

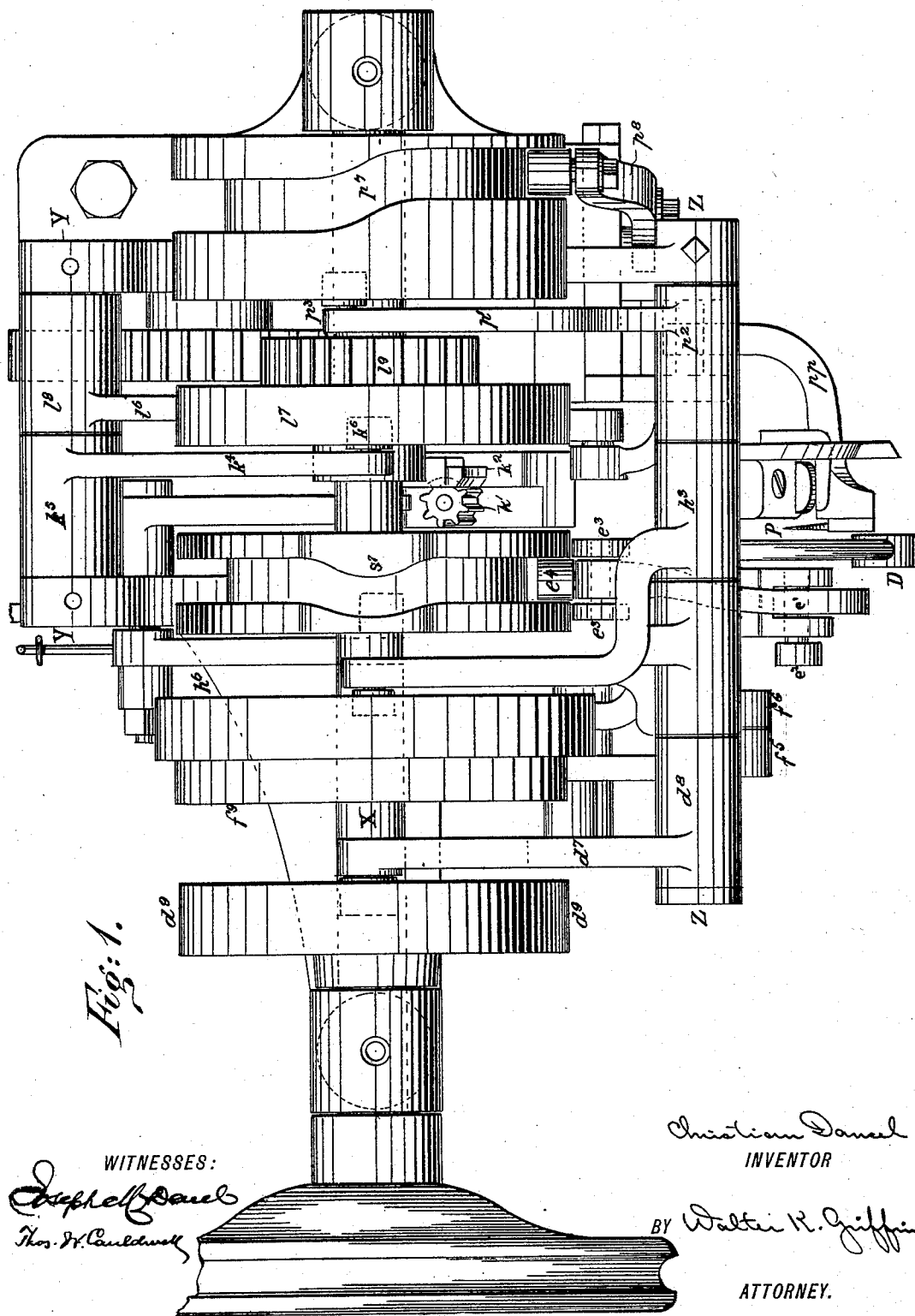
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12 Sheets—Sheet 1.

C. DANCEL.
SHOE SEWING MACHINE.

No. 580,773.

Patented Apr. 13, 1897.



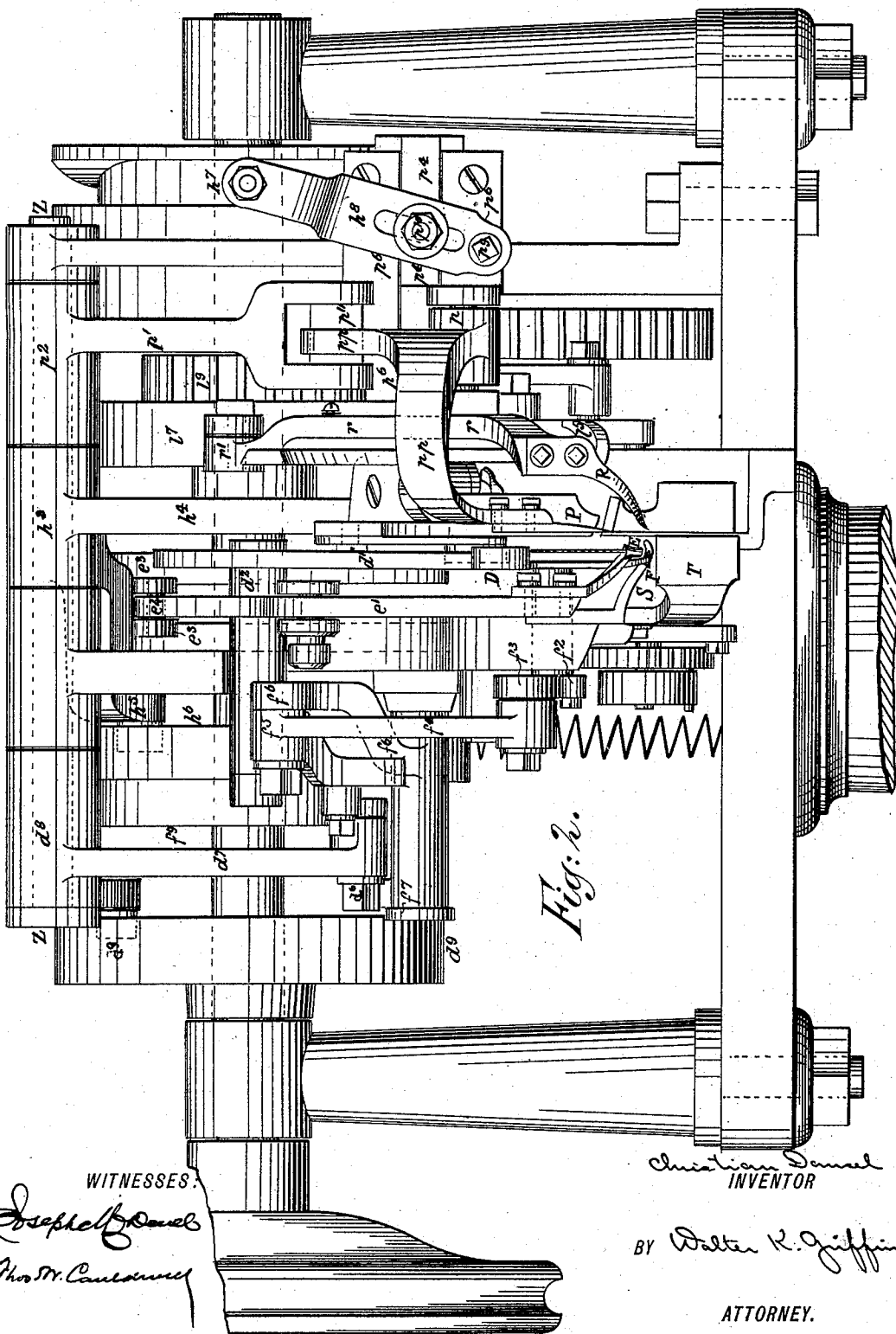
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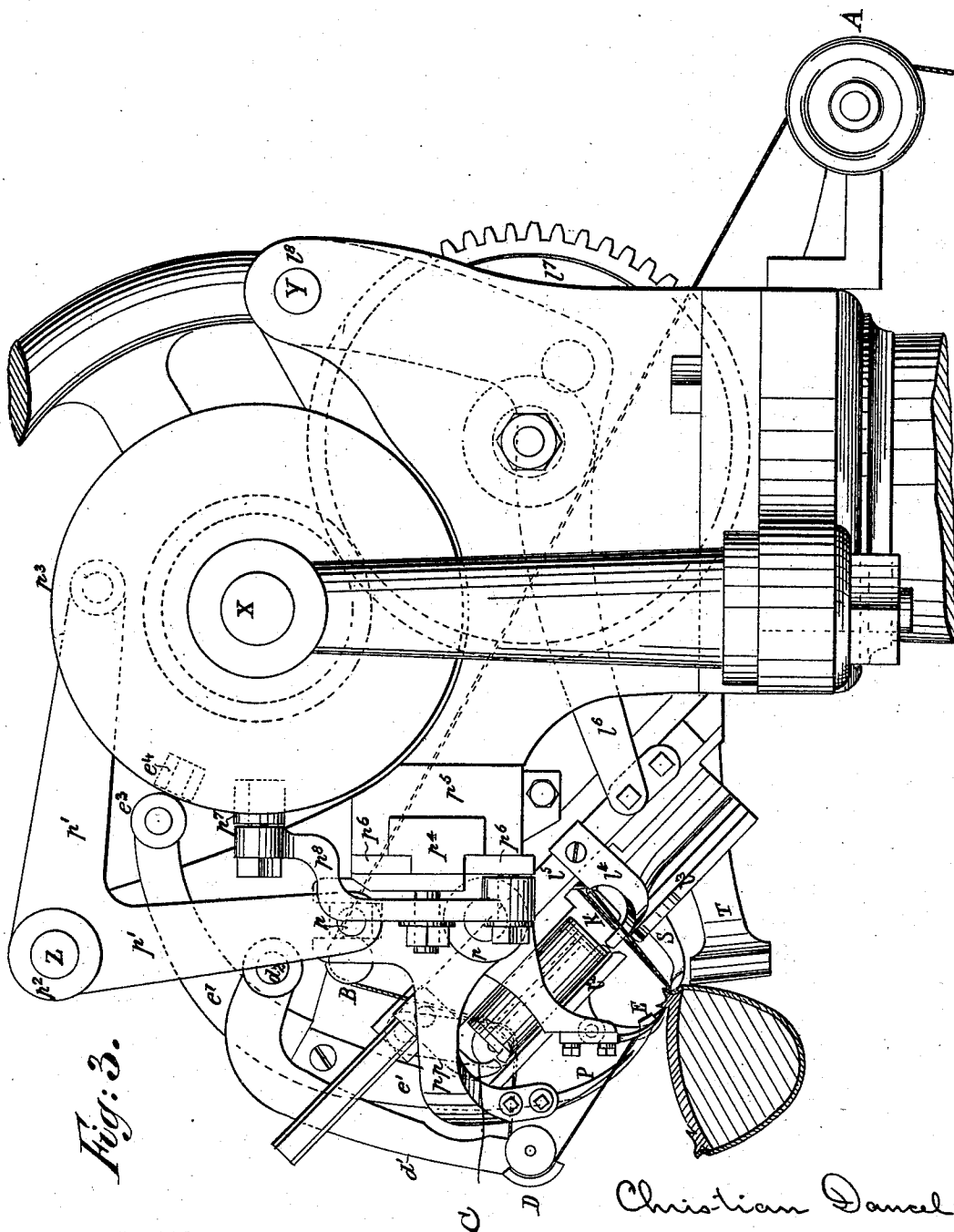


Fig. 3.

WITNESSES:

Joseph Dancel
Thos W. Canlaway

Christian Dancel
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(No Model.)

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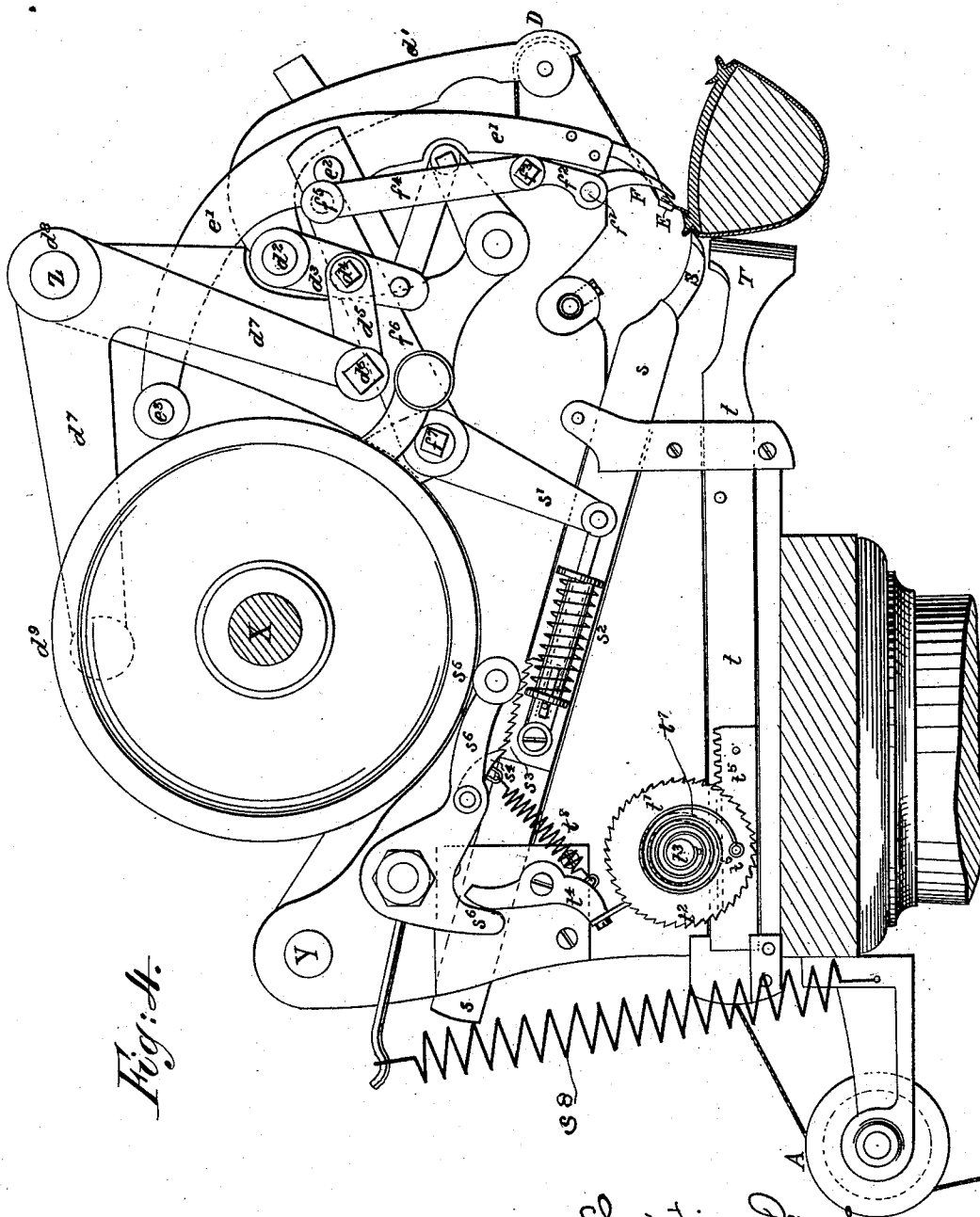


Fig. 4.

WITNESSES:

Joseph Dancel
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(No Model.)

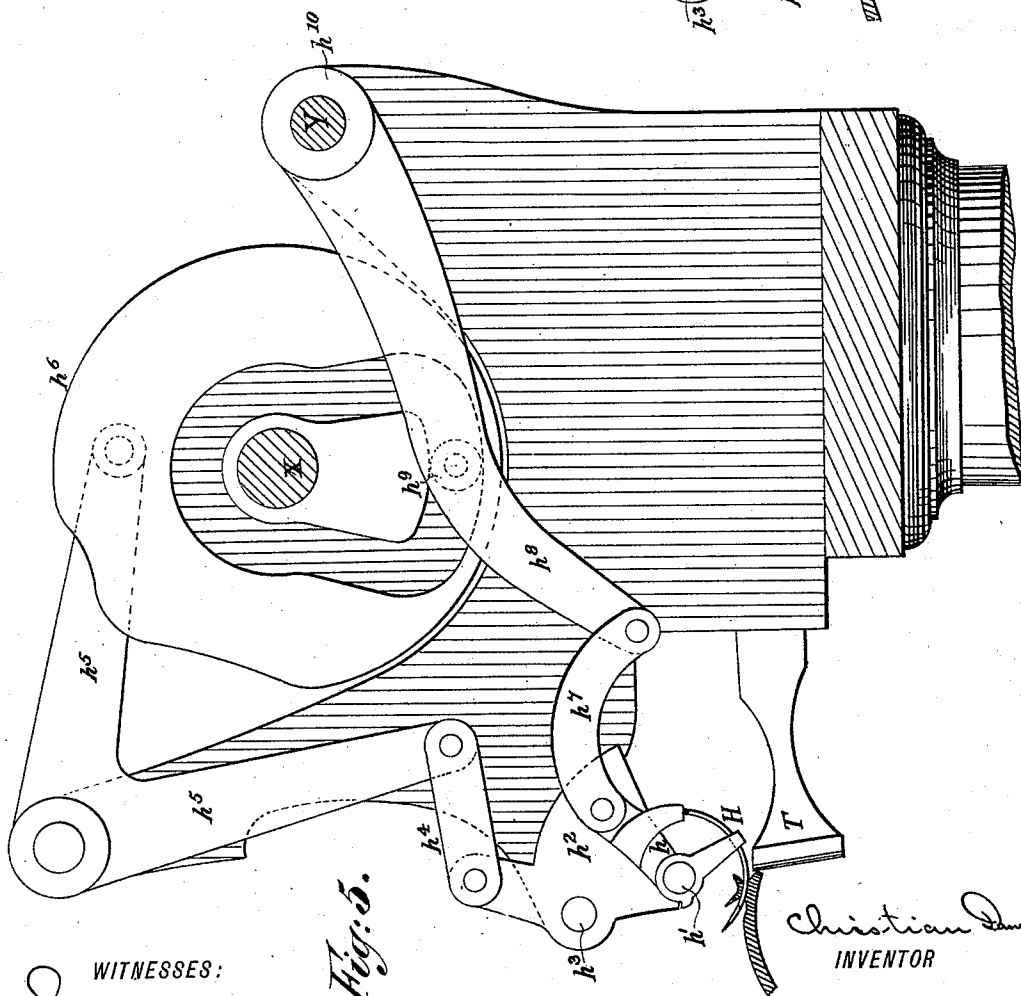
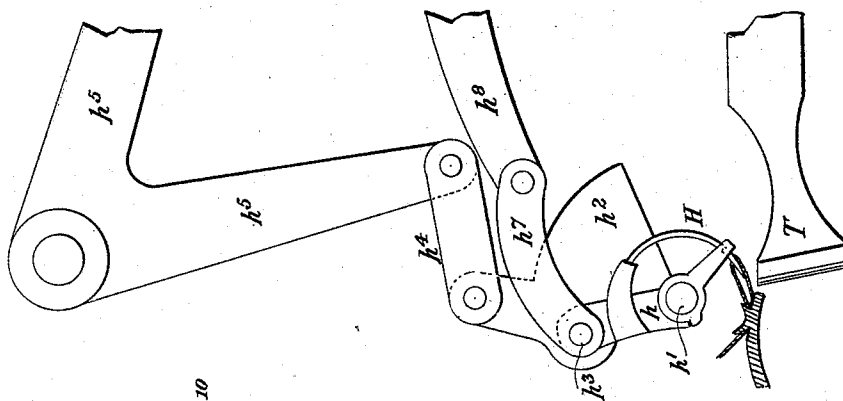
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Patented Apr. 13, 1897.

Fig. 6.



WITNESSES:

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Fig. 5.

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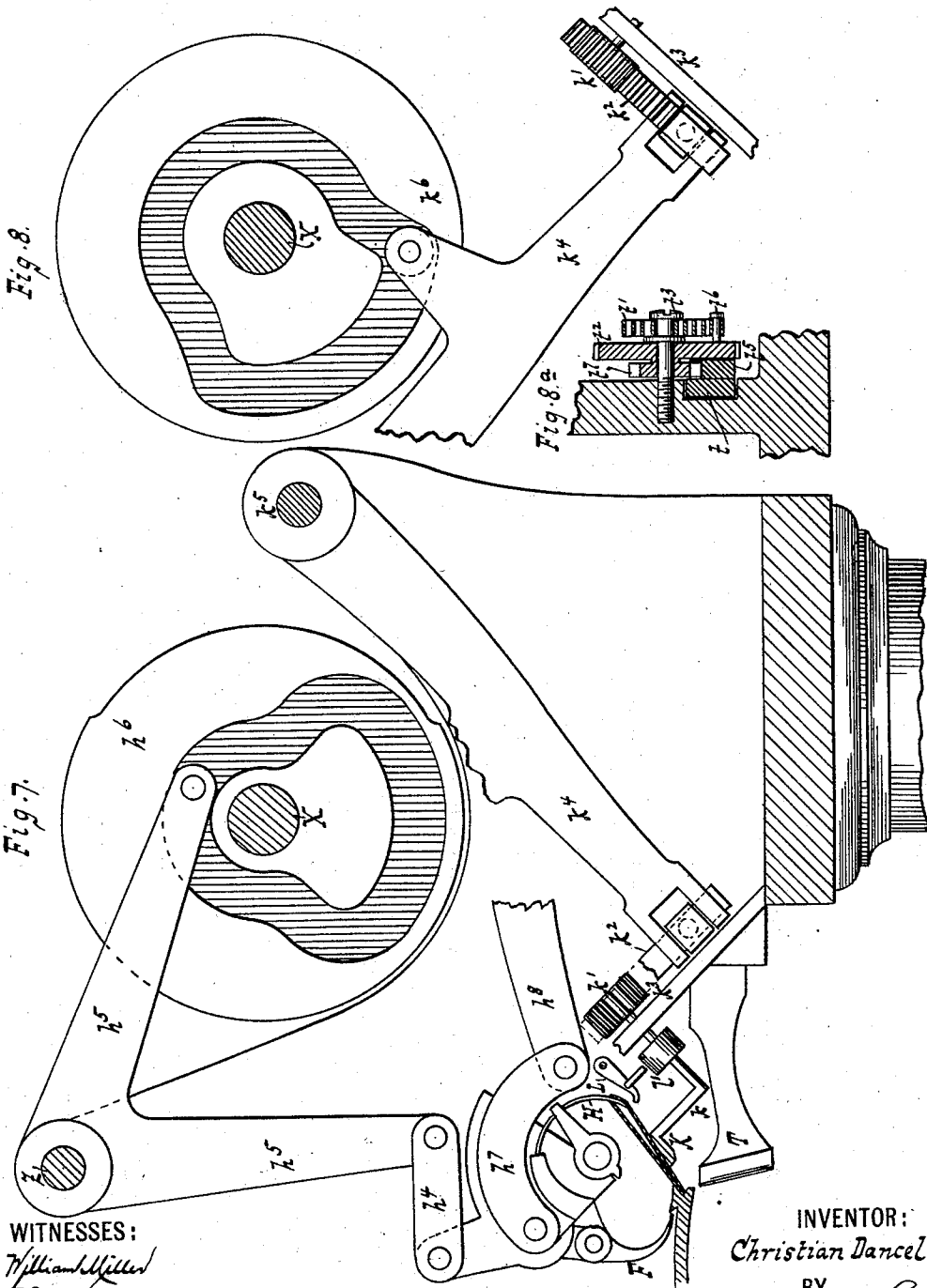
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No. 580,773.

Patented Apr. 13, 1897.



WITNESSES:
William H. Miller
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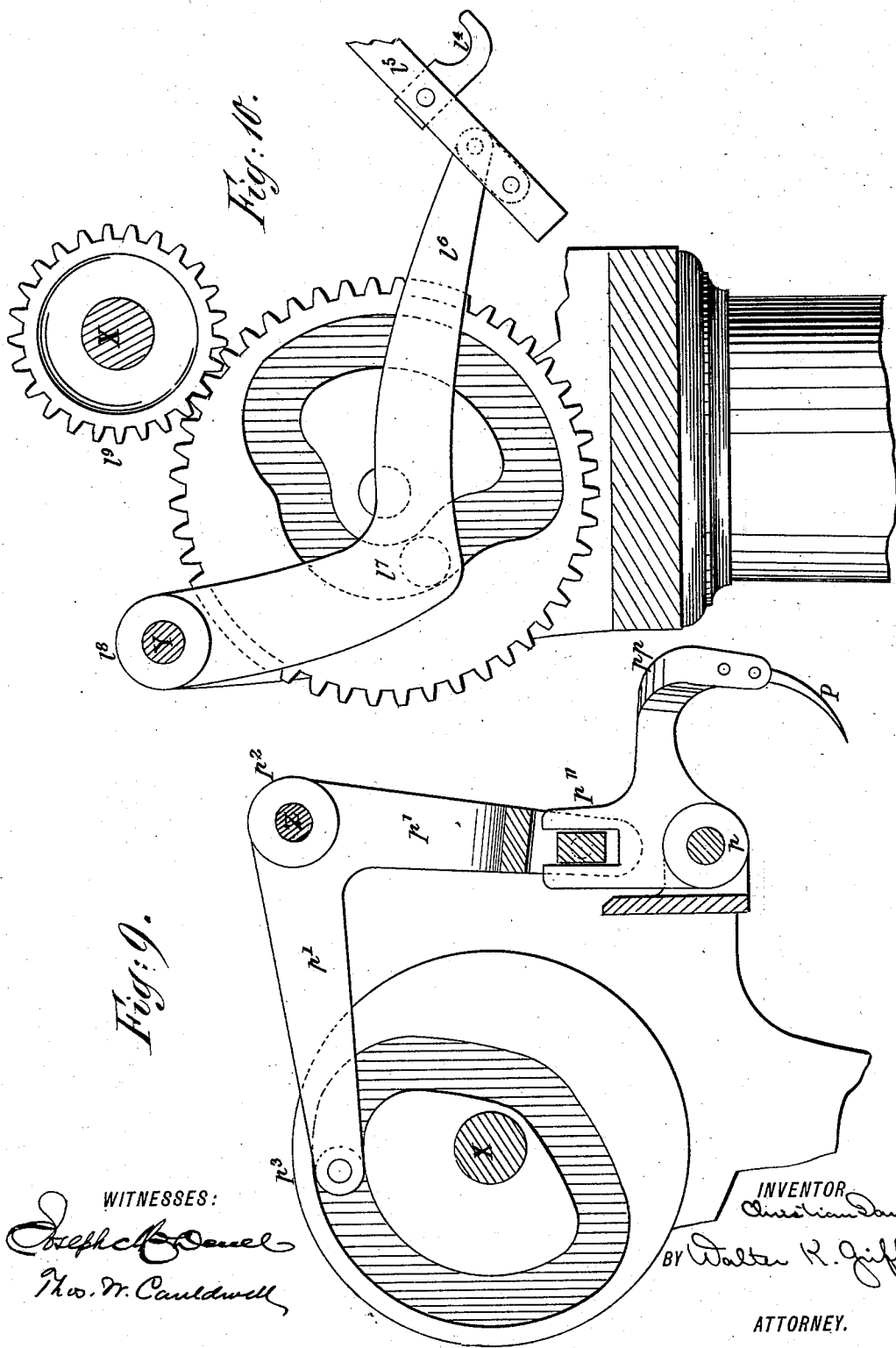
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No. 580,773.

Patented Apr. 13. 1897.

Fig. 11.

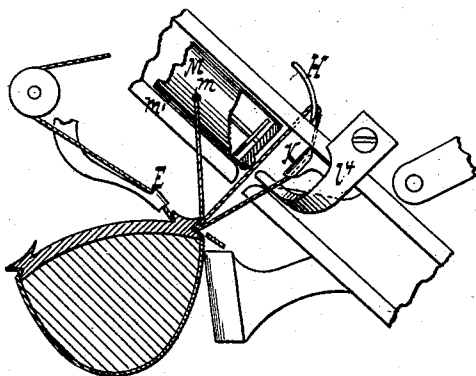


Fig. 13.

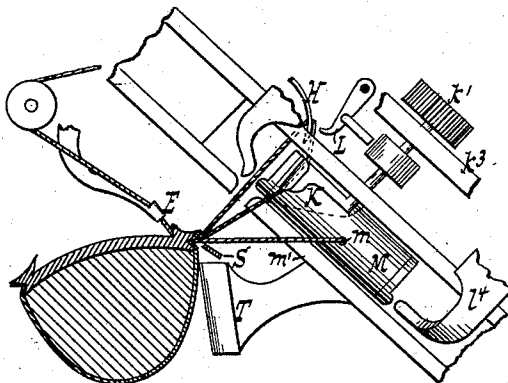


Fig. 12.

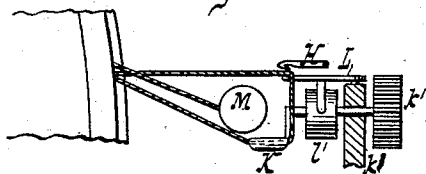


Fig. 14.

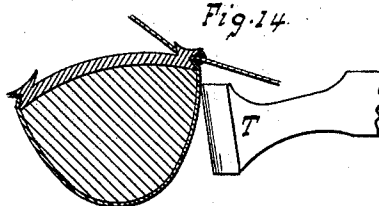


Fig. 15.

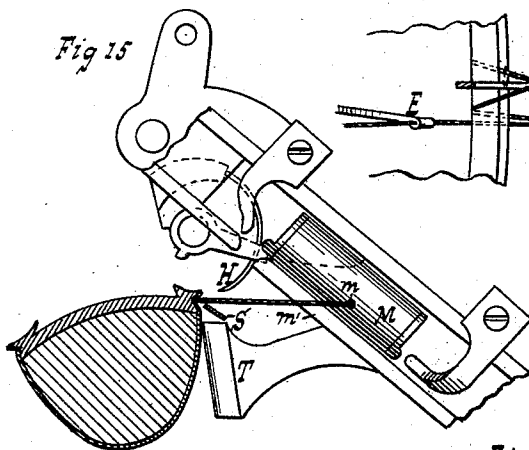


Fig. 17.

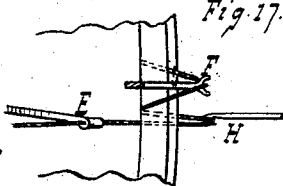


Fig. 16.

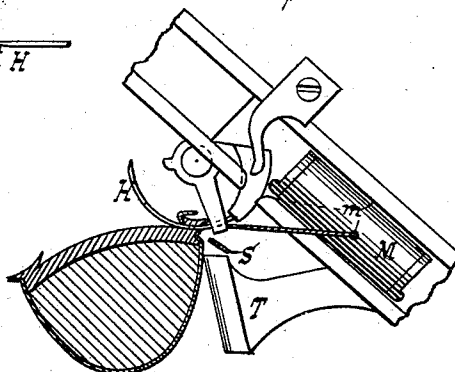
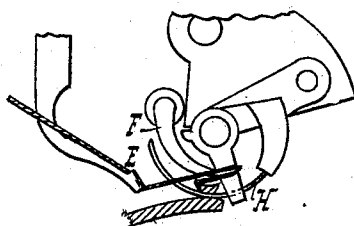


Fig. 18.



WITNESSES:

William Miller
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INVENTOR:

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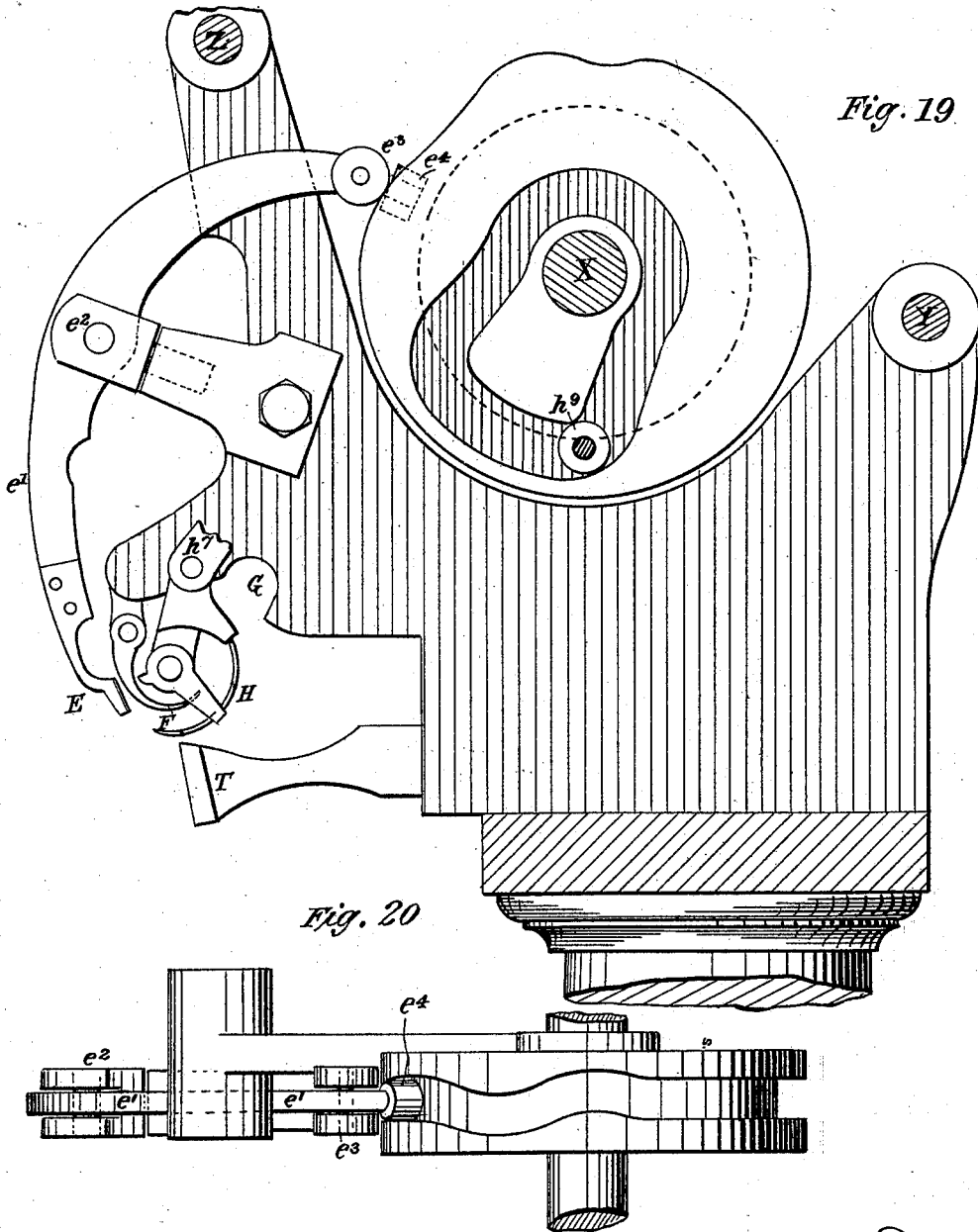
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C. DANCEL.
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No. 580,773.

Patented Apr. 13, 1897.



WITNESSES:
Joseph B. Dancel
Thos. W. Cauldwell

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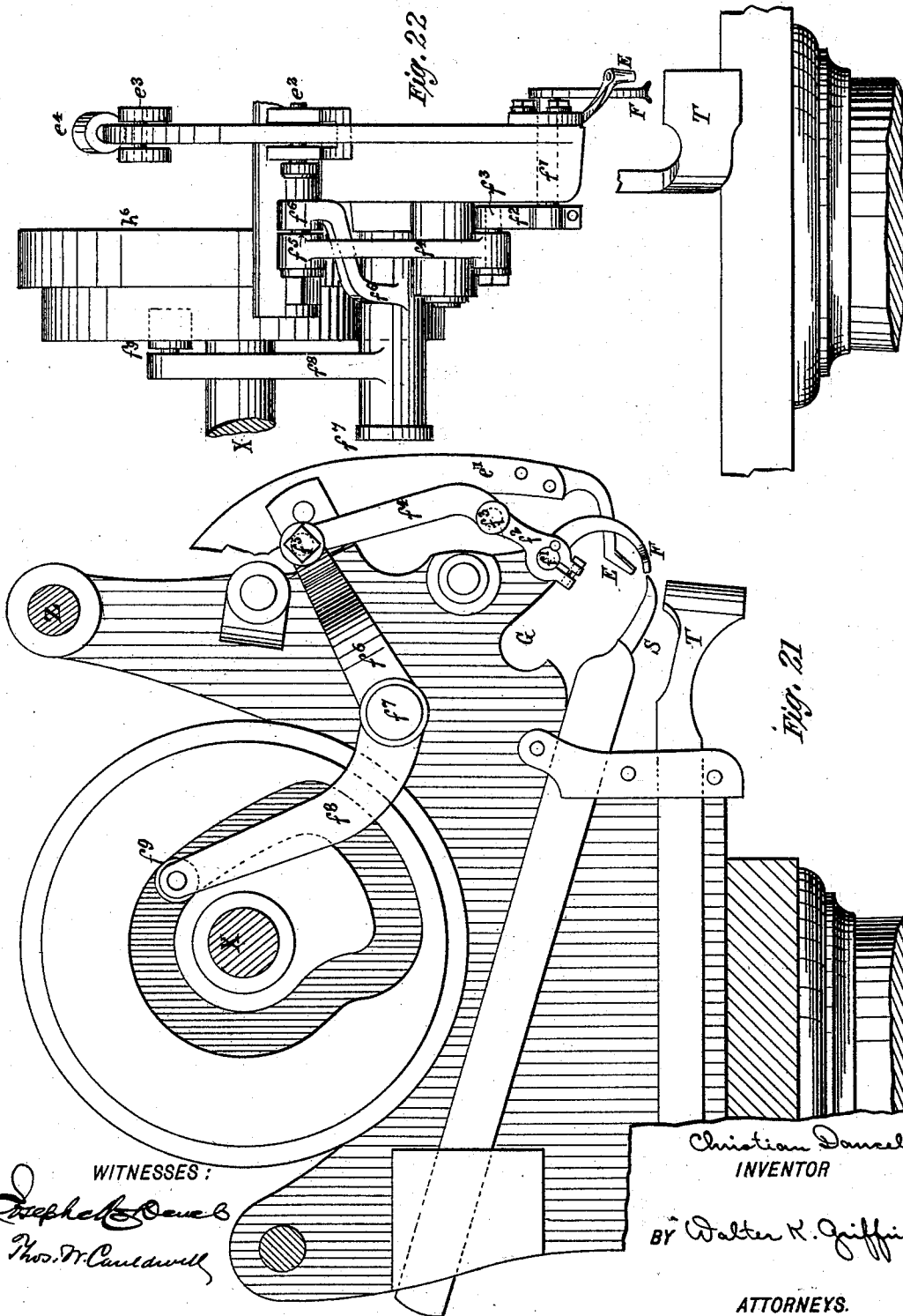
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C. DANCEL.
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No. 580,773.

Patented Apr. 13, 1897.



WITNESSES:

Joseph H. Dancel
Thos. M. Caldwell

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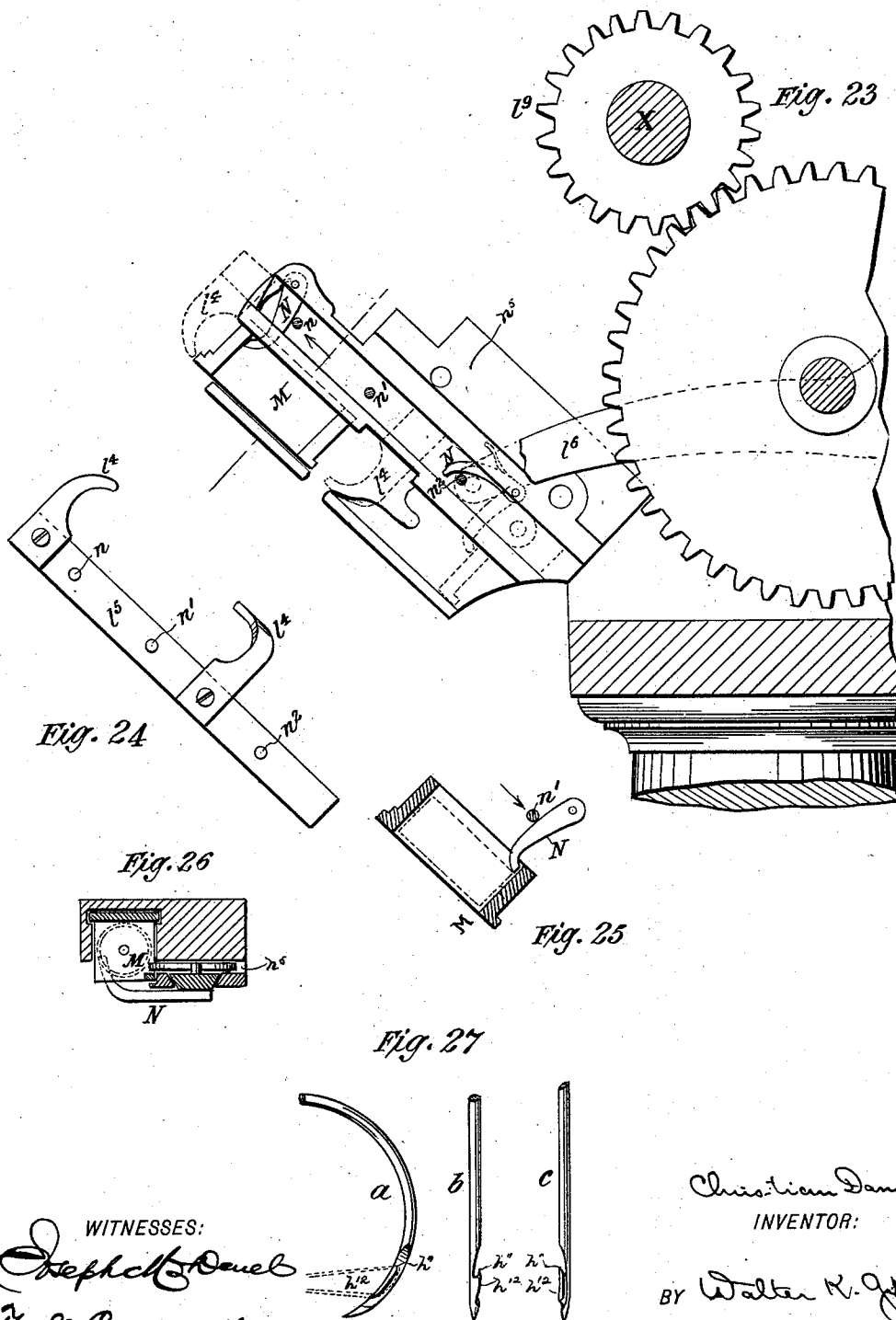
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12 Sheets—Sheet 11.

C. DANCEL.
SHOE SEWING MACHINE.

No. 580,773.

Patented Apr. 13, 1897.



WITNESSES:
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Wm. H. Caudwell

Christian Dancel
INVENTOR:

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(No Model.)

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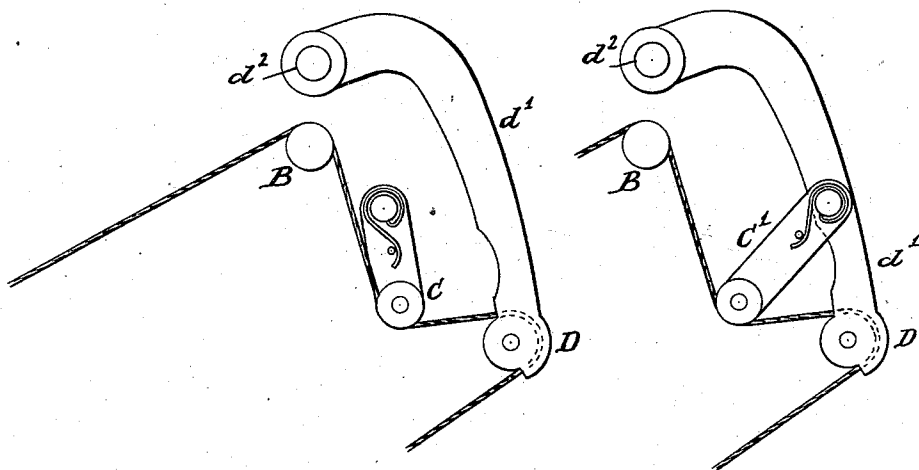
C. DANCEL.
SHOE SEWING MACHINE.

No. 580,773.

Patented Apr. 13, 1897.

Fig. 28.

Fig. 29.



WITNESSES:

E. Wolff
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INVENTOR:

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Rupp & Rupp
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UNITED STATES PATENT OFFICE.

CHRISTIAN DANCEL, OF BROOKLYN, NEW YORK.

SHOE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 580,773, dated April 13, 1897.

Application filed June 4, 1892. Serial No. 435,500. (No model.) Patented in England June 19, 1894, No. 11,865, and in Germany June 19, 1894, No. 83,475.

To all whom it may concern:

Be it known that I, CHRISTIAN DANCEL, of Brooklyn, county of Kings, State of New York, have invented an Improvement in Wax-Thread Sewing-Machines, of which the following description, taken in connection with the accompanying drawings, is a specification, like letters of reference on the various sheets representing the same parts in the actual machine.

The object of this invention, for which was granted British Patent No. 11,865, of June 19, 1894, and German Patent No. 83,475, of June 19, 1894, is to obtain a wax-thread sewing-machine employing two threads for the formation of a lock-stitch and which is adapted for attaching welts to the insoles and uppers of shoes, and also for so-called "turnwork," in which the shoes, after being sewed inside out, are turned or reversed, so as to bring the outsole to its proper position for wear; and the invention resides in the novel features of construction set forth in the following specification and claims, and illustrated in the annexed drawings, in which—

Figure 1 represents a plan view of the machine. Fig. 2 is a front elevation thereof. Fig. 3 is a side elevation seen from the shuttle side. Fig. 4 is a side elevation seen from the drive-wheel side, the drive-wheel being sectioned off. Fig. 5 is a side elevation of the needle and needle-segment with the segment-carriage and the operating cam and levers. Fig. 6 is a view like Fig. 5 with the needle-segment moved up to the extreme of its motion. Fig. 7 is a side elevation of the loop-carried and loop-detaching hook or arm. Fig. 8 is a side elevation of the actuating-cam and lever for the rack, operating the gear of the loop-carried shaft. Fig. 8^a is a sectional view of details hereinafter referred to. Fig. 9 is a side elevation of a cam and lever for the awl. Fig. 10 is a side elevation of the cam and lever for the shuttle-drivers. Figs. 11 to 18, both inclusive, show details hereinafter referred to. Fig. 19 is a side elevation of the looper or thread-eye and its double cam. Fig. 20 is a plan view of the double cam for the looper. Fig. 21 is a side elevation of the thread-arm or hooker and of its cam. Fig. 22 is a front elevation of the cam for the

thread-arm. Figs. 23 to 26, both inclusive, show details of the shuttle-operating devices. Fig. 27 is a detail enlarged view of the needle, showing that side of the needle which faces the shuttle, as also the front view and rear view of the needle. Figs. 28 and 29 show auxiliary take-ups.

The formation of a lock-stitch in weltwork has hitherto presented many difficulties, but by means of my improvements I am enabled to perform this class of work at high speed and with great economy and while the shoe is stretched upon the last, thus avoiding any necessity of removing the last from the upper during any stage of operation. Among the difficulties to be overcome is the necessity of having space to hold the shoe with its last up to the sewing device continuously while yet giving room for the shuttle and sewing devices and the loop-drawing mechanism. This I accomplish by means of a shuttle box or race entirely removed from the line of action of the needle and located at one side and inclined at an angle substantially parallel with the shank of the shoe when held sole upward while being sewed, or inclined from its lower end upward and outward and at practically a right angle to the line extending from the free end of the gage or welt-guide to the free end of the needle when in its retracted position or having drawn up a loop of thread. This inclination, as seen in Fig. 3, makes the shuttle-race lie at practically a right angle to the loop of sewing-thread which has been drawn up by the needle.

In order to obtain a loop long enough through which to pass the shuttle without the thread rendering through the hook of the needle while retaining the advantages of a hooked circular needle of small radius—the use of a needle of large radius of motion being impractical—I cause the needle first to complete its entire circular motion, drawing out all the thread it is possible thus to obtain, after which the needle and its connected parts are moved bodily, thus drawing out further thread, while the needle is simply translated from one position to another, meanwhile acting as a hook by which the thread is drawn out, the remainder of the loop required being drawn out by what I term a "loop-carrier"

after the sewing-thread is removed from the needle. I also use such devices as to secure the result that when the needle has once caught hold of the thread there is substantially no further rendering or reeving of the thread through or across the hook of the needle either while the needle is drawing down the first part of the loop or while the needle is being bodily moved with its connected parts to draw out the second and final portion. This I secure by the peculiar motion I give the thread arm or hooker, which enables it to draw down or out sufficient thread for the loop up to the stage at which the loop is removed from the needle and transferred to the loop-carrier, so that when the needle hook or barb acquires control of the sewing-thread it does so at the practical center or bight of the loop to be formed, the thread-arm and the take-up lever moving down as the needle moves up and back, so as to enable the needle to carry up the loop, without, however, drawing a further supply of thread through the tension-roll, the motions of the thread-arm and the take-up lever being so timed as to keep just sufficient tension on the sewing-thread to prevent it slipping out of the barb of the needle.

Another difficulty has been so to form the thread-loop as to be able to remove it from the needle with ease and certainty, and without fraying or cutting. This I accomplish by the use of a needle in which the groove or thread-guide, from the hook of the needle toward the point, is placed entirely on the side of the needle nearest to the shuttle, by which means the loop of thread never crosses the needle and in no way becomes entangled with it or has to be moved from around it, but while lying along the groove is held substantially in the groove only and on the shuttle side during all stages of operation, by which means when the loop has to be removed from the hook of the needle there is absolutely no obstruction and all cutting or fraying of the thread is avoided. By means of the peculiar groove employed in my needle I further obtain the advantage that the loop of thread while being drawn out is kept apart or open at the end held by the needle, so as to afford easy access for the devices which remove the loop from the needle and carry it over toward the shuttle.

In order certainly to remove and carry over the loop, I make use of a device which I call the "loop-carrier," which has a projecting hook or tongue, which I cause to enter the loop while the needle is being translated backward and upward before the termination of the formation of the entire loop. By this means the carrier is enabled to enter the loop while the loop is still guided by the groove at the point of the needle, and while the two arms of the thread are thereby held apart, and while there is sufficient tension on the thread, by reason of the continuing formation of the loop, to hold both arms of the

thread taut and stiff, so that all possibility of collision of the carrier with the wrong thread is avoided.

In conjunction with the loop-carrier I employ a small arm or finger, the "thread-detainer," which is caused to move close up behind the carrier and which takes the loop of thread from out the barb or hook of the needle without, however, pulling out more thread, and retains and holds it while the loop is being carried over and extended for the shuttle to pass through it. By means of this detainer I avoid any rendering of the thread at the bight of the loop and enable the thread to slip off easily, whereas if it were retained by the hook of the needle it would be almost impossible to get it out of the hook.

In order to obtain a continuous tension upon the thread, I avoid the use of the devices now commonly employed, by which the thread is pulled or drawn out and measured off for the succeeding stitch, and make use of a direct tension, which is continuous and operates directly on the thread to enable the take-up to tighten the stitch, so that the stitches are sewed tight, the degree of tightness regulating the tightness of the stitch. One such tension is employed for the shuttle-thread and one for the sewing-thread.

The machine is mounted on a column or support at a height suitable for the operator. The main or driving shaft X is driven by a pulley or wheel, as usual, and on said shaft are mounted operating-cams. A shaft Y at the rear of the machine forms a fulcrum for certain levers, hereinafter described, and the sewing devices are in front, the shuttle being to the right as the operator faces the machine.

The sewing-thread passes, as is well known, through a wax-pot (not shown) and through a suitably-regulated tension A, Figs. 3 and 4. From the tension the sewing-thread passes over a small guide-roll B, Fig. 3, and from thence to an auxiliary take-up C, as usual. The auxiliary take-up is operated by independent spring-pressure and keeps the sewing-thread slightly taut while it is being carried through the hook or barb of the needle. From the auxiliary take-up the thread passes about roller D of the principal take-up, comprising a lever d^1 , Figs. 3 and 4, fulcrumed at d^2 on the frame of the machine and operated by a link d^3 , jointed at d^4 to a lever d^5 , fulcrumed at d^6 , and actuated by cam d^7 . The auxiliary take-up, as is well known, can be arranged in various ways, as, for example, in Fig. 28 the auxiliary take-up C is shown on a fixed pivot and exposed to spring-pressure, or, as seen in Fig. 29, the auxiliary take-up C' can be pivoted to the main take-up D. It will thus be seen that the spring-pressure upon the tension-roll above the wax-pot regulates and controls the entire tension of the thread. In sewing on welts, by reason of the varying thickness of the stock operated upon, the length of thread for a stitch necessarily varies, the upper being bunched or crowded

at the toe and being of a single thickness only at the shank, and it is therefore impractical to measure off an unvarying length of sewing-thread for a stitch and then to lock the supply-thread to prevent a further delivery. The take-up, in moving up from the work, draws up thread from the supply, and the tension, being continuous over the take-up roll, is exerted to tighten the stitch in the stock by means of the movement. The take-up thus in addition to tightening the stitch or drawing up the needle-thread loop also draws thread from the supply for the succeeding stitch, and if in the preceding stitch, by reason of extra thickness of the work or bunching or for any other cause, an extra length or quantity of the needle-thread loop should have been consumed or should have remained in the work such extra consumption will be compensated for by the correspondingly additional length of thread given up by or drawn from the supply on the rise or drawing-in stroke of the take-up, such additional consumption of the thread causing the take-up to set the stitch and to draw on the delivery at an earlier period in its drawing-in stroke than when less thread is consumed for the stitch. While the stroke of the take-up thus remains uniform, the greater or less consumption of thread in forming a stitch results in a correspondingly greater or less delivery of thread from the supply. The take-up, having thus drawn out sufficient supply-thread, moves down later on to supply thread, without unnecessary tension, to the thread arm or hooker, hereinafter described, in its movement up and back, and then again moves down to supply thread similarly to the needle as it is moved up and back, and, lastly, again to supply thread to the loop-carrier as the carrier carries over one arm of the thread beyond the shuttle, thus in all these movements preventing any abrasion of the thread by undue tension, which would exist if the take-up did not freely surrender the thread required for these movements.

In tightening the stitch the pull of the take-up is such as to draw the upper of the shoe down against the insole, a most decided aid to good work.

From the principal take-up the thread is led down to and is threaded through the eye of the looper or thread-eye E. The thread-eye E is mounted on lever e' , fulcrumed at e^2 , and which is given a double or swivel motion as its rollers e^3 e^4 , Figs. 19 and 20, are moved by the cam-surface and cam-groove of the double cam actuating this lever, so that the eye E moves backward and forward and also sidewise or laterally to place the sewing-thread into the barb of the needle, which draws the sewing-thread through the stock or leather. The looper or thread-eye, with the thread passing through it, is held stationary, away from the paths of the needle and awl, until the thread-arm, soon to be described, has almost completed its upward and

backward motion, drawing out the required loop of sewing-thread. Just before the completion of this movement of the thread-arm the looper or thread-eye, by means of its governing-cam and attached levers, is moved at right angles to the plane of motion of the needle from the side away from the shuttle toward the shuttle, so as to place the thread across the path of the needle. When the needle moves forward, up through the stock, the thread thus held by the thread-eye in position springs into the barb of the needle, the thread-eye meanwhile being moved forward to the front of the needle and around it, passing away from the shuttle side to insure the needle obtaining a sure hold on the thread thus laid around it. As the needle moves down through the stock, drawing a loop of thread by means of its barb, the thread-eye is moved across the front of the needle toward the shuttle side, so that the loop of thread drawn down by the needle lies entirely on the shuttle side of the needle, round the barb, and along the needle groove, soon to be described, so that the thread is in no way twisted round the needle and can be easily removed from the barb when required. When the needle has passed through the stock, the thread-arm moves back to its position of rest, ready for its next series of movements. The movement of the thread-eye to the shuttle side of the needle, after the needle has been threaded, is most valuable in practice, as it avoids the use of subsequent appliances with separate cams to place the thread in position for release and carriage to a side shuttle, which would crowd the working parts and tend to great complication.

The thread-arm or hooker F, Figs. 18, 21, and 22, prevents the sewing-thread from rendering or reeving through the hook of the circular needle while the needle is drawing the sewing-thread through the leather. The thread-arm F is mounted on a small cross-shaft f' in the frame of the machine and oscillated by arm f^2 , jointed at f^3 to link f^4 , jointed at f^5 to lever f^6 f^8 , fulcrumed at f^7 , and having its roller-stud f^9 actuated by a suitable cam-groove. The thread-arm F has a broad or U-shaped termination. To give the thread-arm room for its oscillation toward the back of the machine or away from the operator, a recess G, Figs. 19 and 21, is cut into that part of the machine which is contiguous or near to the needle-segment. The thread-arm F has its cross-shaft f' placed parallel to the needle-supporting pivot and directly above the work. All the movements of the thread-arm are thus in the arc of a circle away from and toward the operator and directly across or at right angles to the path of motion along which the shoe travels and substantially parallel with the plane of motion of the needle. The object of this is to avoid all lateral motion which while the shoe is being sewed at the shank would tend to bring the thread-arm in collision with the sole

of the shoe, which is there curved upward both toward the ball and the heel. So, also, while sewing at the toe, where the upper is crowded and overlapped in a rough irregular short quick rounded curve which projects far above the insole, lateral motion would cause collision of the thread-arm and projecting upper. At the shank the two seams are close together, and the edges of the upper as tacked to the last closely approximate, and in sewing the sole has to be raised at the side toward the operator and lowered at the side being sewed in order to enable the needle properly to enter the stock. I therefore so shape the thread-arm (see Fig. 21) as to curve it upward from its U-shaped termination, so as to clear the sole as far as possible, and I shape the moving cam f^9 and fix the axis of revolution f'' of the thread-arm so that the thread-arm is at its lowest point when in position to move and control the sewing-thread, so that it is raised from the sole when moved either way from this position, which is almost directly over the seam to be sewed. So, also, to enable the thread-arm to clear the ridge or projection of the upper, around the toe more particularly, or wherever it may exist along the sole, I so place the axis of movement of the thread-arm as to cause the thread-arm to rise rapidly after coming in contact with the sewing-thread. I thus also remove the thread-arm up and away from the path of operation of the thread-eye or looper, giving it a clear field for its varied movements, and by locating the thread-arm on the side of the needle and away from the shuttle and by mounting its axis to the front of the machine I avoid crowding the parts within the interior and afford space for the devices which transfer the thread to the shuttle. The plane of motion of the thread-arm being parallel to that of the needle and awl, no collision between these parts is possible.

I am aware that thread-arms having a motion to and from the operator without lateral motion have been used in other machines, but such thread-arms have had a motion substantially horizontal or with a slight rise and fall and have been moved back into the interior of the machine. In sewing outsoles the work is substantially even, and when a lock-stitch is made use of the motion of the thread is small; but in my experiments in constructing my present invention of a lock-stitch welting-machine I found I had to give the thread-arm extended movement in order to draw down a long loop for the shuttle used with a lock-stitch, and this caused collision, as before explained, and to overcome this I devised the quick upward movement of the thread-arm to clear the ridge of the upper and so mounted the thread-arm as to enable this upward movement to be given.

In order to give as long a loop as possible, I cause the thread-arm to come down into contact with the standing thread by means of the U-shaped termination, the thread-arm be-

ing moved back away from the operator and up almost to its extremity of possible action. This movement would bring the thread-arm in collision with the needle segment or block upon which the circular needle is mounted, and in order to avoid this and at the same time to enable the thread-arm to draw out as much thread as possible I cut away the recess G.

The needle H is partly cut away at the side facing the shuttle, so as to leave a shoulder or projection h^{12} , Fig. 27, at such side, the upper part of this shoulder h^{12} forming a hook or barb h^{11} . When the needle-thread loop is held by this barb and shoulder, as shown by broken lines at Fig. 27^a, said needle-thread loop is held spread or opened and said needle-thread loop is also located entirely at one side of the needle, so as to be readily lifted or cast off from the needle without requiring any unwinding or disentangling. The needle-thread loop being held spread, as shown in Fig. 27^a, is in advantageous condition for the safe and accurate entry of a device for removing the loop. In welt-sewing machines, by reason of the irregular thickness of the material sewed and drawn together by the machine, there is no positive point in space from which the thread leaves the stock, and the angle from the horizontal at which the thread runs from the stock to the needle varies according as the stock is thick or thin at that particular stitch, and it therefore becomes exceedingly important to secure as wide an opening of the loop as possible, so that the devices carrying over this lower arm of the sewing-thread loop may never catch the upper arm or miss the lower one by reason of this varying inclination or angle.

The needle H is mounted on a segment h , Figs. 5 and 6, swinging on shaft h' , journaled in a segment h^2 , which in its turn is mounted so as to be capable of swinging independently the needle and needle-shaft with it. This segment h^2 has its fulcrum at h^3 at the front of the machine and is connected by link h^4 with lever h^5 , actuated by cam or cam-groove h^6 . The lever h^8 has its fulcrum at h^{10} on shaft Y, and its roller-stud h^9 is actuated by a suitable cam or cam-groove, so that the lever h^8 , by means of link h^7 , imparts motion to the needle-segment h , to which the needle is directly attached. The lever h^8 thus acts to swing the needle-segment h with the needle about the shaft h' , while the lever h^5 swings the main segment h^2 about the fulcrum at h^3 , so that the main segment h^2 when swinging backward will carry with it the shaft h' , thus enabling the needle H to be swung far back into the machine to get out of the way of other working parts, as also to draw or take up considerable loop of needle or sewing thread. The essence of this part of my invention is to translate the needle bodily beyond the part possible to be reached by its own motion of rotation, so as to draw up a larger loop than the circular needle motion could give of itself,

and it is evident that the main segment or carriage may be arranged in a variety of ways so long as its movements result in thus carrying and transporting the needle bodily; but the means just described I have found preferable and most advantageous. I am thus enabled to retain the use of a circular needle and awl of small radius, with the advantages of entering the stock close to the point of exit, as is the case with the shoemaker's hand-awl.

I am aware of Letters Patent to Mills, No. 93,731; to Destuoy, No. 95,571, and to Stein, No. 124,393, in which the needle has two separate movements, one of oscillation and one of translation in space; but these patents show only a chain-stitch machine with its short thread-loop, and in all of them the needle is used to tighten or draw up the stitch and none of them employed a thread arm or hooker. My invention does not make use of the needle to tighten or take up the stitch, which with the long loop necessary for a lock-stitch would be most detrimental, causing the needle to bend and the thread to render or reeve over the needle-barb to the extent of the long loop necessary to be formed for a lock or shuttle stitch, but on the contrary the needle is relieved from all rendering or reeving of the thread and all undue strain on the delicate needle. Whatever the combination of devices controlling the thread, whether take-up, thread-arm or thread-eye, it is of the essence of this part of my invention that their movements, by suitable cams, be regulated so that the rotary needle catches the sewing-thread at the central point of the bight or loop to be formed by the motion of the needle and that the thread controlling or supplying devices move so as to give up thread to the needle to avoid rendering or reeving of the thread round the needle-barb in all its movements, either of oscillation or translation, the function of the needle in its movement of translation being to carry up a loop for the shuttle and the function of the take-up, thread-arm, and thread-eye to surrender thread as this loop is formed. I have shown the peculiar movements of the take-up, thread-arm, and thread-eye from my experience best adapted for this purpose; but it is evident that the relative movements of these parts may be varied, so far as this part of my invention is concerned, so long as the movements do not interfere with these two functions just described. The needle and loop-sewing thread being thus moved up and back, the loop-carrier K, Fig. 7, swings or moves between the two arms of the thread-loop. This loop-carrier K consists of two lips projecting from the free end of an arm extending from a rock-shaft *k*, the upper or outer lip being the longer of the two, so as to enter safely between the arms of the needle-thread loop and to cause one of said thread-arms to be held or engaged between said lips to be carried toward the shuttle and across the shuttle-path for enabling the shuttle, with its thread, to be shot through the needle-

thread loop. This carrier K has its rock-shaft *k* provided with a gear-wheel *k'*, which is oscillated by the rack *k''*, reciprocated by the forked end of the lever *k'''*, fulcrumed at *k''''* on shaft Y and actuated by a suitable cam or cam-groove *k'''''*, Fig. 8. The long upper lip of K enters the loop of sewing-thread before the arms of the loop are brought into too close contact by the upward and backward motion of the main needle-segment, which motion causes the sewing-thread to drop out of the guiding-groove at the point of the needle and to remain held simply by the barb or hook of the needle.

While the carrier K is engaging the loop, the cast-off or loop-detainer L, Figs. 7 and 12, is actuated to remove the sewing-thread from the hook or barb of the needle. This cast-off consists of a small lever actuated by a cam or eccentric *l'* on the thread-carrier shaft *k*. The free end of the cast-off L is bent up or hook-shaped, and as soon as the carrier K has moved an arm of the needle-thread loop slightly toward the shuttle and suitably spread the loop the cast-off L moves up between the carrier and the needle and into the needle-thread loop, so as to lift or remove the thread from the needle-hook and to retain said thread until the stitch is to be taken up or drawn into the stitch-hole. There is no reeving or rendering of the thread around the cast-off. This cast-off thus, in addition to casting the thread off the needle-hook, also acts as a loop-retainer or post, around which an arm of the needle-thread loop passes. The thread-carrier K carries the thread across and through the shuttle-race, Figs. 3, 11, 12, and 13, either above or below the shuttle M, according to the position occupied at the time by the shuttle in the race or box. The shuttle race or box is cut out about its middle for the passage of the carrier K, the upper portion *l''*, Fig. 3, of the box being substantially equal in length to the lower portion *l'''*, and both portions being of such size that each will contain the shuttle, according to its movements, so that a double-nosed shuttle can be used.

In order so to distend or spread the loop as absolutely to prevent collision of the shuttle with any part of the loop, I construct the loop-carrier so that its breadth from front to back or in the direction of the depth of the shuttle or shuttle-race is substantially the same as the breadth of the shuttle or shuttle-race, so that the carrier by its breadth alone sufficiently spreads the loop to enable the shuttle to pass through it without contact with that portion of the loop which is controlled by the carrier; also, I so locate the point at which the loop-retainer moves up to catch and arrest the loop of sewing-thread that the angle formed by the thread as it runs from this loop-retainer to the back edge of the carrier is substantially a right angle with the portion held under the groove of the carrier. By this means I secure the advantage that the

two arms of the loop cannot possibly come in contact with the shuttle in its motion. (See Fig. 12.)

When the loop-carrier has carried the lower arm of the sewing-thread across the shuttle-race and across the point or one of the points of the shuttle, (see Figs. 11 and 12,) the shuttle is shot or shoved within the shuttle-box along the race, either up or down, as the case may be, by means of two drivers l^4 , placed suitably far apart on a bar l^5 of proper length, according to the size of the shuttle. This bar l^5 moves in a suitable slot or guideway in the shuttle-box parallel with the line of motion of the shuttle and is actuated by lever l^6 , Fig. 10, fulcrumed at l^8 on shaft Y and operated by cam l^7 , mounted in the frame of the machine and driven by gear-wheel l^9 on shaft X.

By causing the lower portion of shuttle-box l^2 to recede or to incline backward into the machine said shuttle-box will be out of the way, so that the shoe, with its last, can be brought up close to the sewing devices. A convenient arrangement is shown in the drawings, where the shuttle-box is in a plane parallel to that of the motion of the needle and at an angle of about forty-five degrees from the perpendicular, which angle is substantially the same which is made by the shank of the shoe when the sole is held upward and horizontally under the machine by the operator, as is usual in working. This part of my invention has for its object to permit the shoe to be sewed sole upward, as is essential for weltwork, and to give the necessary room below for the last. My previous Letters Patent, No. 459,036, show an inclined shuttle-box, but with it the last must be held sole downward, and the arrangement was adapted for solework, not for weltwork. Letters Patent No. 127,423 to Mills are also known to me. That patent shows a shuttle-box closely approximated to the plane of motion of the needle, and the point or nose of the shuttle is brought so close to the needle as to act to take the thread-loop off the needle. Such an arrangement and situation of the shuttle-box my experience shows to be unsuitable. I remove all parts of the shuttle and shuttle race or box away from the plane of movement of the needle, and thus obtain the room required and absolutely avoid all possibility of collision.

By using a double-nosed shuttle M each shot or movement of the shuttle up or down can make one shuttle-stitch, thus saving unnecessary motion. If desired, a single-nosed shuttle with corresponding driving mechanism can be used.

The necessary tension upon the shuttle-thread extending from the stock or work to the shuttle is such as to draw the shuttle forcibly against the driver, either up or down, as the case may be. In order to obtain space for the passage of the sewing-thread between the shuttle and a driver without contact with

either, the shuttle is held upward or down, as may be required, for holding the shuttle away from that driver between which and the shuttle the needle-thread is to pass. The slide-bar l^5 , Fig. 24, carrying the two drivers l^4 , is provided with three studs or pins n n' n^2 , which, as the slide-bar is reciprocated, strike against the shuttle-detents N N, Figs. 23, 25, and 26, placed in suitable recesses n^5 . As the slide-bar l^5 rises the stud n will strike against the upper detent N, so as to swing said detent into contact with shuttle M for holding the latter up or away from the lower driver l^4 , as seen in Fig. 23. At the same time the stud n^2 moves the lower detent N into the recess n^5 , so that said lower detent is out of the way of shuttle M when the latter descends. As the slide-bar l^5 with shuttle M now descends, the stud n frees the upper detent N, so that the latter now swings out of the way into recess n^5 , and the stud n^2 frees the lower detent N, so that when the shuttle M is down the lower detent N has been moved by stud n' into position as shown in dotted lines in Fig. 23, so as to hold shuttle M away from the upper driver l^4 . The detents N are short latches or levers and are provided with springs tending to move the latches downward or to swing the upper latch N into recess n^5 and to swing the lower latch N out of the recess n^5 and into the raceway of the shuttle. Said detents N of course do not swing into recess n^5 sufficiently far to be out of reach of studs n n' when said studs are to move the detents N to the locking position. By slightly curving the top and bottom of the shuttle the shock of any possible collision between the loop-carrier K and the shuttle is lessened, and by curving the lip and back of the loop-carrier the latter will, if necessary, act as a cam to raise or lower the shuttle. The object is each time to obtain space between the shuttle and a driver to enable the loop of sewing-thread to pass freely.

The sides or edges m' , Figs. 11, 13, and 15, of the shuttle bar or race are so located or cut away that the shuttle-thread coming from the shuttle will extend in a straight line from the shuttle to the work, as seen in Fig. 12, and said shuttle-thread being thus not deflected or bent by contact with the shuttle box or race will permit a direct tension from the shuttle to the work, or, in other words, the tension from the shuttle to the work will not be interfered with by the shuttle-thread being deflected by or rubbing forcibly against the shuttle box or race.

The double-nosed shuttle holds a bobbin constructed in any well-known manner. The thread leaves the shuttle at aperture m . In addition to the curved needle a circular awl P, Figs. 1, 2, 3, and 9, is employed, which is mounted on arm p , oscillated on the axis p on feed-slide p^4 by means of the awl-lever p^1 , fulcrumed at p^2 on shaft Z and actuated by cam p^3 . The awl is caused to move down at the proper time, piercing a hole in the chan-

nel in the insole. Said awl has its axis of oscillation p on feed slide or bar p^4 in the block or raceway p^5 , being held in place by the feed-slide-retaining plates p^6 . The slide-bar p^4 is actuated by lever p^8 , fulcrumed at p^9 and moved by feed-cam p^7 . The fulcrum p^9 is on plate p^6 , bolted to the machine-frame, and said lever is connected by pin-and-slot connection with the feed-slide, said pin being shown at p^{10} , Fig. 2. When the awl has moved down and has pierced a hole through the insole, the feed-lever, actuated by the feed-cam, causes the feed-slide to move from right to left the distance of one stitch, carrying with it the awl still in the work, so that the work or shoe is fed or compelled to move with the awl. By this means the awl-hole is brought into the line of action of the needle. The needle having entered and the awl withdrawn, the feed-slide moves back to carry back the awl ready to pierce the next stitch-hole. The awl-lever p' oscillates the awl by means of a fork p'' , which latter allows the awl to move with the feed-slide without losing engagement with lever p' . To the same feed-slide is attached the channel-guide R, Fig. 2, which is a flat blunt arm sufficiently large to feed into the channel cut along the insole. The channel-guide travels with the slide and awl and is also supported on a suitable lever r , actuated by roller r' , bearing against the cam-surface of the disk or cam t^7 , in which is also the cam-groove for actuating the lever k^4 of the spreader. This lever r is oscillated at suitable moments to move or lift the channel-guide out of the channel toward the operator as soon as the needle has pierced through the stitch-hole and while it is being threaded by means of the thread eye or looper. By this means friction or contact with the channel or work is avoided while the channel-guide is being moved from left to right with the feed-slide preparatory to the awl piercing a new stitch-hole. The feed motion being completed, the channel-guide is again caused to move down into the channel to grip the stock.

In addition to the channel-guide there is also used what is generally known as a "back gage" S, Figs. 4 and 21, mounted on a slide-bar s , which slides in grooves in the main frame to and from the operator.

In turnwork the back gage is employed, but in sewing on welts the back gage is unscrewed from the slide-bar and the usual welt-guide is substituted, the motions of the two being identical.

The slide-bar s is moved to and fro by means of a rock-lever s' , operated by a suitable cam-groove in the disk s^7 , Fig. 1, on main shaft X, on which disk are also the cams for actuating roller-studs e^3 e^4 of lever e' , carrying thread-eye E, as also for actuating roller-stud h^9 of lever h^8 , actuating needle-segment h . The rock-lever s' is not attached directly to the back-gage slide-bar, but has a spring or yielding connection s^3 to said bar to allow for un-

evenness and inequality in the material. The tension of the back gage tends to compress the material to be regulated by the strength 70 of the spring.

To the slide-bar s is attached a ratchet-tooth bar s^3 , Fig. 4, adapted for engagement by a pawl s^4 , fixed to lever s^6 , and which lever is actuated at suitable intervals by a cam-disk s^5 75 to press pawl s^4 into engagement with ratchet s^3 . When released by cam s^5 , the spring s^8 swings lever s^6 to lift pawl s^4 out of engagement with ratchet s^3 . The pawl s^4 , thus engaging ratchet s^3 at suitable intervals, will 80 lock the slide-bar against the work during the time the needle is entering the work. The back gage is thus moved forward and compressed with the work toward the channel-guide in the usual manner. 85

The shoe-support T, Fig. 4, is a curved support or bar attached to a slide t , which can move to and fro in guides in the main frame. To the shoe-support is screwed a rack t^3 , into which meshes a small gear-wheel t^7 , Fig. 8, 90 fixed to and revolving with the ratchet-wheel t^2 on axis t^3 . To this axis t^3 is attached one end of the spring t' , the other end being fastened to the ratchet-wheel t^2 at t^6 . Into the teeth of ratchet-wheel t^2 engages the lever or 95 pawl t^4 under the influence of spring t^8 . The shoe-support is thus normally held forward by spring t' and is pressed back by the operator holding the shoe against support T.

The tail or upper arm of lever t^4 abuts 100 against the tail of lever s^6 , and when the lever s^6 moves to raise its pawl s^4 out of engagement with ratchet s^3 the tail of lever s^6 moves the lever or pawl t^4 out of engagement with ratchet t^2 , while the movement of lever s^6 to 105 let its pawl s^4 come into engagement with ratchet s^3 will release pawl t^4 , so that the latter can engage ratchet-wheel t^2 . The lever s^6 by its movement will thus effect a locking and unlocking of both slides s and t . 110

The general operation of the machine is as follows: The principal take-up d' having drawn up a supply of needle-thread and the thread arm or hooker F having moved with a portion of such thread to the position shown 115 in Fig. 18, the needle H comes forward and has its hook caught onto the thread at about the point where the bight of the needle-thread loop is to be formed, so that there will be no rendering or reeving of the needle-thread 120 through the needle-hook in the subsequent operations, the thread-arm F, when returning, supplying needle-thread for one arm of the loop and the take-up d' , when returning, supplying such thread for the other arm of the 125 loop when the needle moves backward, as seen in Fig. 17. Said take-up, it may be noted, also supplies thread for that arm of the needle-thread loop which is carried by the loop-carrier K across the shuttle-path, Fig. 12. 130 The operator holds up the shoe on its last against the back gage or rest T, sole upward, the awl descends, piercing a stitch-hole from the insole toward the upper, and during this

action of the pawl the channel-guide rests in the channel, while the back gage rests against the work opposite the channel-guide, the work being thus gripped and compressed at and opposite the channel. When the awl has pierced the work, the back gage unlocks or moves away from the work, and the feed-slide then carries the work or shoe along one stitch length to the line of action of the needle, the awl is withdrawn, the back gage again comes against the work, and the needle enters the stock, passing through from the upper and between the substance through the insole. The thread-arm having drawn down the necessary loop of sewing-thread, the thread-eye loops or threads the needle, and during this operation the channel-guide is removed from the channel and moves back to its starting position. The needle is then moved back, out from the work, the thread-arm coming down to supply thread as it is drawn through from the insole through and out of the upper. The oscillating movement of the needle being completed, the needle is further swung or carried back by the movement of the needle-segment carriage, the loop-carrier enters the loop and begins to carry over an arm across the shuttle-path, the loop-detainer enters the loop, detaching it from the needle-hook, the loop-arm is carried across the shuttle-path, the shuttle, with its bobbin of thread, is shot through the loop of sewing-thread, the loop-carrier and the loop-detainer resume their original positions, thus releasing the sewing-thread, and the take-up is operated, drawing the sewing-thread tight and pulling in the shuttle-thread into the stitch-hole, completing the stitch.

What I claim as my invention, and wish to secure by Letters Patent, is—

1. In a waxed-thread sole-sewing machine, a hooked circular needle and a shuttle-box located alongside of one another at the front of the machine, said shuttle-box being inclined from its lower part upward toward the front of the machine and having a rectilinear shuttle-path, a shuttle contained in said box, and means, as a loop-detainer and loop-carrier made separate from the shuttle for detaching the loop of sewing-thread from the needle and for spreading said loop across the shuttle-path for the passage of said shuttle therethrough, said loop-detainer being made to swing or move in the plane of the path of the needle and said needle and shuttle having their planes of motion parallel to one another substantially as described.

2. In a waxed-thread sole-sewing machine, a hooked circular needle and a shuttle-box located alongside of one another at the front of the machine, said shuttle-box being inclined from its lower part upward toward the front of the machine, and provided with a shuttle, and cut or divided crosswise at about its middle, and having its edges m' m' cut away or receding at the middle division to permit a direct tension of the shuttle-thread

from the shuttle through these recesses to the work, and a take-up D to tighten the stitch, substantially as described.

3. In a waxed-thread sole-sewing machine, a hooked circular needle; means to oscillate the same; an inclined shuttle-box, located alongside and away from the needle, and cut or divided across its middle; a double-nosed shuttle; means to operate the same; and means as the loop-detainer and the loop-carrier, to detach the loop of sewing-thread from the needle, and spread it through the middle division of the shuttle-box, for the passage of the shuttle, said shuttle-box being inclined from a point back of and below the common or meeting portions of the awl and needle paths upward and forward to a point in front of and above the common or meeting portions of said paths substantially as described.

4. In a waxed-thread sole-sewing machine, a hooked circular needle; a needle-segment; means to oscillate this segment with its needle; a pivoted or oscillating carriage on which the needle-segment is mounted; means to operate this carriage to carry the needle with its sewing-thread bodily beyond its extreme of oscillation; thread-supplying devices as the thread-arm and the take-up, and means to operate the same to yield thread to the needle during these movements of oscillation and translation, substantially as described.

5. In a waxed-thread sole-sewing machine, a hooked circular needle, a needle-segment; means to oscillate this segment with its needle; a carriage on which the needle-segment is mounted; means to operate this carriage to carry the needle with its sewing-thread bodily beyond its extreme of oscillation; thread-supplying devices, as the thread-arm and take-up; means to operate the same to yield thread to the needle during the movements of oscillation and translation; a shuttle-box with its shuttle, located at one side of and away from the needle and having the shuttle located and moving in a plane parallel with the plane of motion of the needle; a loop-detainer, means to operate the same to detach the thread from the needle-barb; a loop-carrier, and means to operate the same to spread the loop of sewing-thread across the line of motion of the shuttle, substantially as described.

6. A hooked circular needle, an oscillating needle-segment and a pivot on which said segment is mounted, combined with an oscillating carriage made to support the pivot, a second pivot on which said carriage is mounted, means substantially as described for oscillating the segment and carriage about their respective pivots, a thread-arm and take-up and means substantially as described for operating the thread-arm and take-up to yield thread to the needle during these movements of oscillation and translation, substantially as described.

7. In combination, a shuttle, its actuating mechanism, a curved hook-needle, its carrier,

and mechanism for moving the needle-carrier toward and from the material, and for oscillating it to cause the needle to traverse the material, combined with a loop-carrier provided with a cam or eccentric and a cast-off or loop-detainer actuated by such eccentric, substantially as and for the purposes specified.

8. In a waxed-thread sewing-machine, a hooked circular needle and a shuttle-box located alongside of one another at the front of the machine, said shuttle-box being inclined from its lower part upward toward the front of the machine, and cut or divided crosswise at its middle, a shuttle, means substantially as described for operating the same, a loop-carrier and shuttle-detents N N made to engage the shuttle for keeping the crosscut in the shuttle-box clear for the passage of the loop-carrier, substantially as described.

9. In a sewing-machine, a hooked circular needle, having a thread-retaining guiding-groove cut along its convex or outer edge from the barb or hook toward the point, and entirely on the same side or half of the needle as the barb or hook, substantially as described.

10. A hooked circular needle having part of its shank at one side cut away so as to form a flat face with the shoulder h^{12} , said face and shoulder both being located at said cut needle side, the remainder of the needle-shank being left uncut or unbroken, substantially as described.

11. In combination, the hooked circular needle with its thread-retaining groove; a shuttle located alongside of the needle; means to oscillate the needle and shuttle; the thread-eye, with means to operate the thread-eye to place the thread across the path of, and wind it around the needle, and then partly to unwind the thread until it is held in the needle-groove entirely on the shuttle side of the needle, substantially as described.

12. In a waxed-thread sewing-machine a shuttle and a needle having their planes of motion parallel to one another, said needle being provided with a shoulder located on the side of the needle facing the shuttle and made to seize and distend a loop of needle-thread, combined with a loop-carrier K made to swing transversely to the plane of motion of the needle and means to operate the same, first, to enter the loop of sewing-thread while the loop is distended upon the needle, second, to

carry over and hold one arm of the loop beyond the path of the shuttle, third, to return releasing the sewing-thread after passage of the shuttle, substantially as described.

13. A shuttle, combined with a needle and with a loop-carrier K made to swing transversely to the shuttle-path so as to seize one shank of the sewing-thread loop and carry said shank across the shuttle-path while leaving the other shank unaffected, said loop-carrier having its breadth substantially equal to that of the shuttle so that its breadth alone will hold said loop-shank in flaring condition for the free passage of the shuttle, with means to operate the same substantially as described.

14. A rectilinearly-moving shuttle and a needle having a barb to seize a loop of sewing-thread, combined with a loop-carrier having a fixed pivotal support and made to swing transversely to the line of travel of the shuttle, said loop-carrier having a thin upper projecting lip, to enter the loop of sewing-thread and divide the two arms of the loop, before the transfer or carrying over of the loop to the shuttle begins, operating and constructed substantially as described.

15. In a waxed-thread lock-stitch sewing-machine for sewing the welt to an insole, a circular hooked needle, its carrier, mechanism for moving the needle-carrier toward and from the material, and for oscillating it to cause the needle to enter and traverse the material through the insole to and through the welt; a work-support, or channel-guide R, on the welt side of the material; a thread-eye; a thread-arm, with mechanism to actuate the same to surrender thread to the needle in its movements of oscillation and of translation; a shuttle and its operative mechanism; means, as the loop-detainer and the loop-carrier, to detach the thread-loop from the needle and spread and carry it across the shuttle-path, and a take-up, situated above the work-support, with mechanism to operate it to tighten the stitch, and draw the upper tight upon the last, substantially as described.

In testimony whereof I have hereunto signed my name, in the presence of two subscribing witnesses, this 1st day of June, 1892.

CHRISTIAN DANCEL.

Witnesses:

WALTER K. GRIFFIN,
JOSEPH M. DEUEL.