4 Sheets—Sheet 1.

T. J. HALLIGAN.

Waxed Thread Sewing Machine.

No. 54,145. Patented April 24, 1866.

Fig: 3.

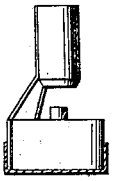


Fig: 5.

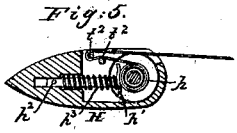


Fig: 6.

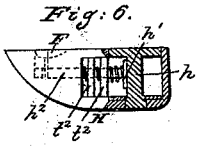


Fig: 4.

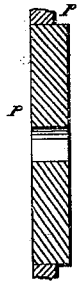


Fig: 6.1.

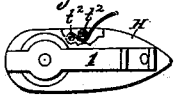


Fig: 6.2.

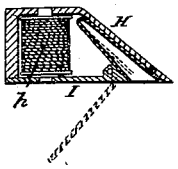


Fig: 1.

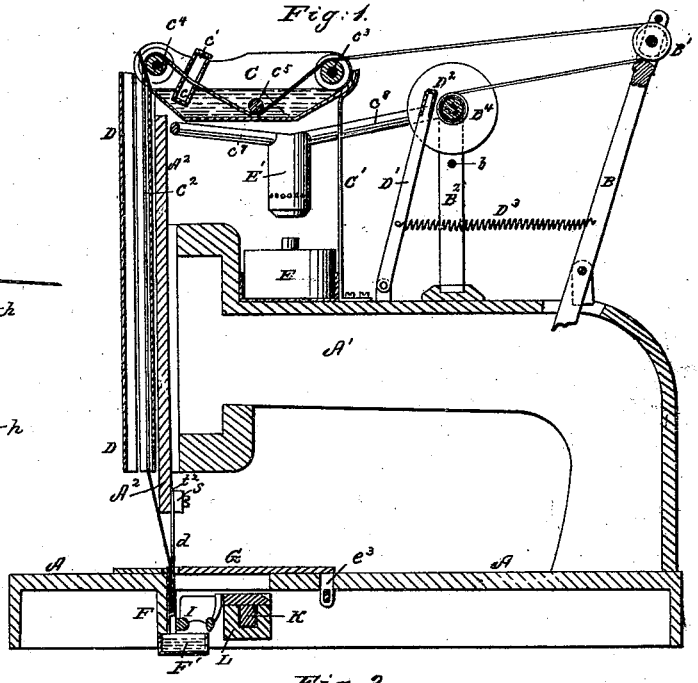
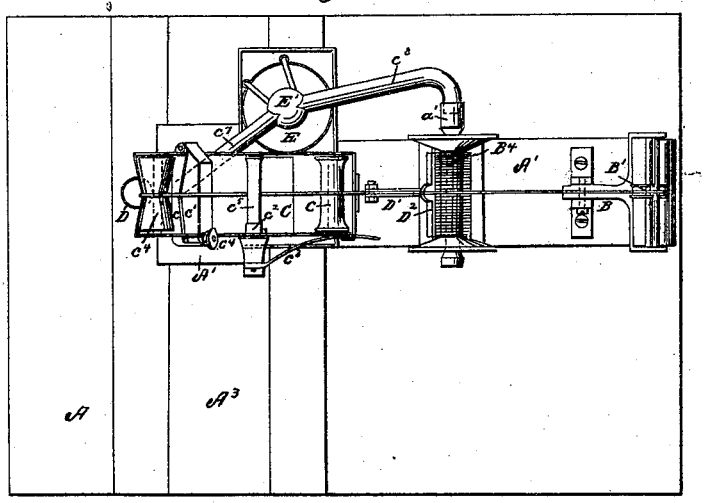


Fig: 2.



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4 Sheets—Sheet 2.

T. J. HALLIGAN.

Waxed Thread Sewing Machine.

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Fig: 12.

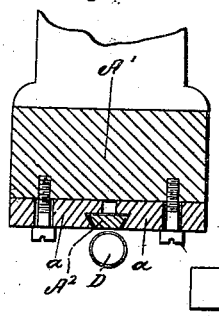


Fig: 7.

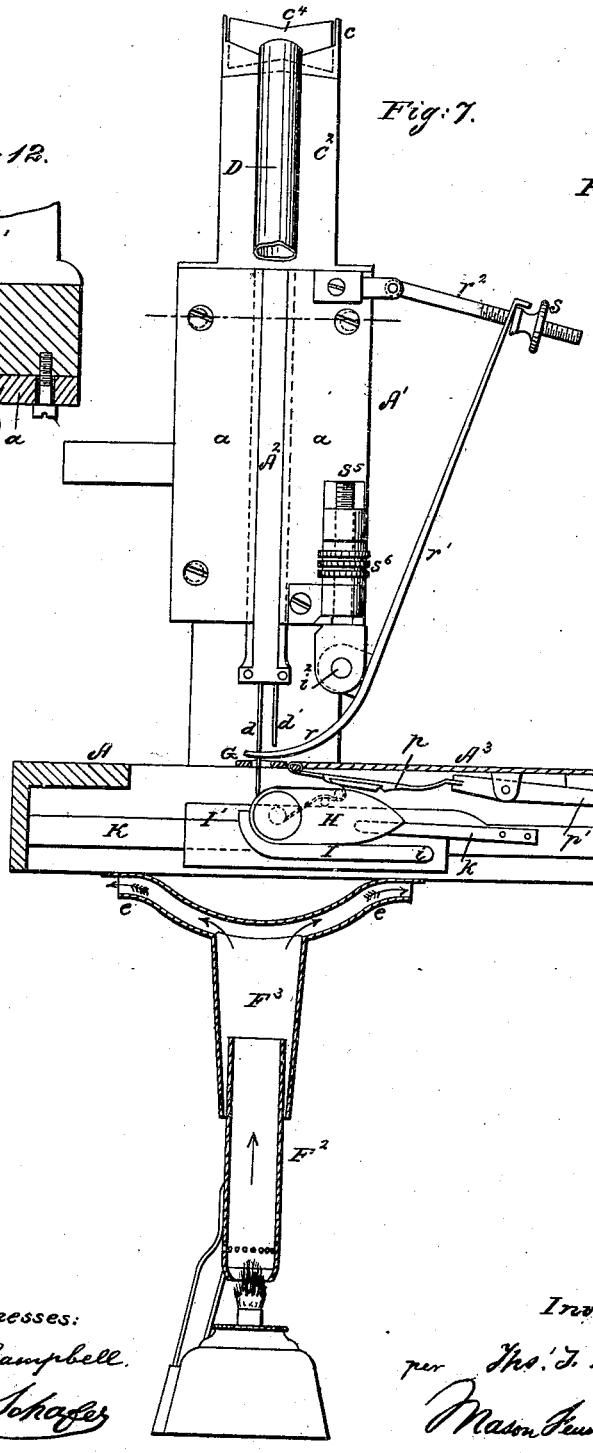


Fig: 13.

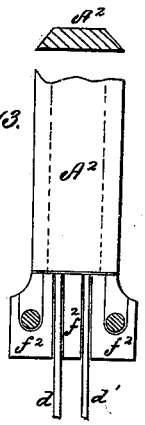
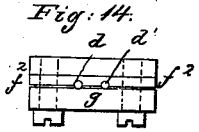


Fig: 14.



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4 Sheets—Sheet 3.

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Fig: 8.

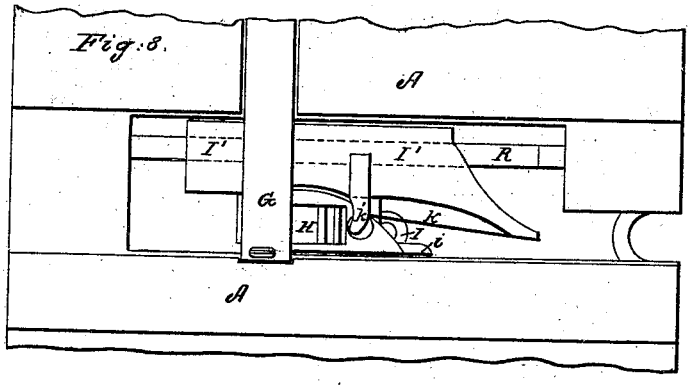


Fig: 9.

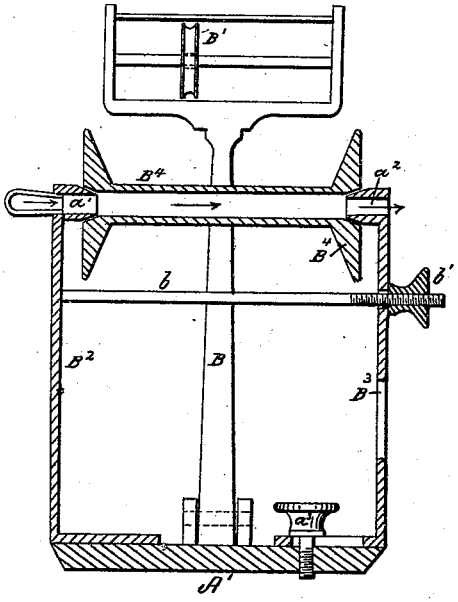


Fig: 10.

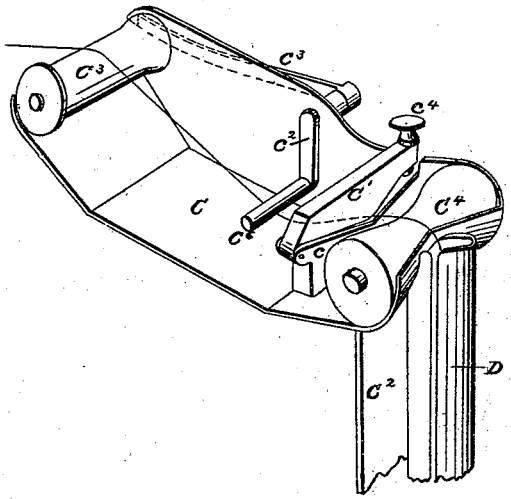
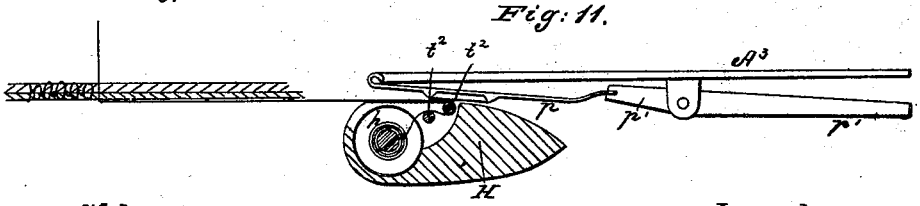


Fig: 11.



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4 Sheets—Sheet 4.

T. J. HALLIGAN.

Waxed Thread Sewing Machine.

No. 54,145. Patented April 24, 1866.

Fig: 15.

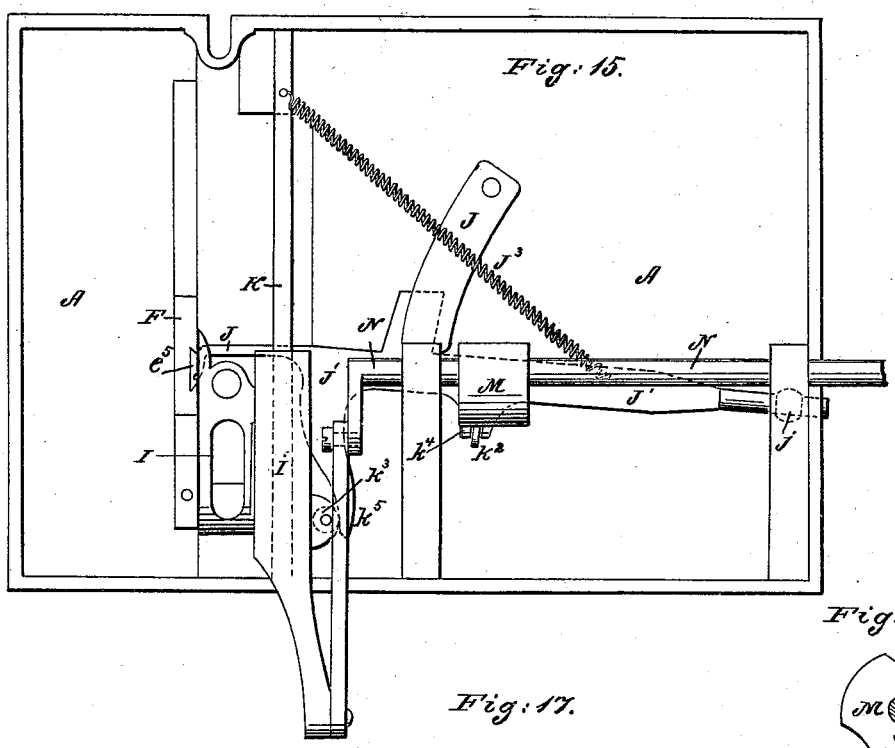
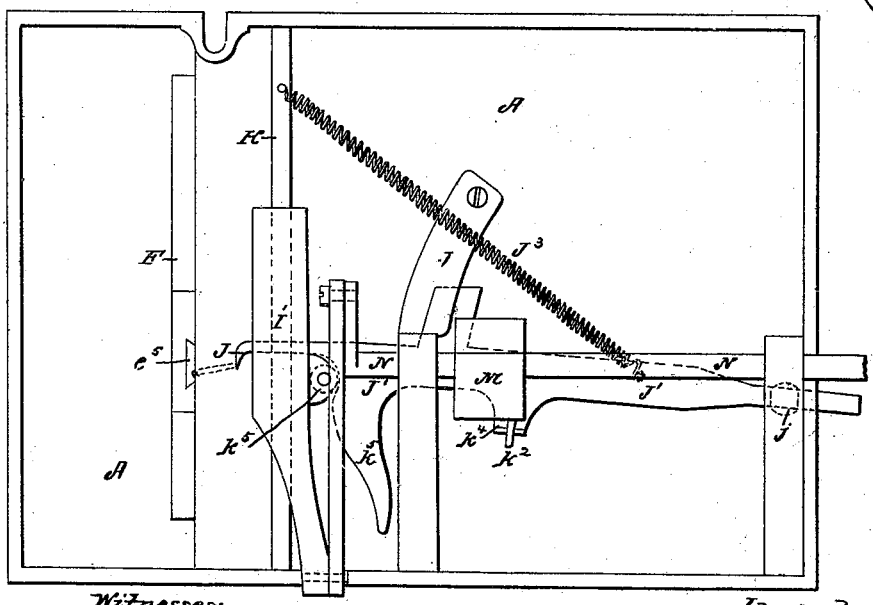


Fig: 16.

Fig: 17.



Witnesses:
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Mason, Fenwick & Lawrence
Attys.

UNITED STATES PATENT OFFICE.

THOMAS J. HALLIGAN, OF NEW YORK, N. Y.

IMPROVEMENT IN WAXED-THREAD SEWING-MACHINES.

Specification forming part of Letters Patent No. **54,145**, dated April 24, 1866.

To all whom it may concern:

Be it known that I, THOMAS J. HALLIGAN, of the city and county of New York, State of New York, have invented certain new and useful Improvements on Waxed-Thread Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a longitudinal section taken in a vertical plane through the center of the sewing-machine and the contrivances for waxing the thread of the upper spool. Fig. 2 is a top view of the sewing-machine and its waxing devices. Fig. 3 is a side view of a lamp for heating the wax-cup, which is on top of the machine. Fig. 4 is a diametrical section through an improved feed-wheel for feeding the work beneath the needle. Figs. 5, 6, 6′, and 6^2 show the improved shuttle. Figs. 6′ and 6^2 show a modification of the spring-tension device. Fig. 7, Sheet 2, is a transverse vertical section through the table of the sewing-machine, showing the mode of heating those parts beneath this table which are exposed to wax, and also the mode of producing tension on the lower thread at the moment of tightening a stitch. Fig. 8 is a top view of a portion of the table, showing the shuttle and its guides. Fig. 9 is a vertical cross-section through the upper spool and its adjustable supports. Fig. 10 is a perspective view of the upper wax-cup, having one side broken away to show the devices contained therein. Fig. 11 is a sectional view, showing the manner of producing tension on the lower thread while a stitch is being drawn tight. Fig. 12 is a horizontal section through the perpendicular head of the bracket-arm, showing the manner of guiding the needle-bar. Figs. 13 and 14 show the mode of securing the needle and its awl to the needle-bar. Fig. 15 is a bottom view of the sewing-machine table, showing the mechanism for opening the loop of the upper thread to allow the shuttle to pass through the loop. Fig. 16 shows the form of cam on the main driving-shaft for vibrating the hooked loop-opener. Fig. 17 shows the hooked loop-opener in the act of spreading a loop.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates particularly to improvements on sewing machinery for using waxed thread and for waxing the thread on its way to the needle.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

A represents the table of the machine, and A′ is the overhanging bracket-arm, carrying on its forward end the needle-bar A^2, which has its side edges beveled so as to fit snugly between the correspondingly-beveled edges of the two laterally-adjustable face-plates *a a*. These two face-plates serve as guides for the bar A^2, and can be adjusted closer to this bar as it wears loose.

Near the rear end of the bracket A′ is a take-up bar, B, which is pivoted in such manner to said bracket as to vibrate in a vertical plane, the vibration being given to it in any suitable manner by mechanism contained within the bracket-arm for giving motion to the needle-bar. The upper end of this bar B is forked, and has a transverse rod between the forks, upon which is placed a grooved pulley, B′, which pulley is allowed to rotate freely and also to slide endwise upon its bar. (Shown in Figs. 1, 2, and 9.)

In front of the take-up bar B, and secured between vertical standards B^2 B^3, is a metallic spool, B^4, having a central hole through it, as shown in Fig. 9. This spool is supported by conical tubular bearings a' a^2, which are formed on the upper ends of the two standards B^2 B^3. The standard B^2 is fixed rigidly to the bracket A′, and is immovable, but the standard B^3 can be adjusted outward by loosening the thumb-screw a^3 when it is desired to remove the spool B^4.

The transverse bar *b* is fixed at one end to the standard B^2 and passes loosely through the opposite standard, B^3, receiving upon its end a thumb-screw, *b*′, by means of which the bearings a' a^2 can be made to press with greater or less force upon the spool B^4, according to the freedom with which it is desired to have this spool turn about its axis.

In front of the spool B^4 is an oblong cup, C, for containing wax. This cup is supported upon the bracket A′ by means of a standard, C′, and a forward boxed standard, C^2. Within this cup, and at its forward and rear ends,

are two rollers, C^3 C^4, the latter one of which has a concave surface for keeping the waxed thread in the middle of its length. The roller at the rear end of the box C may be cylindrical.

The thread to be waxed passes from the spool B^4 to the grooved pulley on the take-up bar B, and from this pulley it is carried forward over the roller C^3, thence down into the wax in the cup C, beneath a transverse bar, C^5, and upward again between two clamps, *c c'*, over the roller C^4, and down through a perpendicular metallic tube, D, to the needle, as indicated by the red line, Fig. 1.

The transverse bar C^5, by which the thread is drawn down beneath the surface of the wax in the cup C, is secured at one end to a crank, c^2, the stem of which passes transversely through one side of the wax-cup, and carries on its outer end a spring-latch, c^3, which catches beneath a pin or stop, c^{15}, on the side of the cup C and holds the bar C^5 down in its place.

The two clamping-jaws *c c'* are constructed on their meeting-faces with incline surfaces which conform to the sectional outline of any one side of the roller C^4, which roller, as represented, is formed of two truncated cones with their smaller ends united at the middle of the length of the roller. This form is given to the smoothing-surfaces of the clamps, in order that they shall always tend to prevent a lateral deflection of the thread from the proper central position, and thus obviate any chafing thereof in its passage from the roller C^4. The direction of the incline of the surfaces is transverse to the direction the thread takes. These clamps are arranged within the wax-cup C and hinged together at one end. The opposite ends are secured together by means of a thumb-screw, c^4. The lower jaw, C, is secured to the wax-cup in an inclined position, and the upper jaw only is movable.

The clamping-surfaces of the two jaws *c c'* are composed of leather or other suitable substance which will scrape off the surplus wax from the thread and leave this thread smooth as it passes between the clamps. These clamps can be made to act with any desired pressure upon the thread as it is drawn between them by adjusting the thumb-screw c^4, and they will not only scrape off the surplus wax and leave the thread smooth, but they will also press the soft wax into the body of the thread and leave it perfectly waxed.

D′ is a bar, which is pivoted to the top of the bracket A′ so as to vibrate in a vertical plane coinciding with the plane of the take-up bar B. On the upper end of the bar D′ a pad or friction-plate, D^2, is pivoted, so as to form a T-head on said bar. This friction-pad is held in contact with the thread on the spool B^4 by means of a spring, D^3, which connects the bar D′ to the bar B, as shown in Fig. 1. At every backward stroke of the bar B the friction-pad D^2 is drawn closely in contact with the thread on the spool B^4, and prevents this spool from turning loosely and thus leaving the thread too loose.

When waxed thread is wound upon the spool B^4, and it is not necessary to wax the thread by passing it through the cup C, a lamp, E, is arranged beneath the wax-cup C, or on one side of it, and provided with a chimney, E′, having two tubular branches, c^7 c^8, the latter one of which conducts the heat from the flame of the lamp through the hollow spool B^4, and thus keeps the waxed thread thereon warm and soft. The tube c^7 conducts the heat forward beneath the forward part of the wax-cup C and keeps the tube D warm, so that the thread will be warmed down to the needle. The needle-bar A^2 will also be warmed by the heat from the tube c^7. When it is desired to wax the thread on its way to the needle the chimney E′, with its tubes, is removed and the open-top chimney (represented by Fig. 3) is placed upon the lamp E, and both arranged beneath the wax-cup C.

Directly beneath the needle *d*, and secured to the lower edge of the face-plate F, is a small wax-cup, F′, (shown in Fig. 1,) into which the point of the needle dips at every downward stroke of the needle-bar A^2. The object of this cup of wax is to rewax the thread in the eye of the needle after passing through the leather which is being sewed. The wax in the cup F′, together with the face-plate F and all the parts which are exposed to wax beneath the table A, are warmed and kept warm by means of a lamp or gas-burner arranged as shown in Fig. 7. If a lamp is employed, a long chimney, F^2, is applied to it, so that it can be adjusted up or down. This chimney enters a funnel, F^3, which terminates at its upper end in two tubular branches, *e e*, that are secured at their extremities to the lower edge of the face-plate F.

On the lower end of the needle-bar a needle, *d*, and an awl, *d′*, are secured by means of a clamp, *g*, which is secured to the needle-bar by means of two screws. (Shown in Figs. 13 and 14, Sheet 2.) Between this movable clamp-plate and the needle-bar a grooved plate, f^2, is interposed, in the grooves of which the needle and awl shanks are confined when the clamp *g* is screwed up. The object of having a movable grooved plate, f^2, is to admit of the awl being set at different distances from the needle, according to the length of stitch required, which is effected by having a number of grooved plates corresponding in size and form to that shown in Fig. 13, but having grooves in them arranged at different distances apart.

In Figs. 1, 7, and 8, G represents a throat-plate, which is secured upon the table A, beneath the bracket A′, by means of a spring-bolt, latch, or any equivalent device, which enters a hole in a perpendicular tongue, e^3, projecting from said plate and passing through the table A, as shown in Fig. 1.

On the forward end of the plate G is a ver-

tical tongue, e^5, which projects downward and fits into a recess which is formed in the rear surface of the face-plate F. This tongue is made of hardened steel, and it has a groove formed in its rear surface for receiving and guiding the needle and awl as the needle-bar A^2 descends, the needle and awl passing through an oblong hole through the horizontal portion of the plate G, as shown in Figs. 1, 7, and 8.

The shuttle H is supported upon a skeleton-frame, I, which projects from the slide I′, and the face of this shuttle is held against the vertical face of the plate F by means of a spring, k, acting upon the back of the shuttle, as shown in Figs. 7 and 8. The projection i of the skeleton-frame I precedes the point of the shuttle as the latter advances toward the needle to enter the loop of the upper thread, and presses the point of the needle back into its groove in the throat-plate or tongue e^5, should the needle be bent out of a true vertical position.

The shuttle is prevented from rising out of its seat by the finger k', which projects from the slide I′, as shown in Fig. 8.

In Figs. 7 and 11, Sheet 2, I have represented a contrivance for producing tension upon the lower thread at the moment the shuttle begins to tighten the stitch in the work. This contrivance is secured to the bottom of the plate A^3, and consists of a spring, p, one end of which is secured to the inner end of the plate A^3, and the other end is secured to a lever, p', which has an adjusting-screw, p^2, applied to its outer end for raising or depressing this end, and thus inclining the spring p more or less, according to the amount of tension required. The spring p inclines from the inner end of the plate A^3 downward and outward, and this spring is so arranged with reference to the position of the shuttle when completing its forward stroke that the thread of the shuttle-bobbin will be held with greater or less pressure by the spring p upon the highest tension-bar t^2 of the shuttle. This pressure of the spring p, by reason of its inclination, will gradually increase as the shuttle moves forward beneath it, and the greatest tension will be produced on the thread of the shuttle-bobbin at the moment of completing the stitch. When the shuttle begins to retreat from the spring p the pressure of this spring upon it will diminish. If desirable, an agate or a glass plate may be set upon the spring p, so as to afford a smooth surface to press upon the thread.

It is obvious that the spring p may be adjusted at pleasure by turning the set-screw p^2, and that the tension upon the thread of the shuttle-bobbin may be regulated at pleasure, whether the machine be in operation or at rest.

The spiral spring p^4 which is interposed between the outer end of the lever p' and the plate A^3, is intended for pressing this end of the lever down upon the thumb-screw p^2.

The shuttle H (shown in Figs. 5, 6, and 11) is formed with a recess in it to receive the bobbin h, and also two transverse bars, t^2 t^2, one of which is arranged above the other, as shown in Figs. 5 and 11. There is also arranged within this shuttle a curved spring pressure-pad, h', which presses upon the thread upon the bobbin and prevents the bobbin from turning too freely. The curved pressure-pad is applied to a stem, h^2, which is acted upon by a spring, h^3. (Shown in Figs. 5 and 6, Sheet 1.)

A pin, h^4, which projects from the stem h^2 toward the flat surface of the shuttle, is used for retracting the pad h' when it is desired to remove the bobbin from the shuttle or to insert this bobbin in its place.

The bobbin h may consist of two circular flanges and a central barrel, one end of which projects from one of the flanges, as shown in Fig. 6. The recess which is formed in the shuttle H to receive this transverse bobbin affords bearings for the peripheries of the flanges of the bobbin and enables me to dispense with the usual axial bearings. The projection on one end of the bobbin passes through the back of the shuttle-case, as shown in Fig. 6, and is pressed upon when it is desired to remove the bobbin from the shuttle. Or the bobbin may consist of a simple spool with two short journals; but with such a bobbin the shuttle H is constructed with a pivoted clamp, 1, which is let flush into the longest face or side of the shuttle, one journal of the spool being fitted to turn in a circular hole formed in the clamp and the other journal in a hole bored through the shortest face or side of the shuttle, as shown.

At the end of the clamp, just where its pivot passes through, a wedge-shaped enlargement is formed on it, and this enlargement is pressed upon by a V or U shaped spring arranged within the shuttle, as shown in Figs. $6'$ 6^2. The action of the spring is to force the enlarged end of the clamp outward, and this has the effect to press the long end of this lever-clamp inward upon the bobbin, and thus produce tension upon it during its revolutions. With this arrangement it is only necessary, in order to remove the bobbin, to press the clamp out to the position shown in red lines in Fig. 6^2.

In Figs. 15 and 16 of Sheet 3 I have represented a contrivance for taking and enlarging the loop which is formed by the raising of the needle, and through which the shuttle passes to form the stitch.

In consequence of the adhesive qualities of the wax which is used in waxed-thread sewing-machines the shuttle will not pass freely through the loop of the upper thread; and in order to obviate this objection the hook J (shown in Figs. 15 and 16) advances at the proper time and catches or takes the loop which is formed by the ascent of the needle, then recedes with the loop, and thus enlarges it for the free passage of the shuttle through it. As soon as the hook J ceases its backward move-

ment it vibrates to one side and releases the loop, so that it can be drawn up as the needle rises.

The hook J is formed on the forward end of a flat plate, J′, which is arranged beneath the table A and held in guides *j j′*, the latter one of which is allowed to oscillate. The forward end of this plate J′ is passed through a slot which is made through the shuttle-slide I′ and its guide-bar K, which slot is of sufficient length to allow the hook J to vibrate freely.

The vibrating movement is imparted to the hooked plate J² and hook J by means of a cam, M, and a spring, J². The cam M acts upon a friction-wheel, k^2, which has its bearings on a projection, k^4, of plate J′, and moves the hook J toward the loop in a lateral direction. The spring J² moves the said hook away from the loop when this loop has been sufficiently enlarged, and at the same time moves the said plate and its hook in a longitudinal or diagonal direction, thus bringing the hook J to a position to be moved up to another loop by the operation of the cam M.

The backward movement is given to the plate J′ and its hook J by means of a roller, k^3, on the shuttle-slide I, acting upon a curved projection, k^5, of the plate J′.

The cam M is keyed to the main shaft N, which operates the shuttle-slide so that the movements of the hooked looper will work in harmony with the movements of the needle-bar and the shuttle.

The pressure-foot *r*, which is used for holding the work down upon the periphery of the feed-wheel, is a curved plate formed on the lower end of a spring-bar, *r′*, which is pivoted at i^2 to a vertical screw, s^5. This screw has a milled nut, s^6, upon it, which is confined between two bearings that are secured to the face of the bracket A′, as shown in Fig. 7. By turning the nut s^6 the pivot i^2 may be raised or depressed and the pressure adjusted for leather of varying thickness. The pivoted rod r^2, with its nut *s*, is used for adjusting the pressure-foot and causing it to bear with greater or less force upon the work which is being sewed.

In Fig. 4 I have represented a cylindrical face feed-wheel, P, which is constructed with a steel hoop or tire, P′, shrunk around a central wheel of softer metal. The serrations are made upon the periphery of the tire P′ before the metal is hardened, and when hardened these serrations will remain sharp for a considerable length of time. By constructing a feed-wheel partly of steel and partly of a softer metal it will be much cheaper than those which are made wholly of steel, and much more durable than those which are made wholly of cast-iron or other metal which is softer than steel. By constructing the rings or tires P′ very thin they can be chilled and made to present a very durable serrated surface.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The construction and arrangement of the upper waxing, smoothing, and thread-controlling apparatus, as described, in combination with the heater, substantially as set forth.

2. The combination of the spool B⁴, vibrating take-up bar B, and a wax-cup, C, when these parts are arranged upon the bracket A′, as described.

3. The construction and arrangement of the wax-cup C, rollers C³ C⁴, depressed bar C⁵, and smoothing-pads *c c′*, in the manner and for the purpose described.

4. Applying the bar C⁵ to a crank-arm which is furnished with a spring-catch arm, c^3, in such manner that it can be conveniently released and adjusted upward, and also again moved down to its position and fastened, substantially as described.

5. The metallic tubular spool B⁴, which is supported upon tubular bearings in such manner that heated air can be conducted through the spool for softening and keeping soft the waxed thread upon it, substantially as described.

6. The chimney E′, constructed with branching tubes c^7 c^8, in combination with the hollow metallic spool B⁴ and the tubular heater D, substantially as described.

7. The combination of the laterally-sliding pulley B′ on the take-up bar B with the spool B⁴, when said take-up bar is arranged directly in rear of the spool, substantially as described.

8. The construction and arrangement of the inclined-faced smoothing-pads *c c′*, in combination with the double-cone roller C⁴, substantially as and for the purpose described.

9. The construction and arrangement of the metallic device D upon the front of the needle-bar arm, in combination with a heater, whereby the upper waxed thread for an upper needle is kept warm and subjected to heat nearly down to the needle, and whereby also heat is imparted to the needle-bar and needle, substantially as described.

10. The combination of the rewaxing-cup F′, arranged so that the needle will dip into it at every downward stroke of the needle-bar, with the upper waxing-cup, C, both cups being subjected to heaters, substantially as herein described.

11. The construction of the attachment F³ *e e*, in combination with a lower heater, all applied so as to heat all those parts of the machine which are arranged below or beneath the table A and exposed to wax, substantially as described.

12. The combination of the pressure-pad D² with the vibrating take-up bar B, substantially as described.

13. A spring, *p*, made adjustable, substantially as described, and applied to the table or plate A³ thereof in such manner as to act with an increased and its greatest tension upon the thread which is passing from the shuttle-bobbin just as the shuttle is completing its stroke, substantially as and for the purpose set forth.

14. The combination of the inclined spring p, lever p', and adjusting-nut p^2 with a shuttle, substantially as described.

15. The construction of a feed-wheel with a serrated steel band, P′, shrunk upon it, substantially as described.

16. The removable grooved plate f^2, in combination with the clamp g and needle-bar A^2, substantially as and for the purposes described.

17. The arrangement of the elastic pressure-pad r and its bar r^2, in combination with the adjustable screw s^5 and the nut s^6, substantially as and for the purpose set forth.

18. The hooked looper J J′, constructed, arranged, and operated substantially as described, and for the purpose set forth.

19. The construction of the shuttle and bobbin as represented in Figs. 5 and 6, and as herein described, for the purpose set forth.

20. The manner herein described, and as represented in Figs. $6'$ 6^2, of combining the bobbin and shuttle and holding in place and applying spring-pressure to the bobbin by means of a single pivoted lever spring-clamp, for the purpose set forth.

THOMAS JOHN HALLIGAN.

Witnesses:
WILLIAM J. OWENS,
JAMES VIRDON.