the ring, there is applied to the ring and making part of it a piece of rawhide, hard leather, india-rubber, or substance of similar cushioning properties, *i*<sup>9</sup>, against which the bobbin-pin strikes at such times.

Neither the nose nor the cushion-piece is essential, but they tend to perfect the machine.

The rotating hook may be caused to revolve in any usual or proper manner, care being taken as usual that the hooked part thereof shall at the proper time seize the loop of needle-thread. We prefer to drive it from the main shaft by means of any proper gearing, and have essayed with success common miter or bevel gear, especially where the hook is so geared that it makes two complete revolutions to each stroke of the needle instead of one revolution at each stroke, as usual in revolving-hook machines.

The hook when thus geared up seizes a loop at each alternate revolution only, and the object of giving it this double speed is that it may draw out and cast off the loop quickly, thus giving more time in proportion for the pulling up of the loop by the take-up than when the hook makes only one revolution for each stroke of the needle.

The pulling up of the loop is accomplished chiefly during the time occupied by those revolutions of the hook during which no needle-thread is seized.

The plan, however, which we prefer is to drive the hook with a differential or varying velocity during each revolution, and we intend to effect this by any means known to mechanics, suitable for the purpose, but propose usually to employ a kind of gearing which we believe to be new, viz., two irregular oval or eccentric screw gear-wheels whose axes lie in planes at right angles to each other.

By reference to the drawings it will be perceived that one of these gear-wheels *k* is mounted upon the main shaft, and the other, *k'*, upon the shaft or axis of the revolving hook.

This shaft rests upon a hollow cone, *g*<sup>3</sup>, which is free to slide in the stationary arm *g*<sup>4</sup>, and is held in place by a set-screw, *g*<sup>5</sup>, the gist of the construction being that the support which carries the hook, and consequently the hook itself, shall be adjustable.

The cogs on these gear-wheels are cut according to well-known rules for cutting screw-gear, and the contour of the wheels themselves is substantially such as is shown in the drawings, and they are so arranged in reference to each other, to the hook, and the needle

that the hook moves with greater velocity during the time of seizing and expanding or drawing out the loop and with less velocity during the time that the loop is being drawn up or pulled up by the thread-controller or take-up.

The loop which surrounds the bobbin must be as wide open as the thickness of the bobbin, and as the hook pulls out or opens the loop in planes substantially at right angles to the plane in which the needle vibrates, and as the bobbin lies above the hook, it is well to prevent as much as possible side strain upon the needle, and to hold down that part of the loop which goes under the bobbin.

In order to accomplish these results there is applied near the needle  $a^2$ , which is contained when below the cloth in the groove  $a^3$ , a small stationary hook,  $j$ , (see special Fig. 5;) this hook is so shaped and located, substantially as shown, that the rotating hook revolving in the direction of the arrows, Figs. 4 and 10, draws the lower part of the seized loop behind the hook  $j$ , so that it rests in the gap  $j'$ . As the revolving hook continues to expand the loop the draw or pull of the thread, in consequence of its being caught behind the stationary hook, tends to pull the needle downward instead of sidewise, and the lower part of the loop is prevented from being drawn up by the needle. At or about the time that the loop is fully formed the lower part of it is carried in such direction by the seizing part of the rotating hook, and is so held down by the bobbin, that this lower part pulls on the stationary hook in a direction somewhat in reverse to that in which it pulled at the commencement of the drawing-out operation, and therefore slips off the stationary hook under its rounded point. This stationary hook may be used or not used, but the machine works better when it is furnished with a stationary hook.

Any proper feed-motion may be used in connection with the stitching mechanism, but the ordinary four-motion feed, consisting of a notched or roughened bar acting in combination with a smooth surface pressing the cloth down upon the roughened surface, is preferred.

As this machine is intended specially for use in heavy work a strong feed is needed, and it is better to arrange the rough surface  $p$  on both sides of the needle, (see specially Fig. 4;) when this surface is thus arranged and the feed-bar lies directly over the gear-wheel upon the main shaft it is impossible to arrange the cams which lift and push it in the direction of the feed directly under the bar, and if these cams are arranged on one side only of the cog-wheels they tend to shog the bar sidewise when resisted by a force equal to that needed to feed the cloth or leather.

In order to obviate this difficulty two hangers or pendants,  $p^1 p^1$ , are attached to and depend from the feed-bar; these hangers straddle the gear-wheel, and apply themselves

against cams  $p^2 p^2 p^4 p^4$ , arranged on each side of the wheel.

Two of these cams lift the hangers, and consequently the feeding surface, and the other two force the bar forward to feed the cloth while the bar is lifted.

The bar is retracted and forced downward by the spring  $p^3$ . (See Fig. 4.)

The feed-bar is supported in place in any usual or proper manner, and its end or a piece,  $p^6$ , attached to its end farthest from the feeding surface, strikes when thrown back against a wedge-formed stop,  $p^7$ .

This stop is supported in a slot in the edge of the platform (see  $p^3$ , Fig. 9) in such manner that it can be moved or slid to and fro to regulate the distance of retraction of the bar, and consequently the length of stitches.

There is attached to this bar a handle,  $p^9$ , outside of the machine, and also a graduated plate or scale,  $p^{10}$ , and there is engraved upon or attached to the platform of the machine an index line or hand; or the graduations may be marked upon the platform and the hand be attached to the wedge.

The wedge is so shaped and the plate so graduated that the length of the stitch may be regulated prior to the commencement of any sewing, and this facility of setting the feed-bar to any predetermined length of stitch is useful.

In ordinary rotating-hook machines the cast-off loop is pulled up tight by the drawing out of a succeeding loop, and the machine hereinbefore described will sew in that manner.

This method of drawing up the loop involves the pulling of the thread in opposite directions through two thicknesses of the whole pile of material being sewn, and consequently there is great resistance, owing to friction, arising from the fact that the thread is pulled upward through the material by a downward pull upon the same thread passing down again through the material.

In sewing leather and very heavy cloth it is important to avoid this resistance, and in order to do so there is combined with the needle and hook a take-up or thread-controller, located above the cloth, and commencing to draw up the loop at or about the time it is cast off by the revolving hook, and finishing the drawing up before the revolving hook seizes a succeeding loop.

There are many take-ups patented, described, and in common use, especially on sewing-machines of the shuttle variety, which will answer the purpose; but we prefer to use a lever,  $l$ , mounted upon a shaft,  $l^1$ , and tending to remain at rest, this tendency resulting from the employment of a friction-spring or pad or pads,  $l^2 l^2$ , pressing upon the lever by preference near its center of oscillation.

The hub of the lever has a slot cut in it, (see Figs. 3 and 12,) and a pin or arm,  $m$ , attached to the shaft upon which the lever is mounted, enters the slot.



The shaft  $l$  has an arm,  $m^2$ , upon it, and this arm and consequently the shaft and pin are caused to oscillate by means of any proper train of mechanical motions; the cam  $m^3$ , acting by means of a bent lever (mounted and concealed in the bracket) upon the arm  $m^2$ , is the mechanical means employed in the machine shown in the drawings.

The needle-thread leading from the guide  $f^2$  is passed through an eye or hook in the end of the take-up lever; thence through the guide  $f^3$ ; thence again through an eye or hook in the end of the take-up lever; thence through an eye,  $f^4$ ; and thence downward and through the eye of the needle.

When the rotating hook spreads the loop the take-up lever is drawn forward by the thread overcoming the friction of the pads, thus furnishing thread for the loop; and after the loop is cast off the pin  $m$ , in its oscillation, (see Fig. 12,) strikes against the end of the slot in which it plays, and throws the lever back, thus drawing up the cast-off loop above the cloth.

The pin  $m$  oscillates back again in the direction the reverse of the arrow at or before the time that the hook seizes a new loop, thus leaving the take-up lever free to be pulled forward by the thread, as before.

The cam and connections to drive the lever must be so constructed as to perform the drawing-up and permit the spreading at the proper times.

The hook on the end of the take-up lever is formed by punching a hole in the end of it so as to leave a tongue,  $l^2$ , extending into the hole. The punched end of the lever is then bent over on itself, substantially as shown in the drawings, and when thread is passed through the hook the tongue prevents it from escaping, somewhat in the same manner as the snap of a snap-hook.

When the bobbin is wound and put in the case and the thread subjected to the tension and led from the center of the bobbin, as before described, it is to be put into place in its containing-ring upon the bobbin-supporter, and a door-shutter or covering-plate,  $n$ , is shut over it.

This plate is pivoted at  $n^1$ , (see Fig. 4,) and a spring,  $n^2$ , tends to throw it open.

It is prevented from swinging open by means of a spring-catch,  $n^3$ , Fig. 3.

The needle is then to be threaded with the thread led through the tension eyes, take-up lever, &c., and the cloth is to be put in the usual place and pressed down by the presser-foot.

A revolving motion imparted to the main shaft will cause the needle to descend, pierce the cloth, and rise a little; then the hook in its rotation will seize a loop, expand it, and pass it around the bobbin-case and bobbin and cast the loop off, all during a further ascent, or an ascent and partial descent of the needle.

When the loop is cast off it will be drawn up by the take-up, thus inclosing or surrounding

the bobbin-thread; and a subsequent descent of the needle, seizing, expanding, casting off, and drawing up of a loop of needle-thread around the bobbin-thread, will complete a stitch, provided the feeding apparatus acts as usual to advance the cloth while the needle is out of it.

We claim as of our invention—

1. A rotating hook, so formed, substantially as described, as to seize, expand, and cast off loops of needle-thread, as specified, and in its action causing a round turn of thread around the seizing part of the hook.

2. The relative arrangement of a reciprocating eye, pointed needle, and a revolving hook, substantially such as specified, so that the seizing portion of the latter revolves in planes perpendicular to that in which the former reciprocates, the arrangement being substantially such as specified, and both the needle and hook operating substantially as described.

3. The combination of a reciprocating eye-pointed needle with a revolving hook, substantially such as is specified, and a bobbin, when the axes of the two latter are in planes parallel to that in which the needle reciprocates, the relative arrangement being as described.

4. In combination with a revolving hook; a non-revolving bobbin-supporter, provided with a ring or annular elevation, substantially such as described, on which a bobbin or a bobbin-case may rest, as described.

5. A non-revolving bobbin-supporter, provided with a ring or annular elevation having a gap or opening in the periphery thereof, the construction being substantially such as described, when arranged and operating in combination with a revolving hook, substantially as described.

6. A bobbin, in combination with a bobbin-case and a horizontally-revolving hook, all constructed and operating substantially as described.

7. A bobbin, in combination with a bobbin-case, having peripheral eyes or holes, and a central standard with a guide-eye or hook located at the axis of the bobbin, through which bobbin-thread may be led, as described.

8. A take-up lever, mounted upon a shaft and operated in one direction by a pin or arm upon the shaft, and in the other by the pull or draft of the thread, the combination of lever, pin, and shaft being substantially such as set forth.

9. The take-up lever, provided at its end with the double hook and tongue between the two parts thereof, the construction and combination being as set forth.

10. The combination of two irregular eccentric or oval screw-gears, the one mounted upon a shaft lying in a plane at right angles to the plane in which the shaft of the other gear is located, the combination being substantially such as set forth.

11. The combination of two sets of cams,

one set upon each side of a cog-wheel, with two legs or pendants attached to a feed-bar, whereby the feeding surface may be properly actuated when located above the cog-wheel, substantially as set forth.

12. In combination with a revolving hook, substantially such as specified, and mounted upon a vertical axis, an adjustable support,

substantially such as described, for the lower end of the hook-shaft.

In testimony whereof we have hereunto subscribed our names.

JAMES A. HOUSE.

HENRY A. HOUSE.

Witnesses:

G. C. BISHOP,

C. H. DIMOND.