4 Sheets—Sheet 1.

A. SWINGLE.

Sewing Machine.

No. 14,207. Patented Feb. 5, 1856.

Fig. 1

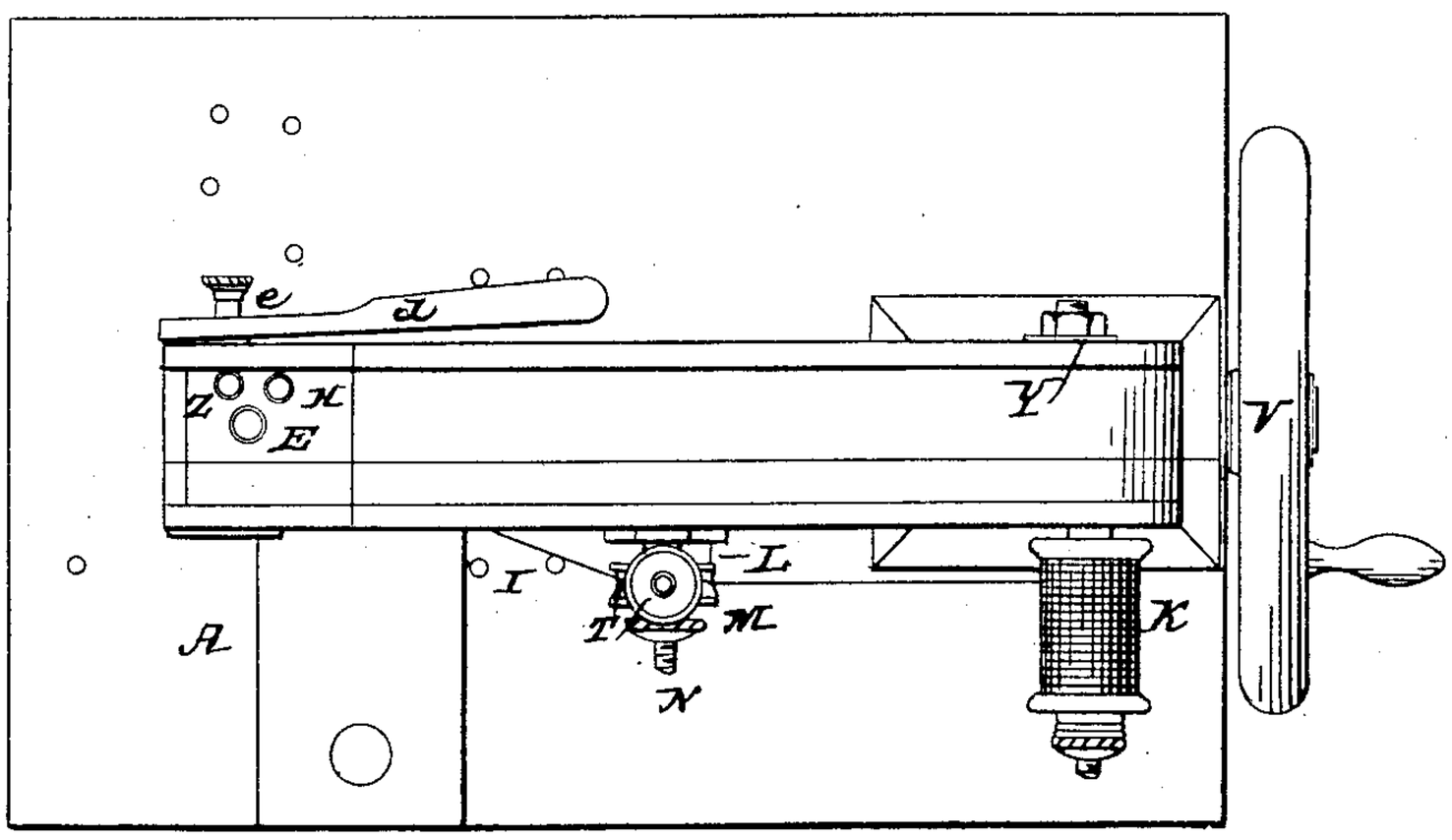


Fig. 5

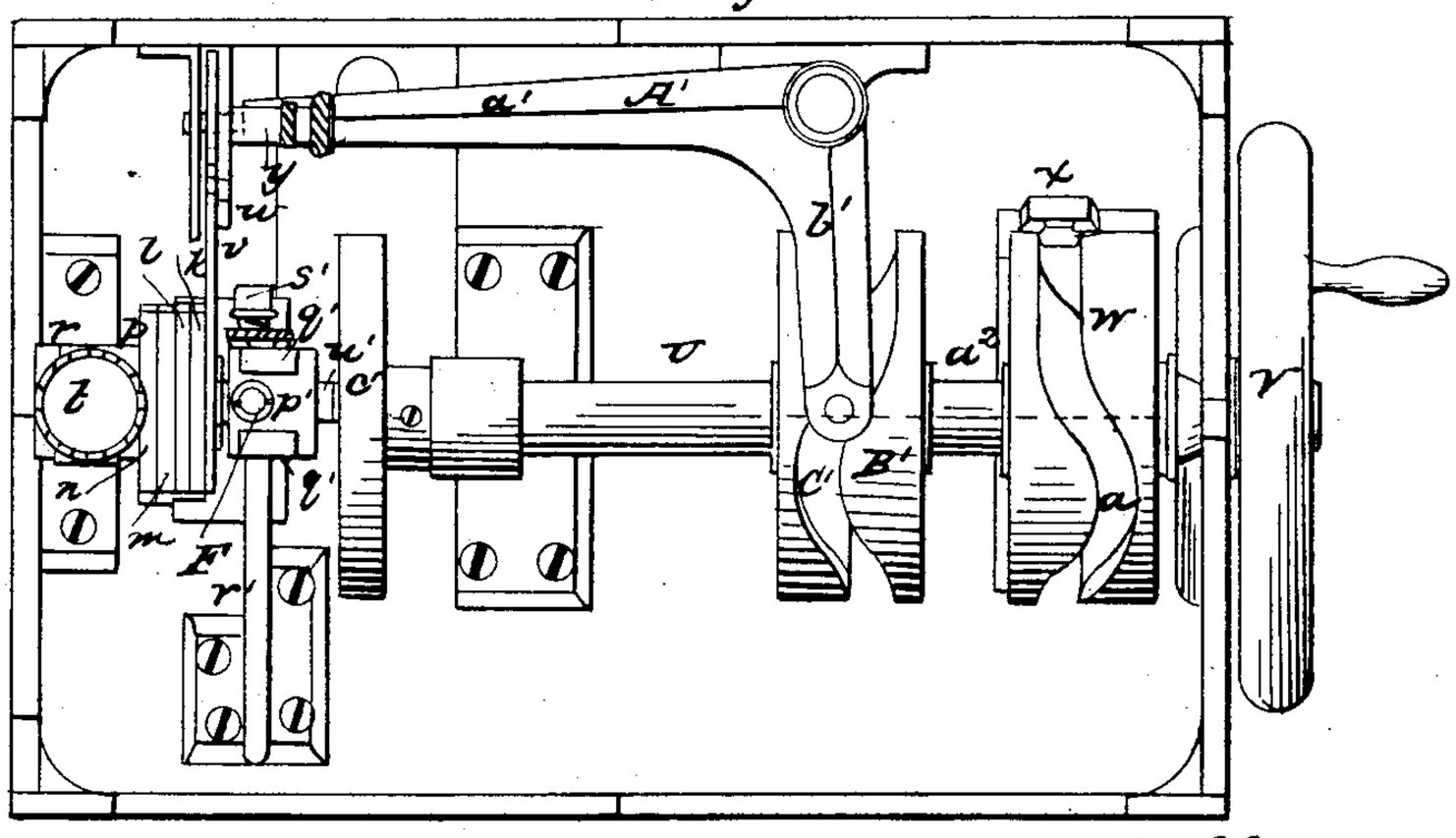


Fig. 10

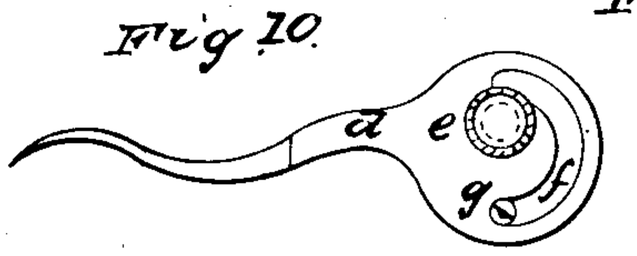
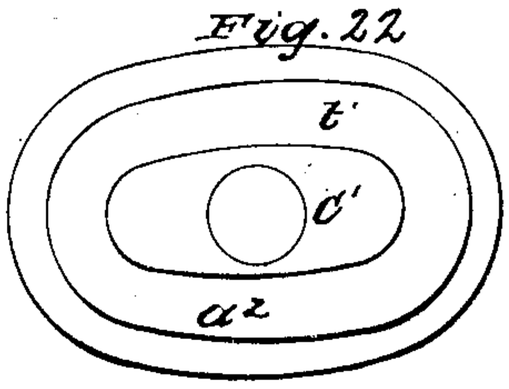


Fig. 11

Fig. 22



4 Sheets—Sheet 2.

A. SWINGLE.

Sewing Machine.

No. 14,207.

Patented Feb. 5, 1856.

Fig. 2

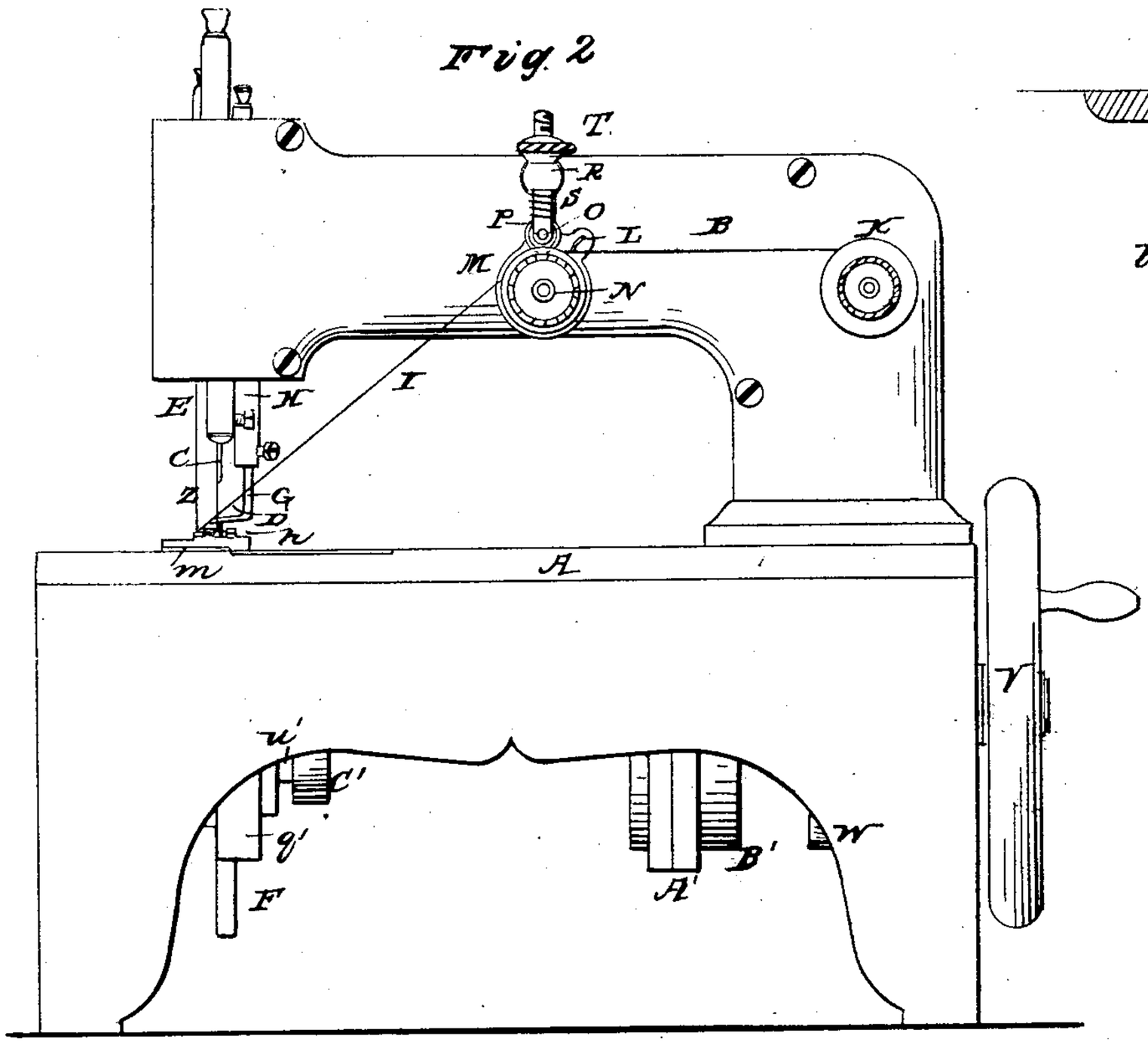


Fig. 16.

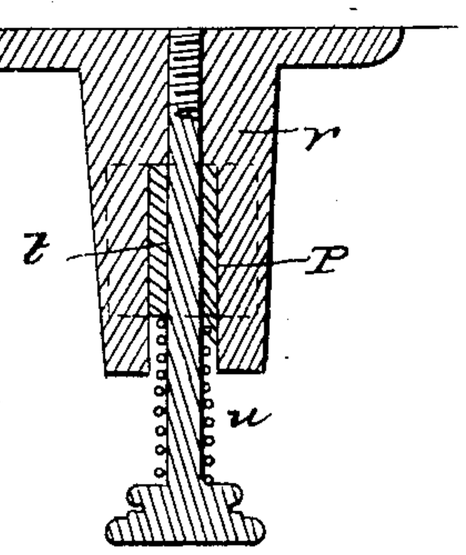


Fig. 12.

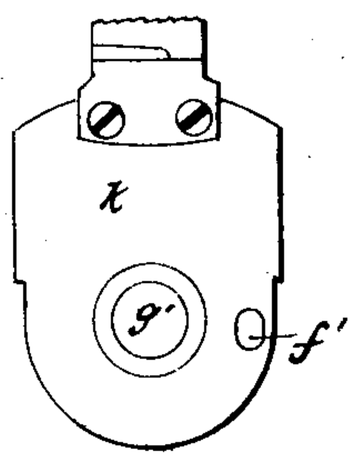


Fig. 23

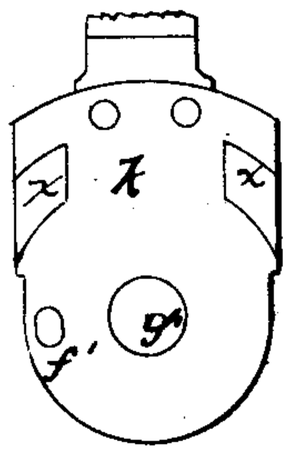


Fig. 13

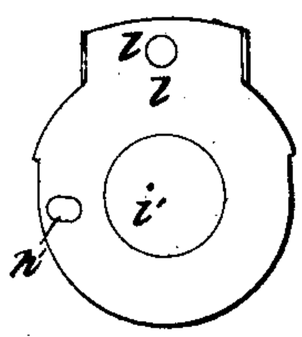


Fig. 14

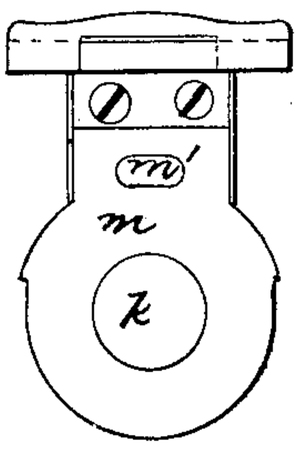
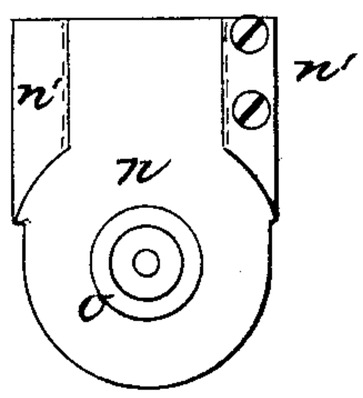


Fig. 15.



A. SWINGLE.

Sewing Machine.

4 Sheets—Sheet 3.

No. 14,207.

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Fig. 19

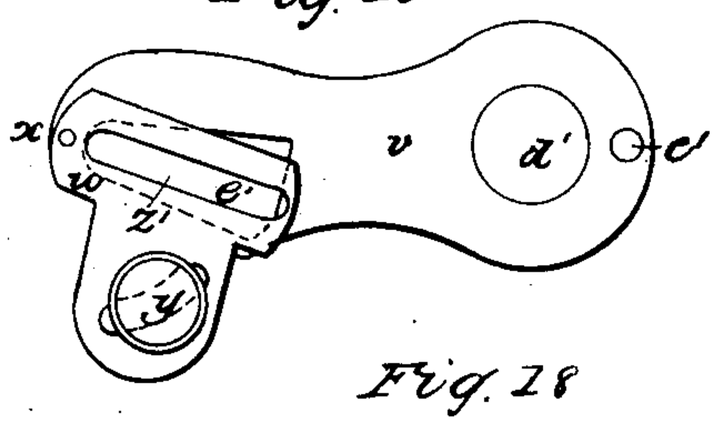


Fig. 18

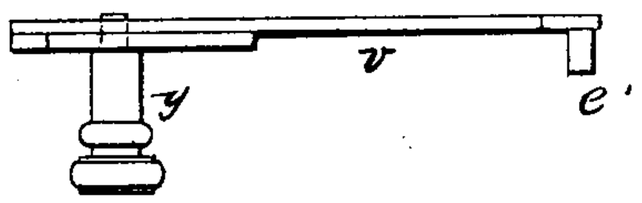


Fig. 3

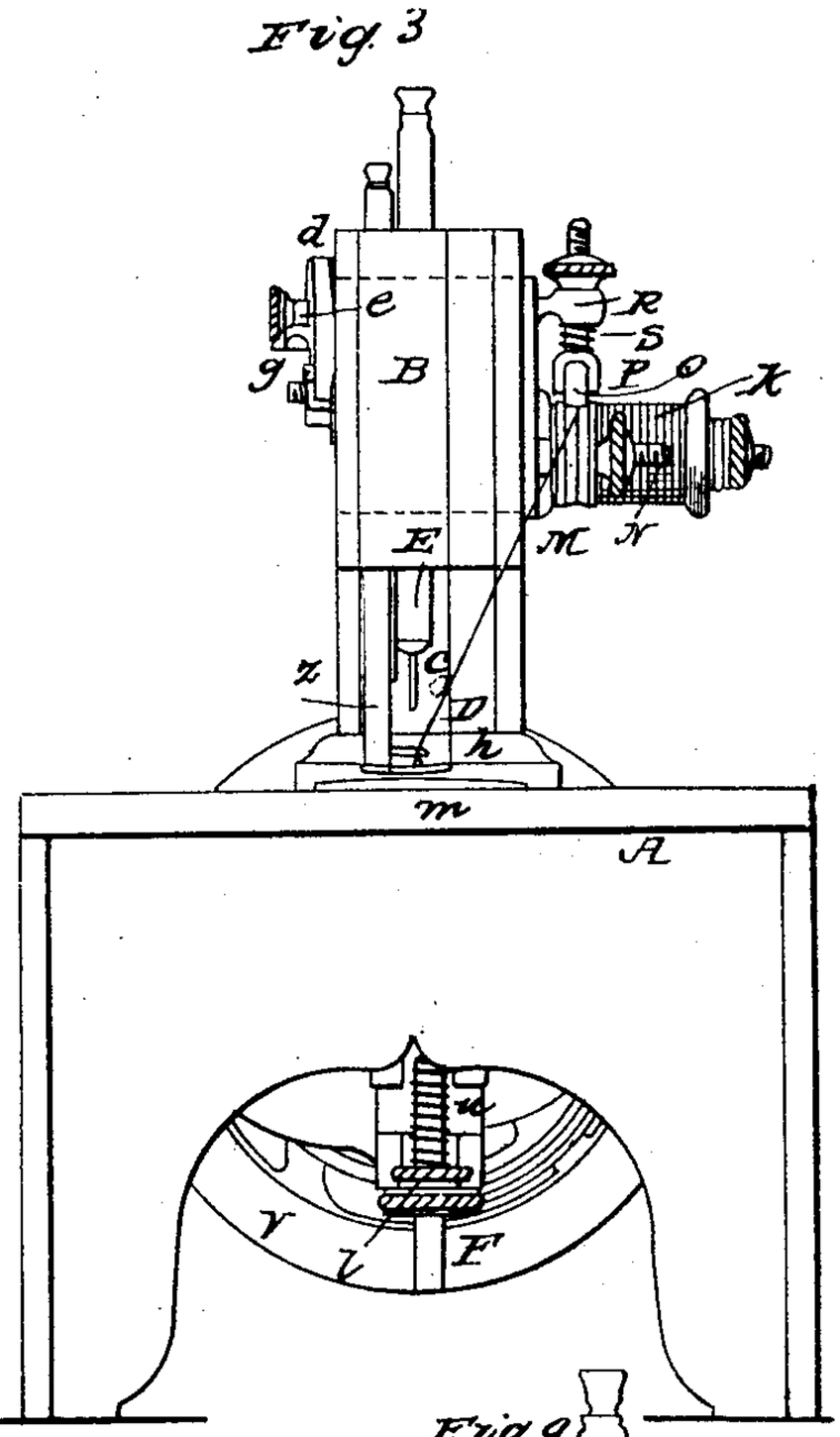


Fig. 6

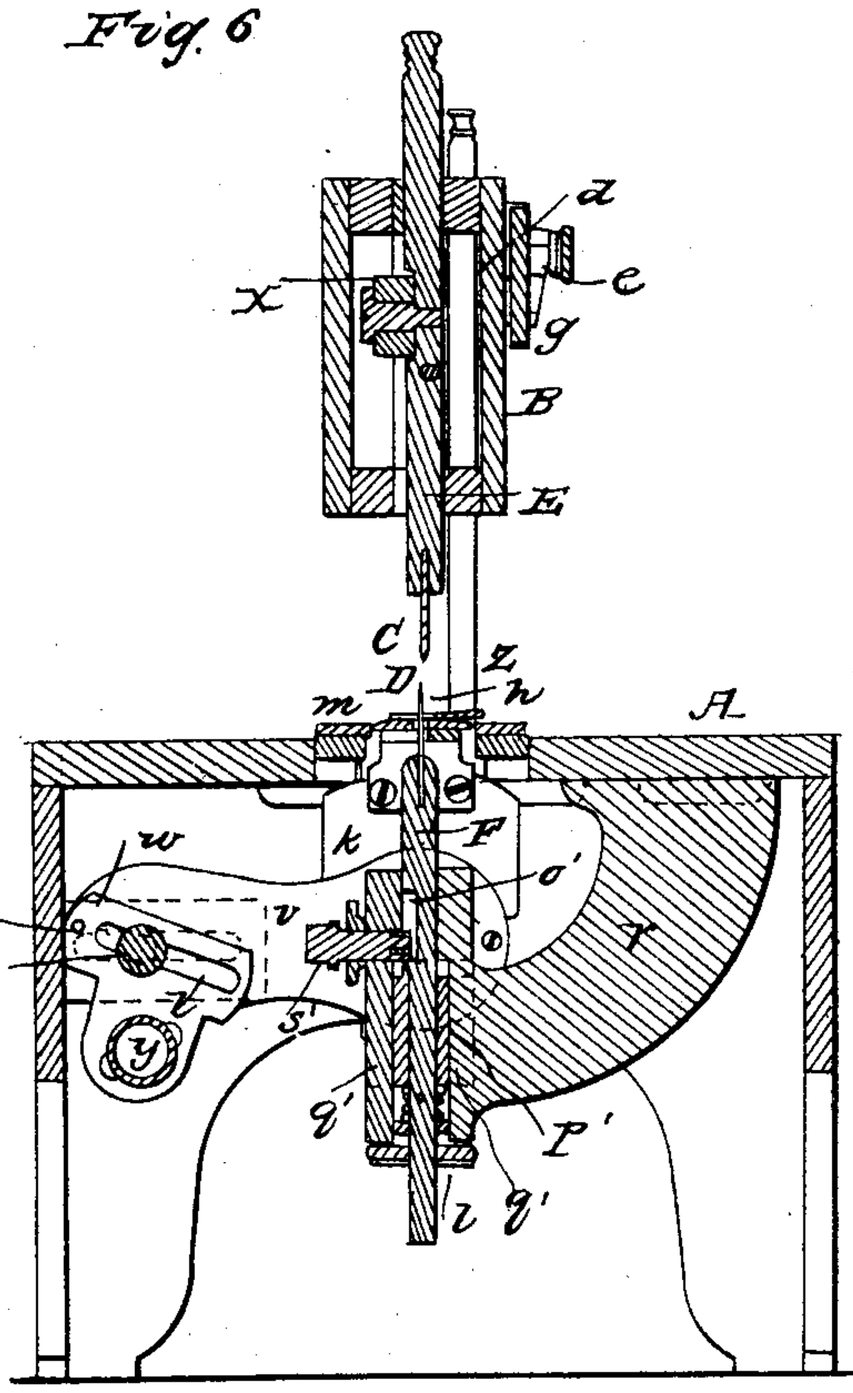
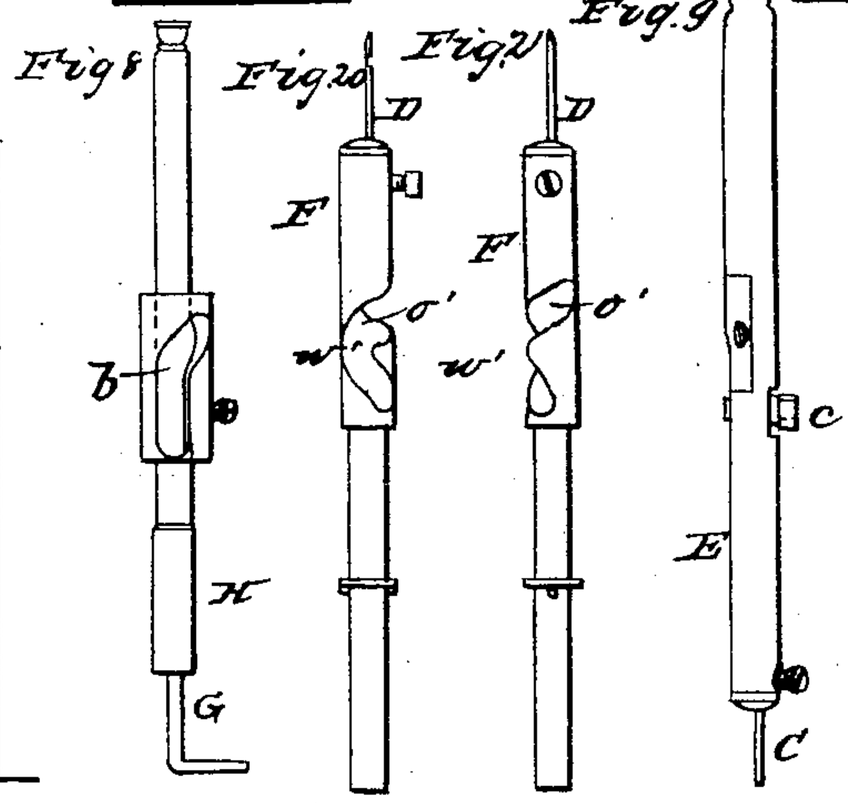


Fig 8

Fig 20

Fig 21

Fig 9



4 Sheets—Sheet 4.

A. SWINGLE.

Sewing Machine.

No. 14,207. Patented Feb. 5, 1856.

Fig. 4

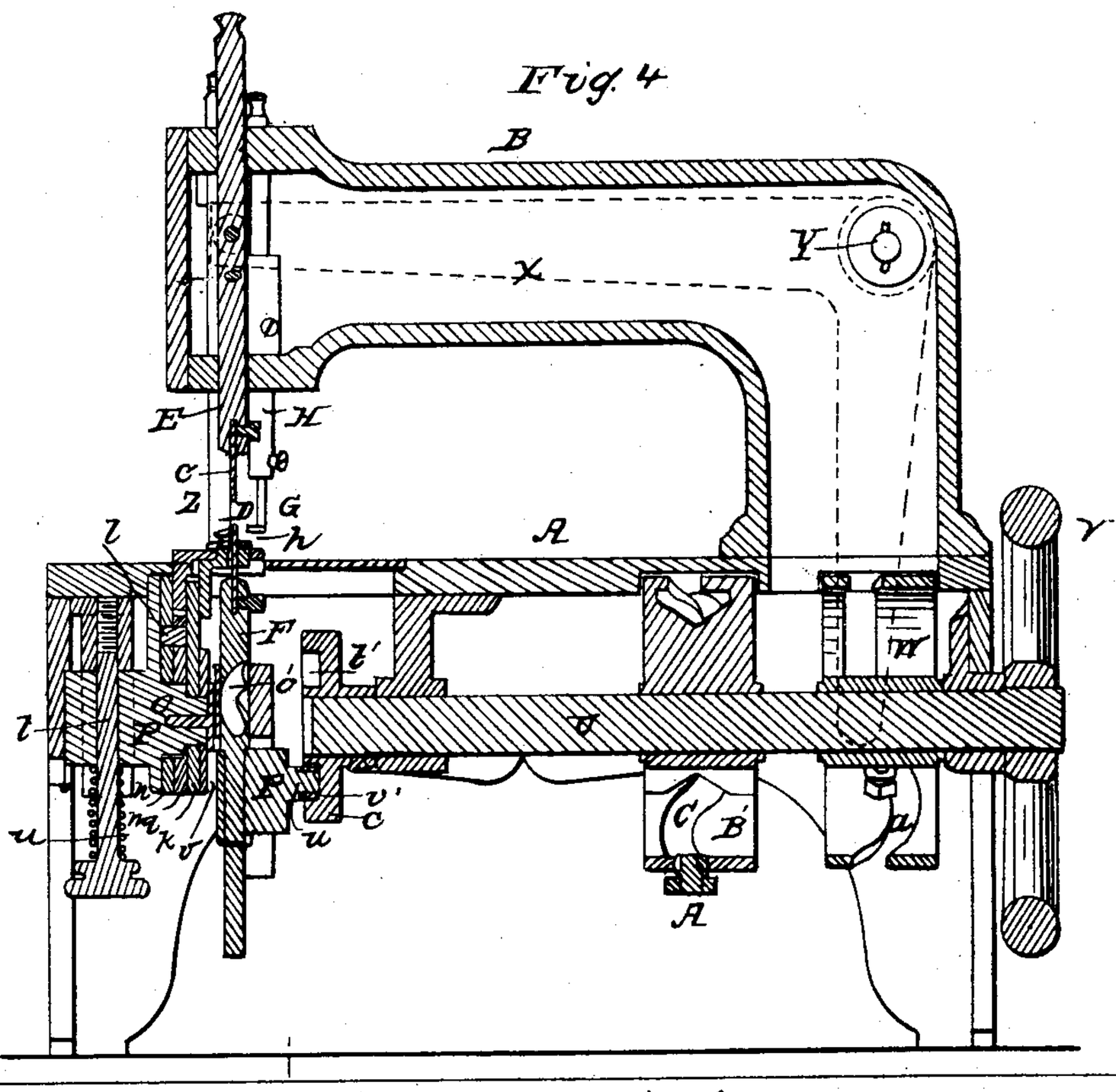


Fig. 7

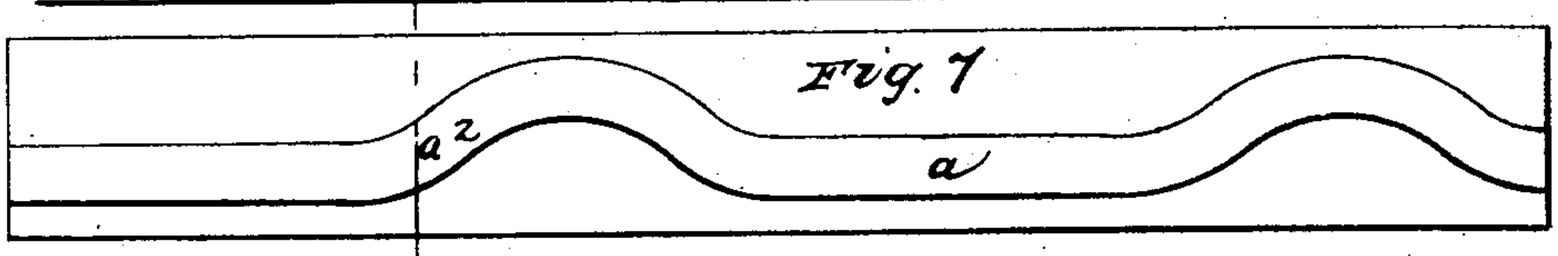
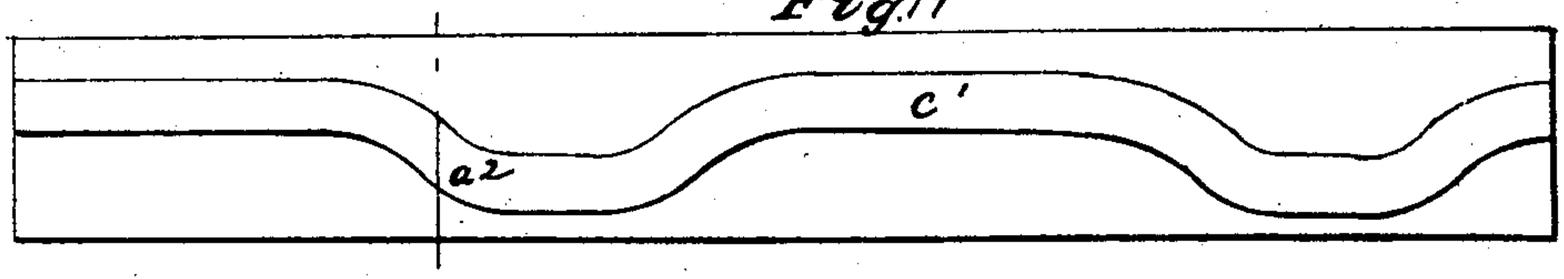


Fig. 14



UNITED STATES PATENT OFFICE.

ALFRED SWINGLE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO ELMER TOWNSEND.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **14,207**, dated February 5, 1856.

To all whom it may concern:

Be it known that I, ALFRED SWINGLE, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Machinery for Sewing Cloth, Leather, and other Material; and I do hereby declare that the same is fully described and represented in the following specification and the accompanying drawings, letters, figures, and references thereof.

Of the said drawings, Figure 1 denotes a top view, Fig. 2 a side elevation, and Fig. 3 a front end view, of a sewing-machine constructed in accordance with the principles of my invention. Fig. 4 is a central vertical and longitudinal section of said machine. Fig. 5 is an under side view of it. Fig. 6 is a transverse section of it, taken through its awl and needle, said section being made so as to represent parts intervening between the needle-carrier and the front end of the frame of the machine. Such other figures as may be necessary to a more complete delineation of the parts of my invention will be hereinafter referred to and explained.

In the said drawings, A represents the bed or table of the machine containing said invention. B is the hollow arm or standard, that projects above and over the same and supports most of the operative parts of the machinery arranged above the top of the table. C is an awl or punch, which operates in connection with a hook-needle, D, their respective carriers or slides being seen at E and F, and one being placed over the other.

The thread-guide or thread-carrier is represented at G. It consists of a bent or curved arm fixed to the lower end of a vertical shaft, H, to which a reciprocating horizontal intermittent rotary motion is to be imparted, in order at proper times to lay the thread across the needle and below its barb, or in the notch of said barb. The thread proceeding down through the end of the guide G is shown at I, it being carried from a spool or bobbin, K, through the eye of a small projection, L, and thence around the grooved periphery of a roller, M, that revolves freely on a stationary pin, N. From this roller the thread is carried to and through the thread-guide G. Another and smaller roller, O, having a convex periphery, or one curved transversely to fit into the grooved periphery of the roller M, is made to bear upon the thread resting on the roller M. The said roller O is carried by a fork, P, whose shank extends through a stud, R, (projecting from the arm B,) and has a helical spring, S, arranged upon it, and made to operate so as to force the roller O toward the roller M. The upper part of the said shank is provided with a male screw cut upon it, such having a female screw-nut, T, which, by being screwed down against the stud R, serves to raise the roller O against the pressure of the spring.

The thread-tension apparatus, composed of the rollers M and O, their fork P, its screw and nut, and spring, as above described, is of great advantage when a waxed thread is employed in the machine, it producing a proper and uniform tension of the thread, and preventing the wax thereon from being scraped therefrom, as takes place when a waxed thread is carried and pressed between two flat surfaces.

The principal operative parts of the machine obtain their motions from the rotation of a driving-shaft, U, which carries a fly-wheel, V, and may be put in revolution by any suitable motor. This driving-shaft is furnished with a grooved cam, W, the groove *a* of whose periphery is represented in Fig. 7 as developed upon a plane surface. In the said groove *a* the lower arm of a bent lever, X, is projected, the said lever being made to turn upon a fulcurm, as seen at Y. The front end of its upper arm is so jointed to the awl-carrier E that when said arm is moved upward and downward it shall produce vertical movements of the said carrier, they being governed by the operations of the groove *a* (of the cam) on the lever, a side view of said lever being exhibited in red lines in Fig. 4.

The shaft H of the thread-guide G is provided with a curved groove, as represented at *b* in Fig. 8, such groove being made to receive a pin or stud, *c*, projecting from the awl-carrier, as seen in Fig. 9, which is a side view of said carrier. By means of the cam *b* and the stud *c* the curved arm of the thread-carrier is moved so as to carry its eye toward and away from and by the needle at proper times, the said

arms being made to move through the sector of a circle and to lay the thread in a very obtuse angle across the needle.

A vertical rod, Z, slides freely in the arm B, and is raised and lowered by means of a slotted lever, *d*, which turns upon a set-screw, *e*, that serves to confine said lever in position. This lever is shown in Figs. 1, 3, and 6, and more particularly in Fig. 10, which exhibits a side view of it, its cam-lifting slot *f*, set-screw *e*, and the pin *g*, which extends from the slide-rod Z, and enters the lifting-slot. To the lower end of the said slide-rod Z there is fixed what may be termed the "stationary bearer," which is simply a plate of metal formed as seen in top view in Fig. 11, and in side view and end views, as shown in Figs. 2 and 3. It is provided with a long opening or notch, *i*, through which the awl and the needle play. This bearer is arranged directly over the feeder *k*, (see Figs. 4 and 6,) which operates in connection with what I term a "lifter," *m*.

Fig. 12 exhibits a view of that side of the said feeder which is next to the rocker-arm *v*.

Fig. 13 is a view of the elevator, such elevator sliding between parallel guides *x' x'*, fixed to the inner side of the feeder, as seen in Fig. 23, which is a view of such inner side of the feeder.

Fig. 14 is a view of that side of the lifter *m* which is next to the feeder, while Fig. 15 is a view of that side of the guide-plate *n* which is next to the lifter, the said elevator, lifter, feeder, and guide-plate being exhibited also in Figs. 4, 5, and 6 in their relative positions with respect to each other, and as placed upon a round stud or pin, *o*, projected horizontally from a slide or carriage, *p*, which is supported and plays vertically in a stationary forked projection or standard, *r*.

Fig. 16 denotes a vertical and transverse section of the projection *r*, its slide *p*, screw *t*, and spring *u*. The carriage or slide *p* rests upon the spring *u*, which is supported by and made to envelop the screw *t*, such screw being screwed into the standard *r*, as seen in the drawings.

The employment of a spring for the carriage *p* to rest upon and be forced upward constitutes an important feature of my invention, as will be hereinafter described.

On the round stud *o* as a fulcrum a rocker-arm, *v*, is placed, the said arm being made to extend outward, as seen in Figs. 5 and 6. To the rocker-arm *v* a slotted plate, *w*, is applied and made to turn upon a pin or fulcrum, *x*, and to be fastened in position by a set-screw, *y*. Into the inclined straight slot *Z'* of the plate *w* the longer arm, *a'*, of a bent lever, A', extends, a stud from the shorter arm, *b'*, being caused to enter and work in the groove *c'* of a cam, B', fixed upon the driving-shaft U.

In Fig. 17 the groove *c'* of the cam is represented as developed upon a plane surface. By means of the cam B' and the lever A' an intermittent reciprocating rotary movement is imparted to the rocker-arm *v* during the continued rotary movement of the driving-shaft, and by means of the adjustable slotted plate *w* the amount of such movement may be regulated, so as to increase or diminish what is usually termed the "length" of the stitch, or that movement of the feeder necessary to insure such a length of stitch as may be desirable under any circumstances. The relative positions of the cams of the driving-shaft thereon or with respect to each other are denoted by a dotted line, *a²*, in Figs. 5, 7, 17, and 22.

Fig. 18 denotes a top view of the rocker-arm *v*. Fig. 19 is an external or front side view of the same. From these figures it will be observed that the said rocker-arm is provided with a circular hole, *d'*, through which the round stud or pin *o* extends, the diameter of this hole and that of the pin being equal to each other. It will also be observed that said rocker-arm is furnished with a pin or stud, *e'*, which passes through an elongated slot, *f'*, formed through the feeder, and arranged therein as seen in Figs. 12 and 23, the said feeder being also provided with a circular hole, *g'*, for the reception of the pin *o*, and to enable said feeder to rotate on said pin, the diameters of the hole and pin being made to correspond in size. The pin *e'* of the rocker-arm passes entirely through the elongated slot *f'* of the feeder, and enters a round hole, *h'*, made in the elevator *l*, as seen in Fig. 13.

The elevator *l*, as well as the lifter *m*, is provided with an elongated slot, through which the pin *o* passes, these slots being shown at *i'* and *k'* in Figs. 13 and 14. The width of each of these slots is equal to the diameter of the pin *o*. From the upper part of the elevator a stud or pin, *l*, is made to extend, as seen in Fig. 4, and to enter a short curved slot, *m'*, formed in the lifter, as seen in Fig. 14. The lifter is made to play or slide vertically between parallel lips or guides *n' n'*, projected from the guide-plate *n*, (see Fig. 15,) such guide-plate being fixed to the carriage or slide *p*, so as to be immovable with respect to the same. The feeder is formed with its upper end curved to the arc of a circle whose center is in the axis of the pin *o*, and said feeder extends through the lifter, and has its upper end notched or provided with teeth, as seen in Figs. 4, 6, 12, and 23.

By examination of Figs. 2, 3, 4, and 6 it will be perceived that the upper or bearing surface of the lifter is arranged a short distance above the top surface of the bed or table A. An important advantage in sewing some kinds of articles, and particularly in connecting the vamp and quarter of a shoe when one is made to overlap the other, is attained by such an arrangement of the top surface of the lifter with respect to that of the bed or table. When the quarter and vamp of a shoe are being connected or sewed together by a sewing-machine, the heel part or counter is generally doubled under the two quarters, so as to cause an excess of thickness of material near those parts of the quarter and vamp which are to be sewed

together. Were not the lifter elevated somewhat above the bed, such heel part or counter would present an obstruction to the proper operation of the machine, as it would cause those parts which are being sewed together to assume an inclined position when they ought to be horizontal, such being unfavorable to the production of good work. In my machine the counter or heel part may be supported on the top surface of the bed A, while the parts sewed together may be placed directly over and be sustained by the lifter, the amount of elevation of the lifter above the table being equal to the thickness of the counter or heel part, which is doubled under the quarter.

Having thus described the construction of my improved feeding apparatus, I shall now proceed to explain the manner in which it operates to feed or move the cloth along over the needle during the operation of forming stitches thereby.

To the feeder *k* reciprocating forward and backward movements are given during the vertical movements of the rocker-arm *v*, for when the rocker-arm is moved in either one direction or the other its stud or pin *e'* will be carried into contact with one or the other end of the elongated slot *f*, and by being borne against the same will move the feeder on the pin *o*. During the time that the pin *e'* is in movement from one end of the slot *f* to the other it is acting upon the elevator *l* in such manner as to cause it to move the lifter *m* either upward or downward. The upper surface of the cloth or material to be sewed, being borne firmly against the stationary bearer *h* by the upward pressure of the spring *u*, acting through the feeding apparatus, is maintained against said bearer by the lifter when the cloth is stationary, and also by the feeder when said cloth is moved along. Previous to the action of the feeder upon the cloth or material to be sewed the lifter is depressed so as to deposit the cloth on the feeder, which, being put in movement laterally, is pressed by the spring against the cloth or material and feeds it along the distance required. The lifter next moves up and raises the cloth or material off the feeder, so as to allow said feeder to move backward. When the rocker-arm is raised upward, the spring is relieved from its pressure, whereby the spring is rendered free to force the feeder against the material being sewed and while said feeder is moved, so as to move the said material.

By means of the combination and arrangement of the stationary bearer and a spring, *u*, or the equivalent thereof, with the lifter and feeder and their operative mechanism, the lifter and feeder, during the operation of sewing the material and feeding it along, are not only enabled to accommodate themselves to any variation in the thickness of the material while it is being sewed, but the feeder is pressed against the material while the lifter is moved downward and while the said feeder is moved, so as to move the material. This will be obvious to a person who may understand the construction of my invention, and who may be skilled in the art to which it appertains or that with which it is most nearly connected.

The needle D employed on my machine is a barbed or hooked needle, it being particularly represented in Figs. 20 and 21, which are side and edge views of it and its carrier F, such carrier being there exhibited with a cam-groove, *o'*, for regulating the rotary movements of the needle during its vertical movements. This needle-carrier is supported by and rotates horizontally in a sliding carriage, *p'*, adapted to play vertically between parallel guides *q' q'*, attached to a stationary projection or arm, *r'*. The said arm is provided with a screw-pin or projection, *s'*, (see Fig. 6,) which enters the cam-groove *o'* of the needle-carrier. This projection, in connection with such cam-groove, serves to effect the rotary movements of the needle-carrier when the latter is raised or depressed in a vertical direction, such elevation and depression of the needle-carrier being produced by the action of a groove, *t'*, of a cam, C', fixed upon the driving-shaft. This groove is made in the side of the cam C', and has the form as represented in Fig. 22, a projection or stud, *u'*, from the sliding carriage *p'* being made to enter said groove *t'*, and be provided or not with a friction-roller, *v'*.

In machines for performing chain-stitch sewing by a hooked needle it has been customary to combine with the mechanism for imparting vertical movements to the needle a mechanism for producing reciprocating semi-rotative movements of it, and this for the purpose of preventing the loop held by the hook or barb of the needle from being pulled off the same while the cloth or material being sewed is moved along. In such machinery the thread-carrier has been made to operate so as to cause it at a proper time or times to lay or wind the thread entirely around the needle, the barb of the needle at such times standing in the direction in which the cloth is moved. It remains in such direction not only while the thread is being laid around the needle, but until the barb has descended through the cloth or material far enough to carry the loop through the other loop in the needle. As soon, however, as this has been accomplished, the needle commences to make a semi-rotative movement, and subsequently completes this movement, in order that the barb may stand in a direction such as will prevent its loop from being pulled from it while the cloth is in movement. When the movement of the cloth has ceased, the needle takes its upward movement and returns to its former position. These movements of the needle are accomplished in my machine; but, in connection with the mechanism for producing them, I employ a mechanism or means which, after the needle has risen upward and made its backward semi-rotative movement, shall turn it and its barb about ninety degrees toward the thread-guide, or so as to enable the barb, while it next descends, to simply catch

the thread laid and bent across the needle and not wound entirely around it. As soon as the needle descends and catches the thread, it is turned back through the arc of its last movement.

In the drawings the cam-groove o' of the needle-carrier is represented with a bend, w', formed to effect, by its action against the pin s', these last-described movements of the needle, the remaining rotary movements of the needle being produced by the remainder of the groove acting in concert with the said pin, and formed in a suitable manner, as is well understood by mechanicians. Important advantages result from these additional movements of the needle and the peculiar movement of the thread-guide, for when a thread is wound once entirely around the needle the machine requires its awl to be made much larger than would be necessary were the thread simply laid across the needle as described. This will be evident when the quantity of thread to be drawn through the cloth during the descent of the needle is taken into consideration. When the thread is wound entirely around the needle, it cannot be drawn so closely into the cloth as when it is simply laid across it, as specified, and, besides this disadvantage, it requires a very inconvenient movement of the thread-guide, whose eye has to be made to perform an entire revolution in a circle, instead of a partial one, as does the thread-guide of my machine.

As in various other machines, the awl serves to puncture the hole for the passage of the needle through the material to be sewed, so in mine it performs the same function, while in my machine the feeder presses the cloth against a rigid or unyielding bearer. Such bearer is so combined with the frame-work as to enable it to be adapted to leather or material of any thickness capable of being introduced into the machine, the spring u permitting the feeding apparatus to readily accommodate itself to the varieties of such thickness that may occur in any piece of the material.

I do not claim in a sewing-machine a cloth-feeding apparatus consisting of a bar furnished with points or notches, and not only having a vertical or up-and-down motion for the purpose of fastening the cloth upon and releasing it from said bar by striking or forcing it against a yielding plate or spring, but a lateral motion, or forward and back, for feeding the cloth along after each stitch has been performed by the needle; but

What I do claim in the machine hereinbefore described, and for the purpose of operating the feeder and the lifter arranged on one shaft as explained, is—

1. The combination of the rocker-arm v, having a pin or stud, e, the elevator l, and the guide-plate n, when arranged substantially in the manner described, the whole being applied to the said feeder and lifter and made to actuate the same, essentially as specified.

2. In combination with mechanism for giving vertical movements to the needle and that producing reciprocating semi-rotative movements thereof, in manner and for the purposes as described, mechanism or means for imparting to the needle a rotary movement, so as to move its barb toward and away from the thread-guide during the movement of such barb above the cloth, substantially in manner and for the purposes as hereinbefore specified.

3. I do not claim a tension apparatus composed of a spring bearing against a fixed surface or another spring, the thread being drawn between the two; but I do claim, as a tension apparatus, the combination of a rotary grooved roller and a pressure roller, operating by means of a spring or its equivalent, essentially as specified, the same, when a waxed thread is used, producing advantages substantially as hereinbefore stated.

In testimony whereof I have hereunto set my signature this 22d day of December, 1854.

ALFRED SWINGLE.

Witnesses:

F. P. HALE, JR.,

WM. F. RICE.