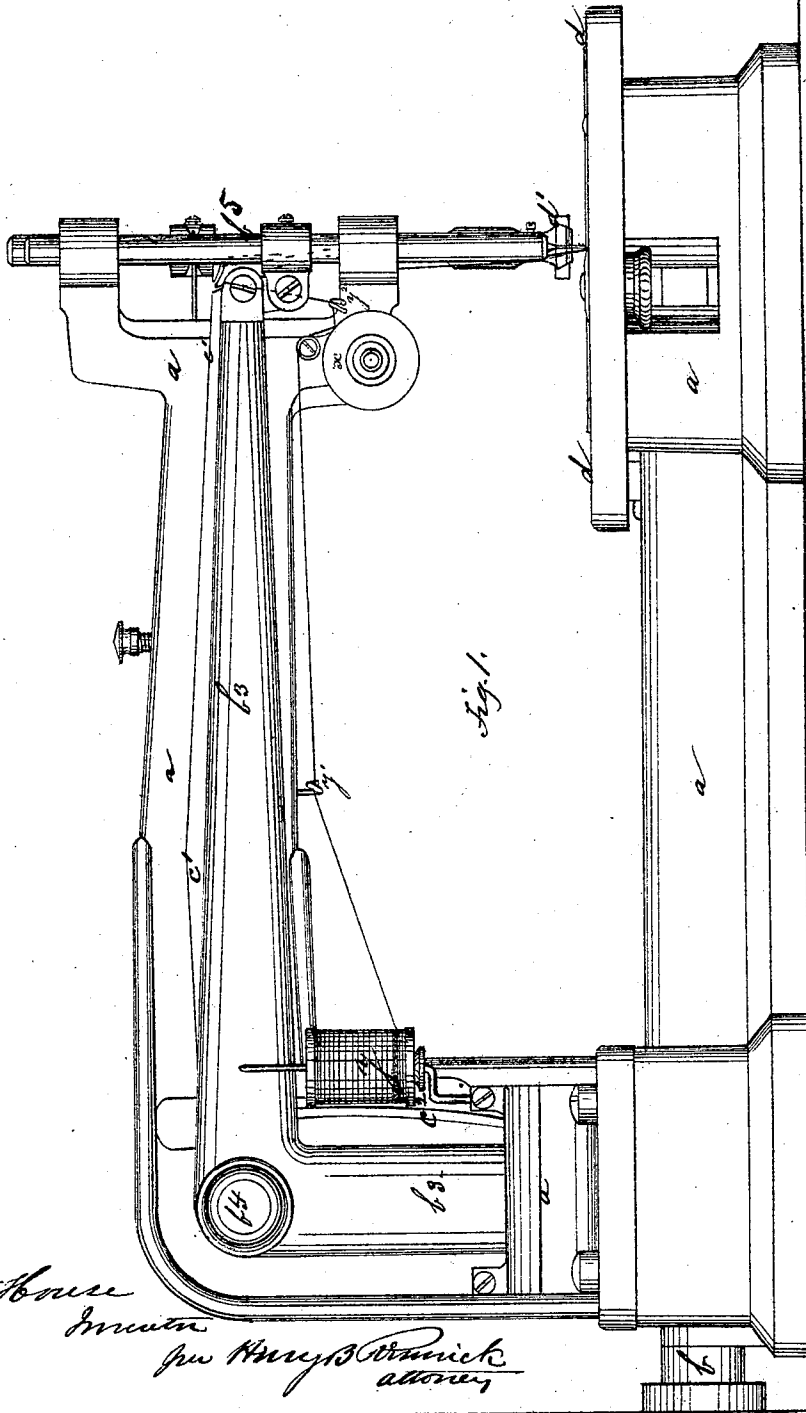


JAMES A. HOUSE.
Improvement in Sewing Machines.

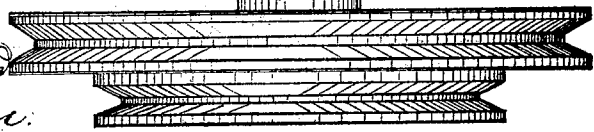
No. 124,360.

Patented March 5, 1872.



James A. House
Inventor
per Henry B. Winnick
attorney

Witness of *Louis Seaman*
W. L. Bennett.



JAMES A. HOUSE.
Improvement in Sewing Machines.

No. 124,360.

Patented March 5, 1872.

James A. House
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per Wm. B. Tompkins
attorney

In presence of Louis Scamman
W. L. Bennett

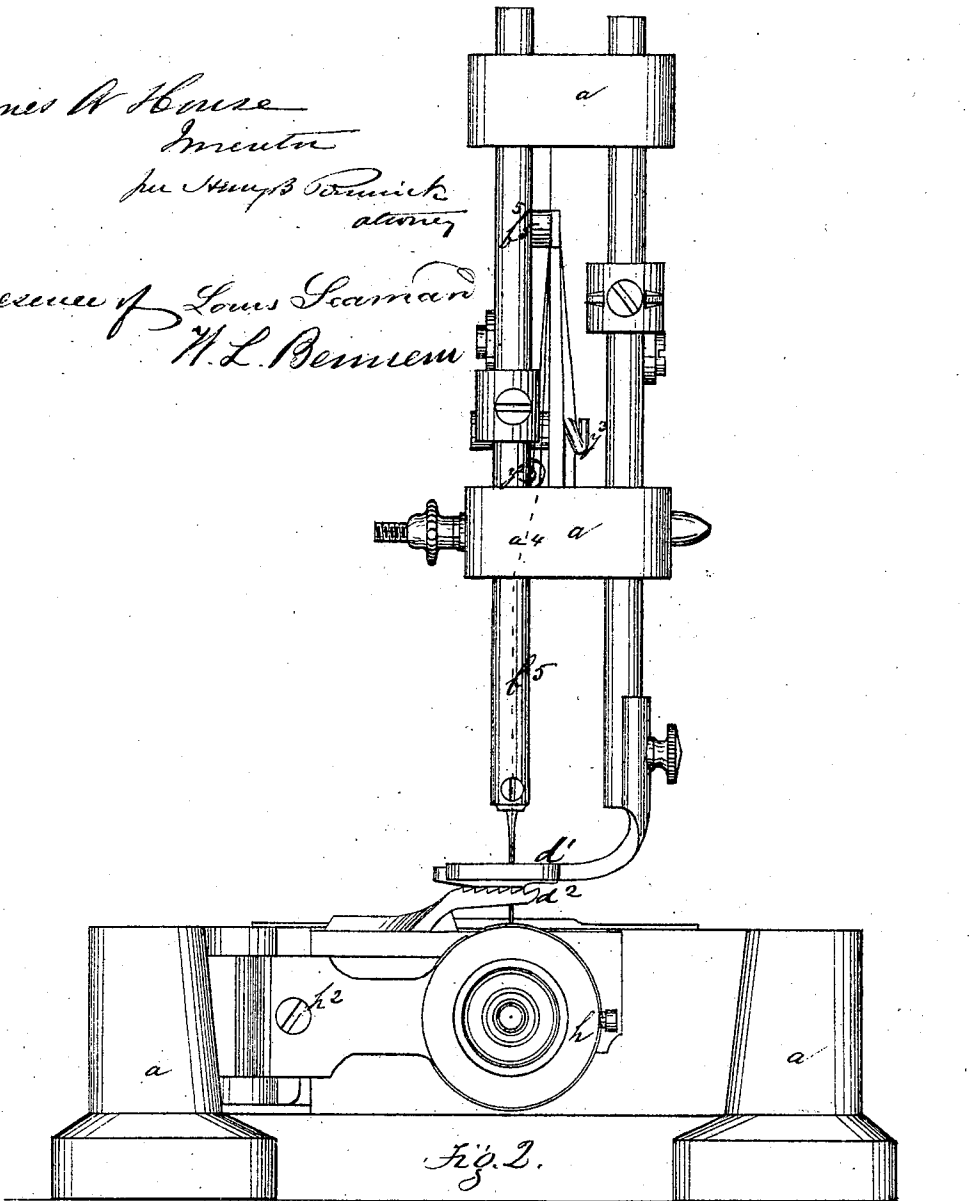
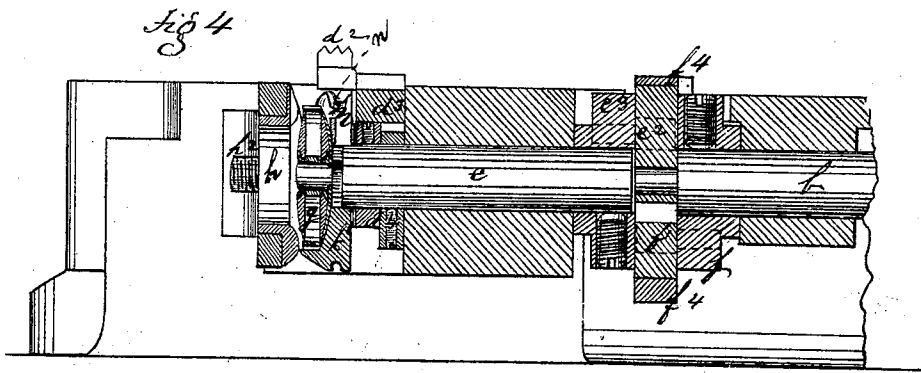
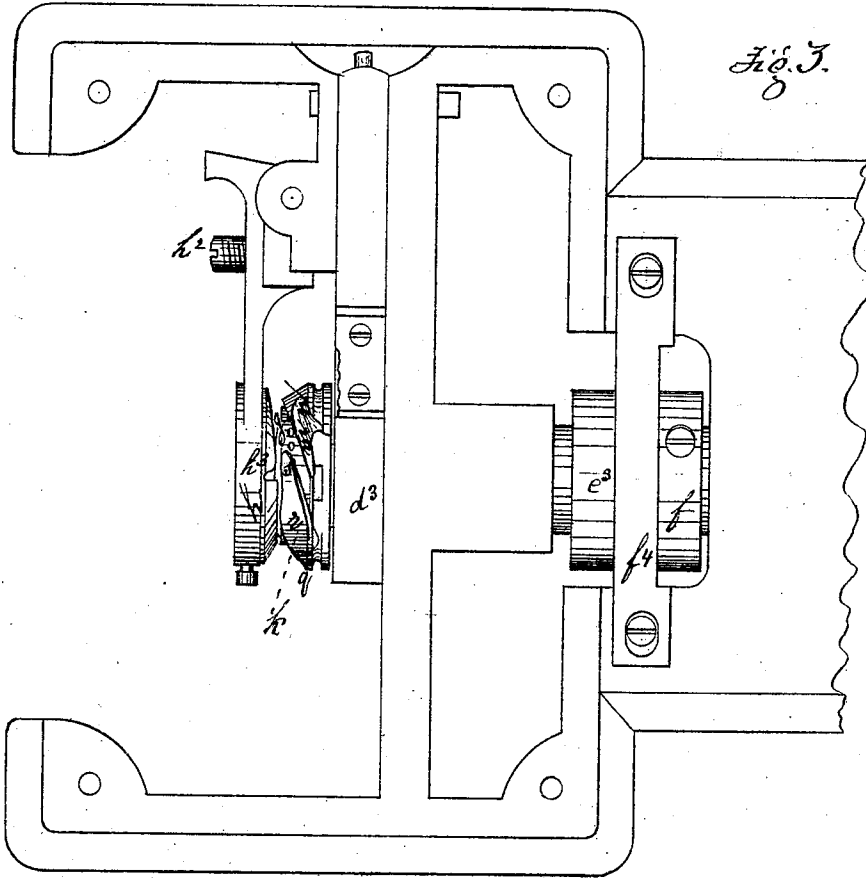


Fig. 2.

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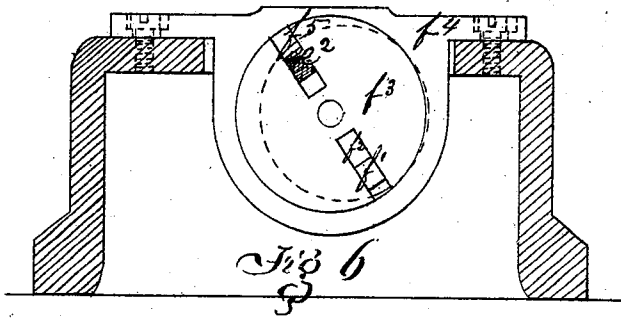
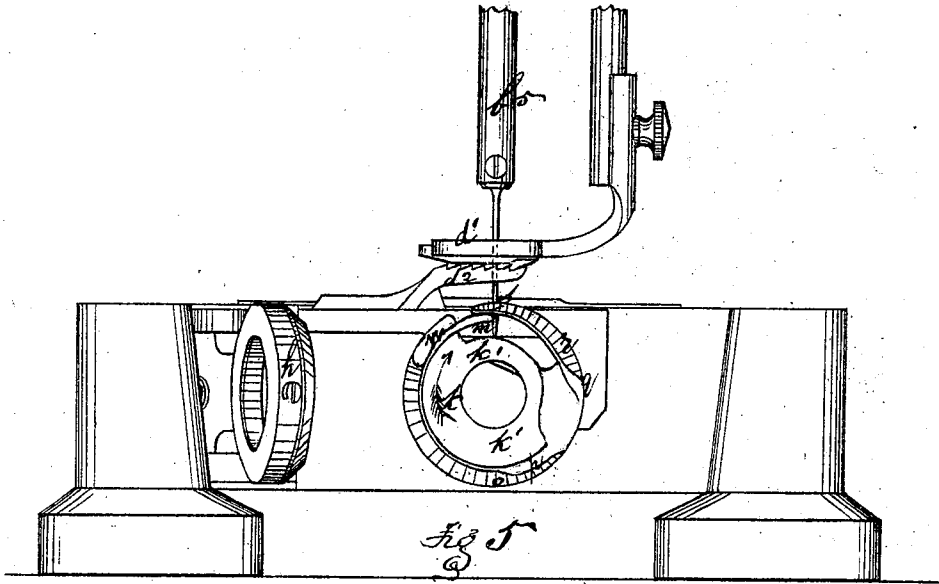


In presence of Louis Secor James A. House
W. L. Bennett. Inventor
per Henry B. Robinson
attorney

JAMES A. HOUSE. 5 Sheets--Sheet 4.
Improvement in Sewing Machines.

No. 124,360.

Patented March 5, 1872.



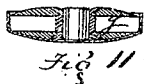
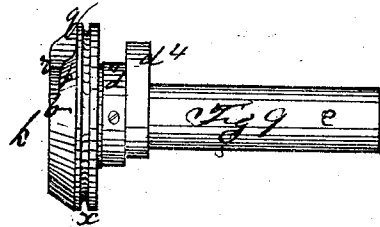
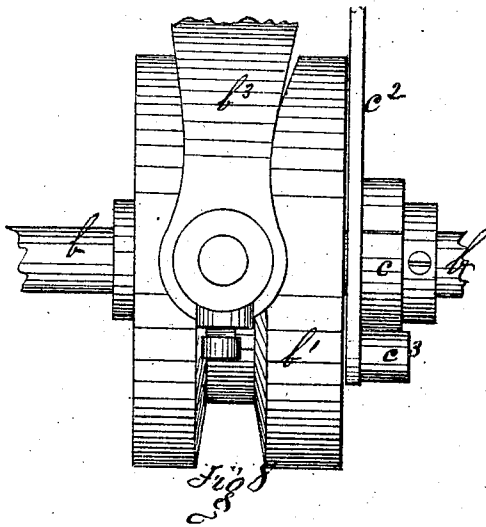
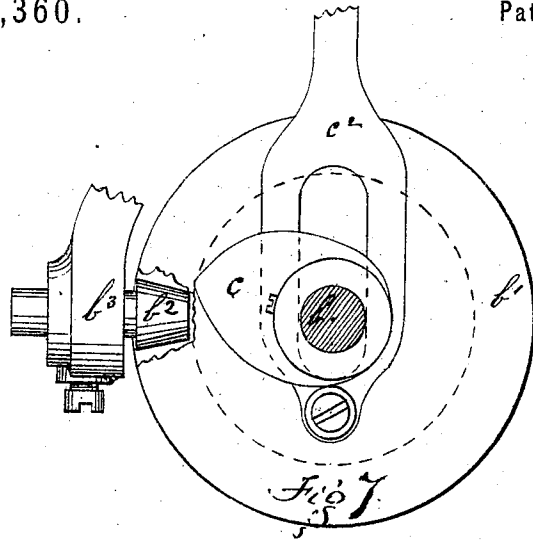
James A. House
Inventor.
per *Samuel Arnick*
attorney.
In presence of Louis Seaman
W. L. Bennett

JAMES A. HOUSE.

Improvement in Sewing Machines.

No. 124,360.

Patented March 5, 1872.



James A House
 Inventor
 Partners & Associates
 Attorneys

In presence of Louis Seaman
 W. L. Bennett

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 124,360, dated March 5, 1872

To all whom it may concern:

Be it known that I, JAMES A. HOUSE, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful improvements in that class of sewing-machines in which the loop of needle-thread is drawn out and passed over a bobbin by means of a revolving hook, some of which are also applicable for other purposes.

These improvements have been made with a view of producing a sewing-machine of the Wheeler & Wilson class or system which will sew leather and heavy fabrics as well as those of lighter make, and will allow of the use of a bobbin holding much more lower thread than such bobbins now do—more thread, in fact, than can be wound upon the spools used in the shuttles of ordinary shuttle-machines. These improvements are illustrated in the accompanying drawing; and the following, taken in connection with the drawing, is a full, clear, and exact description of my invention.

In the drawing, Figure 1 is a side elevation of my machine on a scale of about three-quarters. All the other drawings are full size; and Fig. 2 is a front elevation with the cloth-supporting table removed. Fig. 3 is a top view or plan of certain parts. Fig. 4 is a vertical longitudinal central section through the same. Fig. 5 is a front elevation of certain parts with the bobbin-ring withdrawn. Fig. 6 is a section, taken just in front of the differential disk. Fig. 7 is a front elevation, partly in section, of the needle and take-up cams, and of the parts acted upon by them. Fig. 8 is a side elevation of the same. Fig. 9 is an elevation of the revolving hook; and Figs. 10, 11, and 12 are a plan, section, and front elevation of the bobbin and bobbin-case.

This machine has no pad or other apparatus for detaining the loop of needle-thread below the cloth after it has been cast off by the hook. It has a take-up apparatus, and its hook moves with a velocity differing during each revolution from that of the main shaft, although it makes the same number of complete revolutions per minute. The needle, moreover, is, in the best form of the machine, not driven by crank motion, but but by contrivances which permit it, at times, to pause entirely or move upward or downward very slowly, somewhat as in shut-

tle-machines; and the hook has several peculiarities, hereinafter described. In all these points the machine differs from the ordinary Wheeler and Wilson machine.

In the drawing the frame of the machine is represented at *a a*. In it is mounted a horizontal shaft, *b b*, carrying the needle-driving cam *b*¹ and the take-up cam *c*. The needle-cam is grooved, and acts upon a roller, *b*², mounted in the lower end of the bent lever *b*³ pivoted at *b*⁴; and the front end of the lever, by means of a short connecting-rod, is attached to the needle-arm or stock *b*⁵, which, at its lower end, carries the needle. The groove in the needle-cam is so shaped as to cause the needle to pause in its ascent just after the loop has been seized by the hook, and with needle-eye at about the cloth level (by preference, below the cloth) until the hook has expanded the loop; and I find this pause advantageous because it prevents the hook from drawing thread through the eye while it is moving or stationary in the cloth or leather; and in sewing leather or heavy-starched fabrics such drawing either frays or cuts the threads unless the needle is so large that it makes bad work. The machine will sew ordinary woven fabrics well when the needle has no pause; and I propose at times to construct the machine with the needle moved by a crank or equivalent motion. I intend at times to apply any of the mechanical devices known or used to drive sewing-machine needles, so as to permit them to pause or move very slowly up or down, in place of the rotating cams specially described and shown in the drawing. By examination of the drawing it will be perceived that the cam-groove is of a wedge-shaped section, and that the roller lying therein is a frustum of a cone. The take-up lever *c*¹ is arranged (see Fig. 1) between the needle-lever and the bracket-arm, which makes part of the frame. It is pivoted near its center to the bracket, and provided at its forward end with two hooks or eyes, through which the needle-thread passes. Its rear end is pivoted to a connecting-rod, *c*², (see Figs. 1, 7, and 8,) which is forked near its lower end so as to straddle the main shaft, and there carries a roller, *c*³, which is acted upon by the cam *c*. When thread is passed through the eye or eyes in the forward end of the take-

up lever and through the needle-eye, the drag of the thread keeps the roller in contact with the cam, the front end of the lever descending by means of the pull or drag of the needle-thread upon it, and the same end ascending to act as a take up by reason of the action of the cam upon the roller. This is the take-up I prefer; but other known take-ups of various kinds may be substituted for it. The machine is fitted with a cloth-supporting plate or table, d , and a presser-foot, d^1 , provided with an ordinary presser-spring and cam, all as usual. It has also a four-motion rough-surface feed, the roughened surface d^2 being mounted upon an ordinary feed-bar, d^3 , actuated, as usual, by a retractile spring and cams d^4 d^5 , (see Fig. 9,) mounted upon the hook-shaft, all as usual. The hook-shaft e lies, by preference, in line with the main shaft, and upon it is mounted the hook, which is driven with a speed changing during each revolution of the main shaft, the hook moving faster than the main shaft while seizing and expanding the loop, and slower after the loop is cast off, and while it is being taken up, thus gaining time not only for the take-up to act properly, but also for the operations of the needles, as hereinafter described. There are many known contrivances for thus imparting to one shaft by means of another shaft a differential motion, or motion varying in velocity during each revolution from that of the driving-shaft; and I intend to use any of such known contrivances in this machine; but I prefer one of my own invention, now to be described. To the end of the main shaft b is secured a disk, f . This disk has projecting from it a pin, f^1 , (a crank and crank-pin would serve the same purpose.) This pin enters a slot, f^2 , (see Fig. 6,) in a disk, f^3 , which I call the differential disk. This disk is supported by and free to revolve in a journal-bearing or pillow-block, f^4 , which is secured to the bed-plate; and I prefer to make it adjustable transversely to the main shaft, attaching it by means of screws passing through slots, or in any other proper known way, which will permit adjustment in planes perpendicular to the axis of the disk. This same disk has in it another slot, f^5 , and into this slot enters a pin, e^2 , projecting from a disk, e^3 , which is mounted upon the hook-shaft e . It is obvious that the disk f , when revolved, will, through the pin f^1 , revolve the differential disk f^3 , which latter, acting, by means of its slot f^5 , upon the pin e^2 , will cause the disk e^3 and, consequently, the hook-shaft and hook, to revolve; and if the differential disk have its center or axis in line with the axes of the hook and main shaft, then these shafts will revolve with the same angular velocity; but if the differential disk be moved out of line, then the pin f^1 will sometimes act nearer to, sometimes further away from, the center of the differential disk, and will thus cause it to move alternately faster and slower than the main shaft. This same sidewise adjustment of the differential disk will cause different localities in the groove f^5 to act during the same

revolution upon the pin e^2 , so that the shaft e will move differentially in relation to the differential disk f^3 ; and if the slots be as shown, straight, and on the same diameter, then the variation of velocity will be intensified, so that, when f^4 is moving faster than b , then at that very time e will be moving faster than f^4 , and vice versa. The further the differential disk is moved out of the shaft line the greater will be the difference of velocity between the motions of the main shaft and the hook. Two straight slots in the differential disk, both cut on the same diameter, serve all necessary purposes in the present machine; but I intend to use slots, either straight or curved, and with various angular relations to each other. The differential disk enables me to locate both the driving and driven shaft in the same line, to dispense with all cogs or connecting-rods, and to adjust the variations of velocity, while the parts are unaltered in their construction. The bobbin g of this machine lies within the periphery of the hook, as usual; but this bobbin, as reference to Figs. 4, 10, 11, and 12 will show, is thicker at the center and much thicker at the periphery than usual, and lies in a case like a pill-box cover with a rounded top, which is provided with a series of small holes, through which the bobbin-thread may be passed so as to attain a proper tension upon the lower thread. This bobbin is held in place partly by the hook and partly by a bobbin-ring, h , as usual, but, instead of mounting the latter upon a slide, I prefer to mount it upon a hinge, so that it will swing out (as in Fig. 5) when it is required to remove or replace a bobbin, and may be swung rearwards, so as to confine the bobbin. A set-screw, h^2 , serves to limit the rearward movement of the swinging arm, so that the ring confines the bobbin without bearing upon it. I prefer to make the ring proper, or the acting part thereof, of steel, and held in its supporting-arm, as shown, (see especially Fig. 4,) and also to notch it slightly, as shown at h^3 , (see Fig. 3,) so as to take a small boss upon the bobbin-case, and prevent it from turning, but both the boss and the notch are refinements of construction necessary in theory but, practically, unimportant. I also prefer to form the ring so that it is furthest from the face of the bobbin on that side thereof, where the cast-off loop slips up under the operation of the take-up, so as to prevent the loop from being pinched while being drawn up. The hook k is, as a whole, an irregular hollow conical frustum supported on a dish-like base-plate, k' , with the bobbin lying in the cavity or hollow, as usual. The seizing part of the hook is shown at m ; just behind it, sunk into the surface of the cone, is the groove n , which vanishes away upon the conical surface, and first receives one part of the bight of needle-thread, and then guides it to the front of the hook, whence it leads over the front of the bobbin, as usual. At o the edge face of the hook recedes, permitting that part of the bight behind the bobbin to lead up in

a straight line toward the needle-eye preparatory to drawing up the loop, but this line of recession does not extend directly to the base-plate, which lies behind the bobbin, but makes a sort of step (see especially Fig. 9) at p before the conical surface disappears entirely; the cone then ceases to exist through an angle of some 30° or 40° , and then reappears at q , and extends out, as at r . The loop is cast off when the two parts forming the bight thereof lead upwards through the gap or space bounded on two sides by the projections at p and q , and the two projections p and q overlie the bobbin and prevent it from being lifted upward. This is the function of these two projections, and they, in conjunction with the passage between them, are a new feature in revolving-hooks. That portion of the hollow conical frustum which commences at q gradually increases to its full height, as at r , and continues nearly at full height to s , but at s the rear of the frustum is cut away, (see specially Fig. 3,) thus forming a hook which points in the opposite direction to and lies in front of the seizing-hook. The hook-shaped projection s is further from the axis of the hook-shaft than the seizing-hook, and this peculiarity insures the passing of the cast-off loop behind it when pulled up by the take-up apparatus. This hook does not act as a hook, but, on the contrary, is formed and located so as to prevent the cast-off loop from catching while being drawn up; it is, in fact, a guard. I found the projection r to be essential, and made hooks with that projection, and with no guard like s ; but I discovered that the cast-off loop then frequently caught upon the projection r , thus breaking or fraying the thread, and, after many attempts to remedy this defect, I hit upon the plan of prolonging the projection r until it overlapped the point of the seizing-hook. This construction leaves a narrow throat (see specially Fig. 3) between s and the seizing-hook, and one part of the loop, when cast off, lies in this throat, and is pressed rearward by the rear side of the guard s , so that it cannot catch upon r . The drawing shows an annular groove surrounding the hook. This groove was cut for the needle-point to lie in during the rotation of the hook, it being my intention usually to draw out the loop while the needle-eye lies below the cloth. I have since then lowered the hook-shaft a little, and am thus enabled to dispense with this annular groove.

In the operation of the machine, the needle-thread is led from the spool y through the eye y^1 ; thence through the tension apparatus x ; thence through y^2 upward to one of the eyes in the take-up lever; thence downward through y^3 , and up again to the other eye in the take-up lever; thence down again through a long eye or slit in the piece a^4 of the bracket-arm a ; and thence through the needle-eye; and the bobbin is wound, put in its case, and the case

into the cavity of the hook, by preference, with the bottom of the case in front or nearest the ring; the needle descends, rises a little, and pauses; while it stands still, or nearly so, the hook seizes and expands a loop of needle-thread, puts it around the bobbin, and casts off the loop; this being performed while the hook is moving with greatest speed. Then the needle rises rapidly, and the take-up acts at the same time, pulling up the cast-off loop. The needle-arm descends again, pierces the cloth and rises a little, and, during the time occupied by the needle in rising, descending and rising again a short distance to spread the loop, so that the hook can seize it, the hook makes about one-half a revolution only, moving then at its slowest speed. The differential movement of the hook, therefore, affords time for proper performance of all their duties by the needle and take-up.

I claim, of my own invention—

1. The projections making part of the hook with the gap between them, the former preventing the lifting-up of the bobbin while the cast-off loop is being drawn up through the gap, said projections being constructed and operating substantially as specified.

2. The reversed hook or guard overlapping the seizing-hook, and constructed and operating substantially as described.

3. I claim a differential disk in combination with two pins taking into grooves therein, one pin being secured to a driving and the other to a driven shaft, and the whole being and acting substantially as set forth, to cause one shaft to be moved by another with a differential velocity.

4. I claim a differential disk, mounted in a pillow-block, capable of sidewise adjustment, substantially as specified, in combination with two shafts and a pin on each of them, entering slots in the differential disk, whereby one shaft can be caused to revolve at a differential velocity by motion derived from another shaft, and the difference of velocity can be augmented or diminished by adjustment of the disk.

5. In combination with a hook revolving with a differential velocity upon an axis lying in a horizontal plane, and a needle acting in a vertical plane, I claim a take-up apparatus, the combination being substantially such as herein described.

6. In combination with a hook provided with projections to prevent the lifting up of a bobbin, and revolved by means of apparatus which gives it a differential motion, substantially such as herein described, I claim a needle, operating with a pause in its motions, substantially as described, the combination being substantially as set forth.

7. In combination with a needle, actuated by mechanism, substantially such as set forth, which causes it to pause after it has risen a short distance, I claim a hook rotating in a vertical plane, as described, by means of mech-

anism which imparts to it a differential velocity and a take-up apparatus, substantially such as described.

8. I claim a revolving-hook, made with projections to prevent the lifting of the bobbin, and a guard overlapping the seizing-hook, meaning hereby to claim a rotating hook for operating upon the needle-thread of a sewing-

machine constructed in all respects substantially as hereinbefore described.

Witness my hand this 27th day of January, A. D. 1871.

JAMES A. HOUSE.

Witnesses:

CHARLES H. DIMOND,
GEO. H. DIMOND.