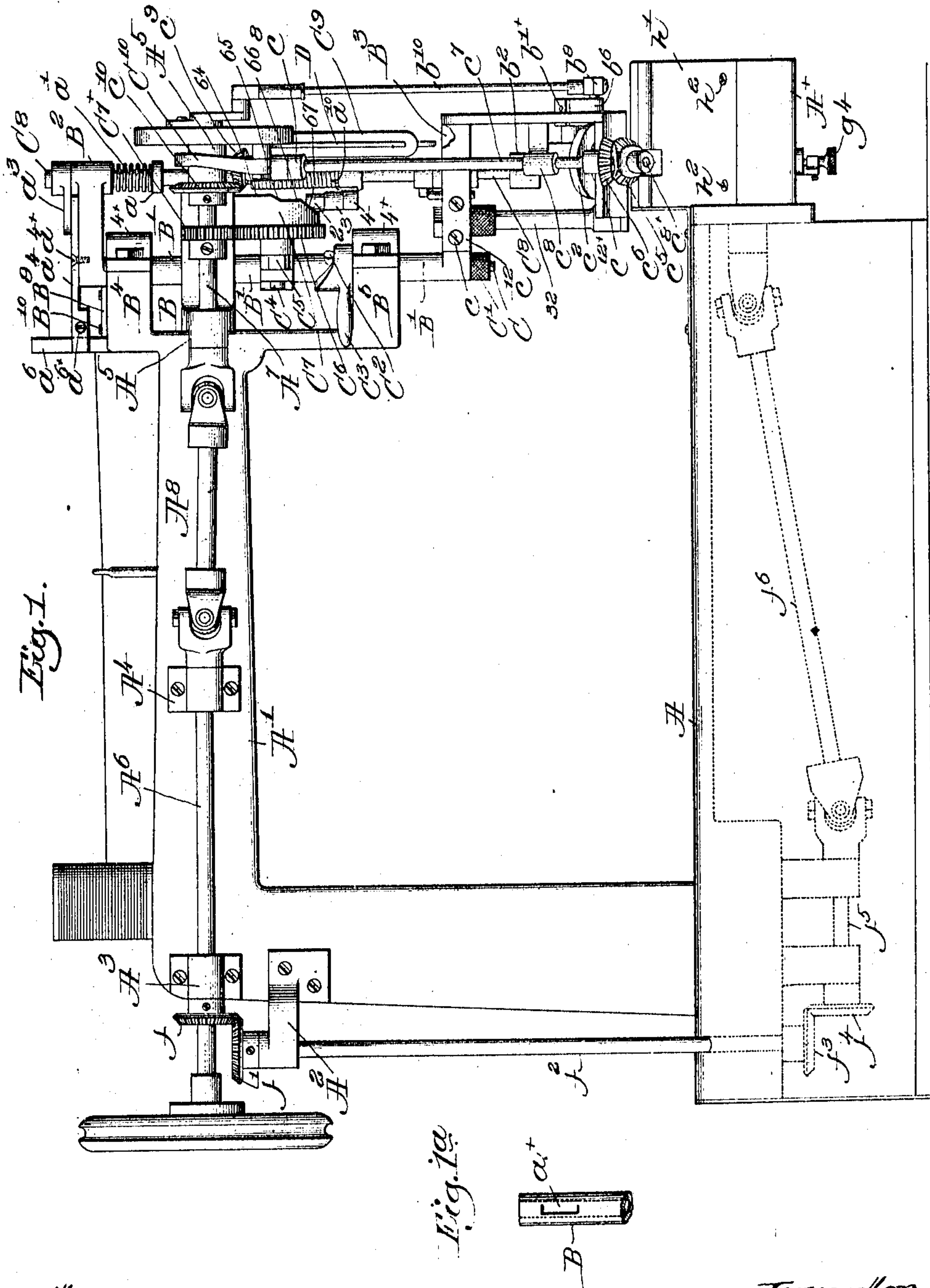


W. ARBETTER.
SEWING MACHINE FOR FELLING.
APPLICATION FILED AUG. 23, 1902.

969,740.

Patented Sept. 6, 1910.

6 SHEETS—SHEET 1.



Witnesses:
Fred S. Grunke
W. C. Linsford

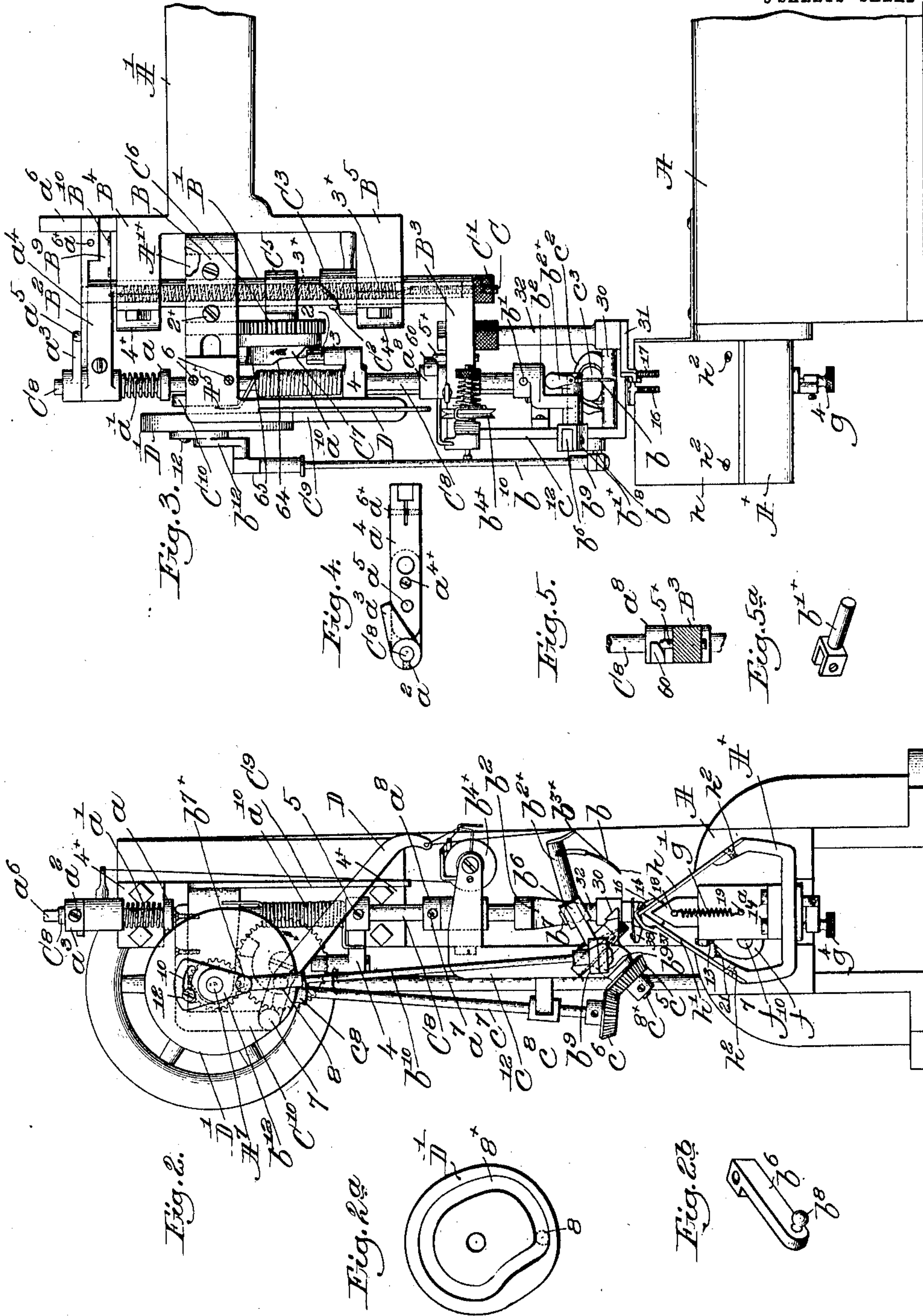
Inventor.
Wm. Arbetter,
By Crosby & Gregory,
Attys.

W. ARBETTER.
SEWING MACHINE FOR FELLING.
APPLICATION FILED AUG. 23, 1902.

969,740.

Patented Sept. 6, 1910.

5 SHEETS—SHEET 2.



Witnesses:
Fred S. Grumbaf.
W. C. Saneford.

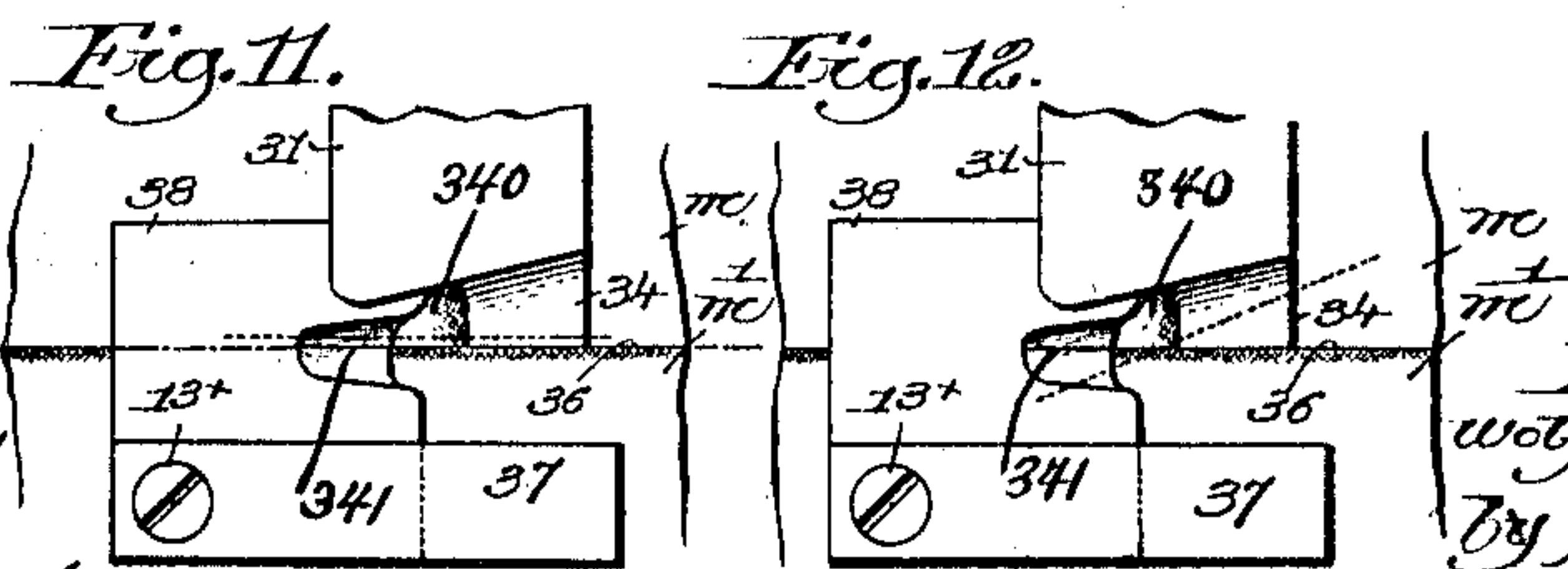
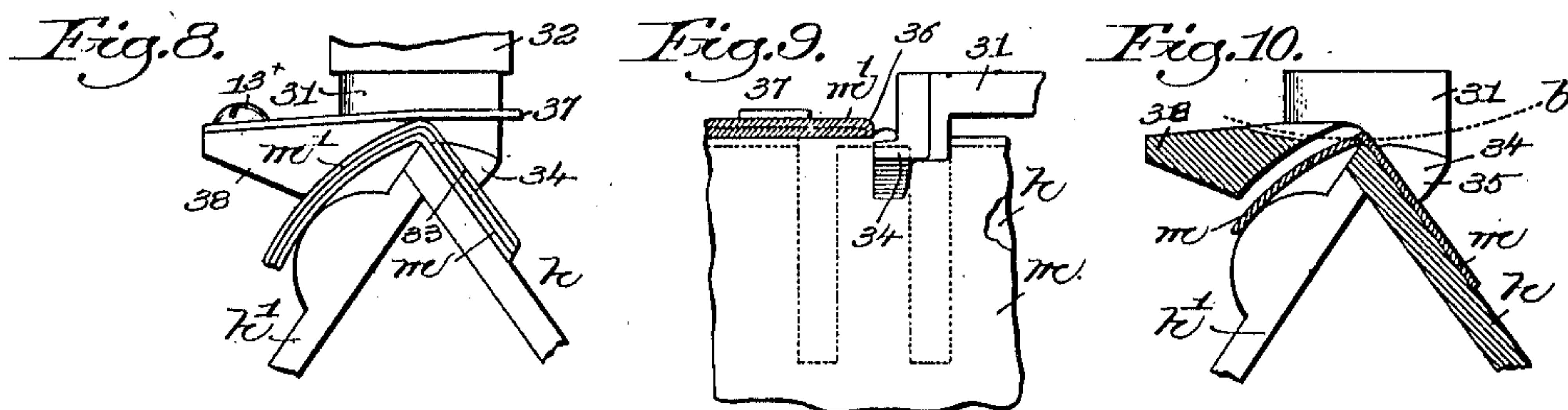
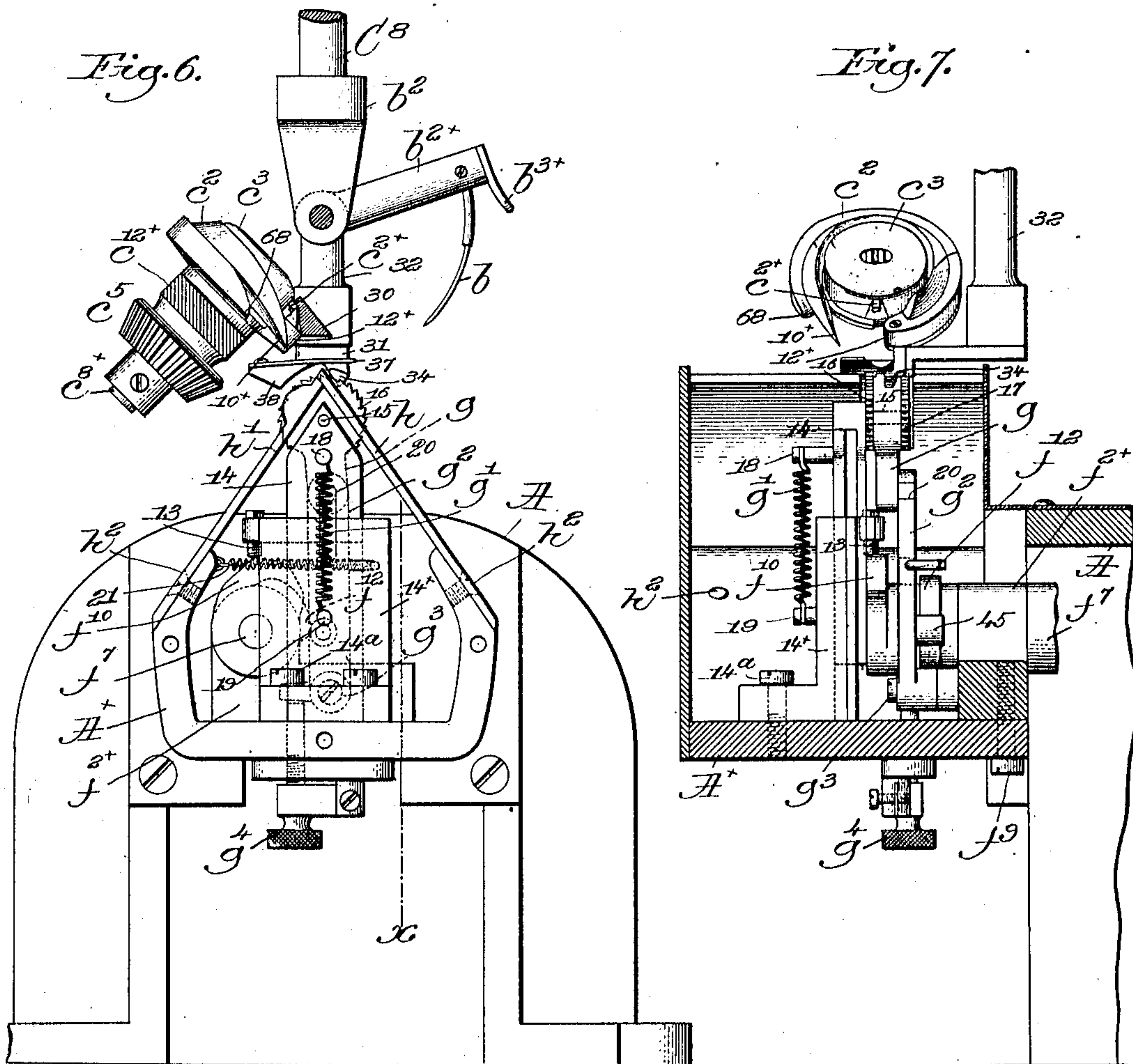
Inventor.
Wolff Arbetter,
by Crosby Gregory
attys.

W. ARBETTER.
SEWING MACHINE FOR FELLING.
APPLICATION FILED AUG. 23, 1902.

969,740.

Patented Sept. 6, 1910.

6 SHEETS—SHEET 3.



Witnesses:
Fred S. Grunke,
W. C. Lumsford.

Inventor.
Wolfgang Arbetter,
By Lewis Gregory,
attys.

W. ARBETTER.
SEWING MACHINE FOR FELLING.
APPLICATION FILED AUG. 23, 1902.

969,740.

Patented Sept. 6, 1910.

6 SHEETS—SHEET 4.

Fig. 13.

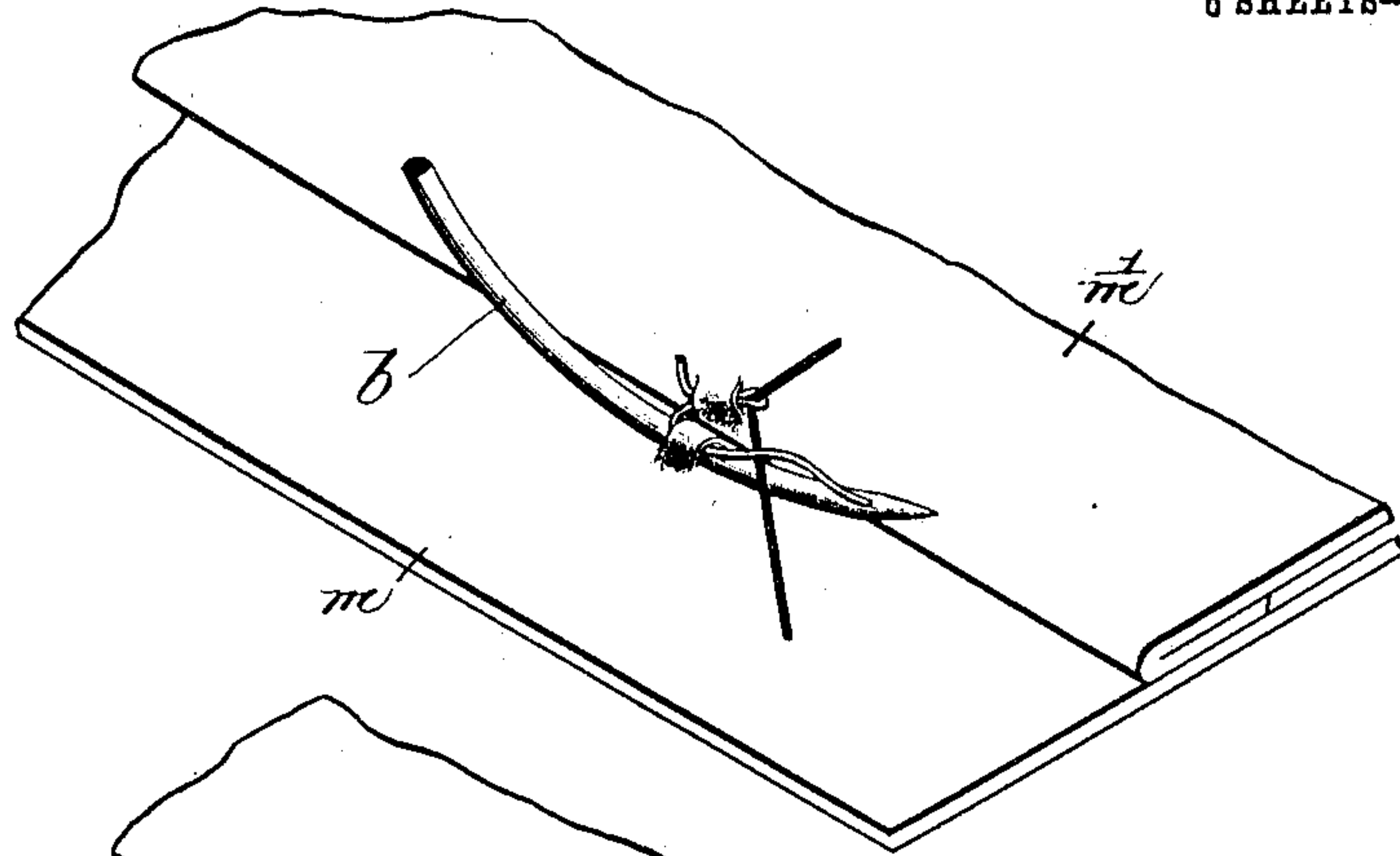


Fig. 14.

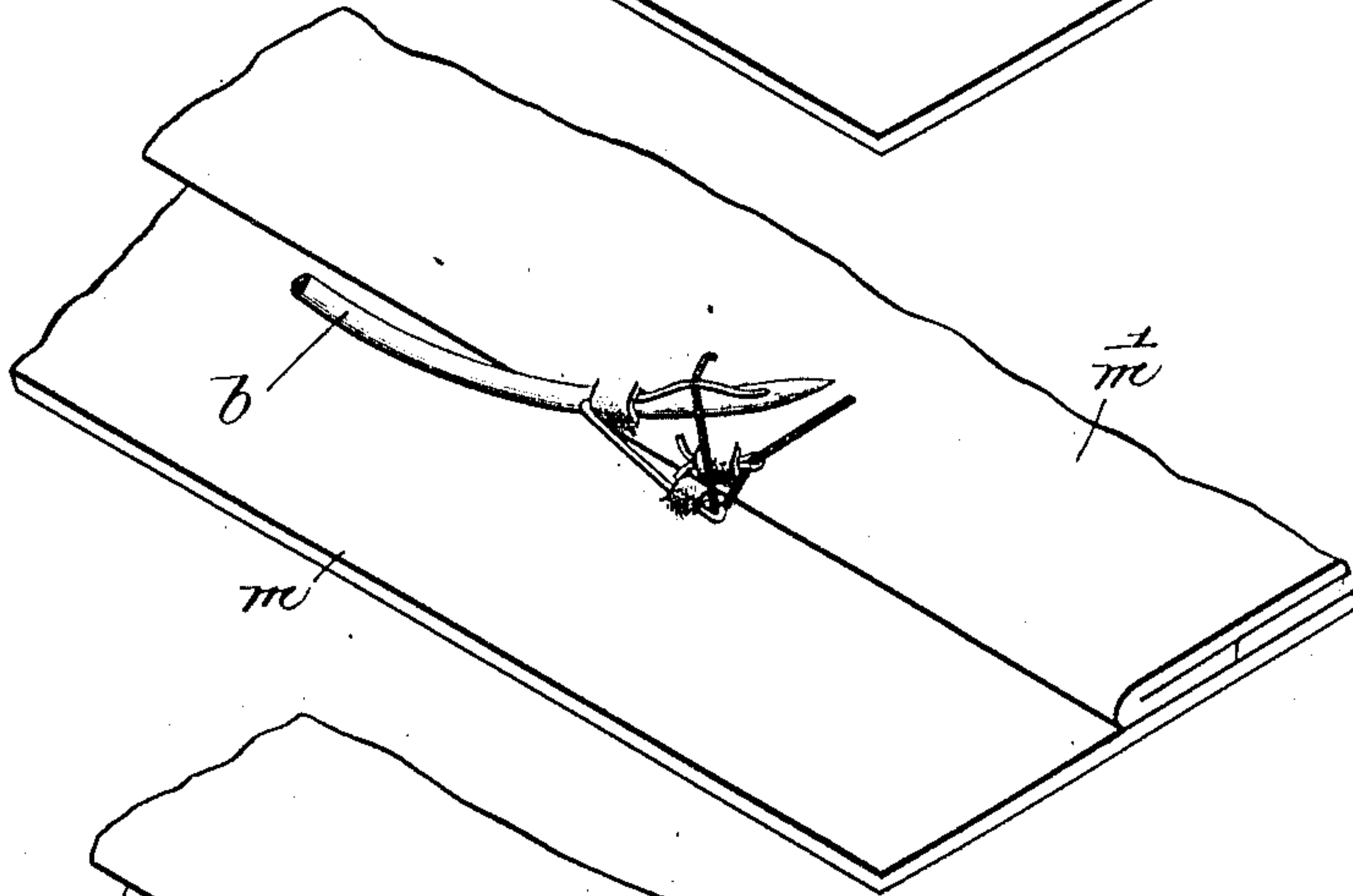


Fig. 15.

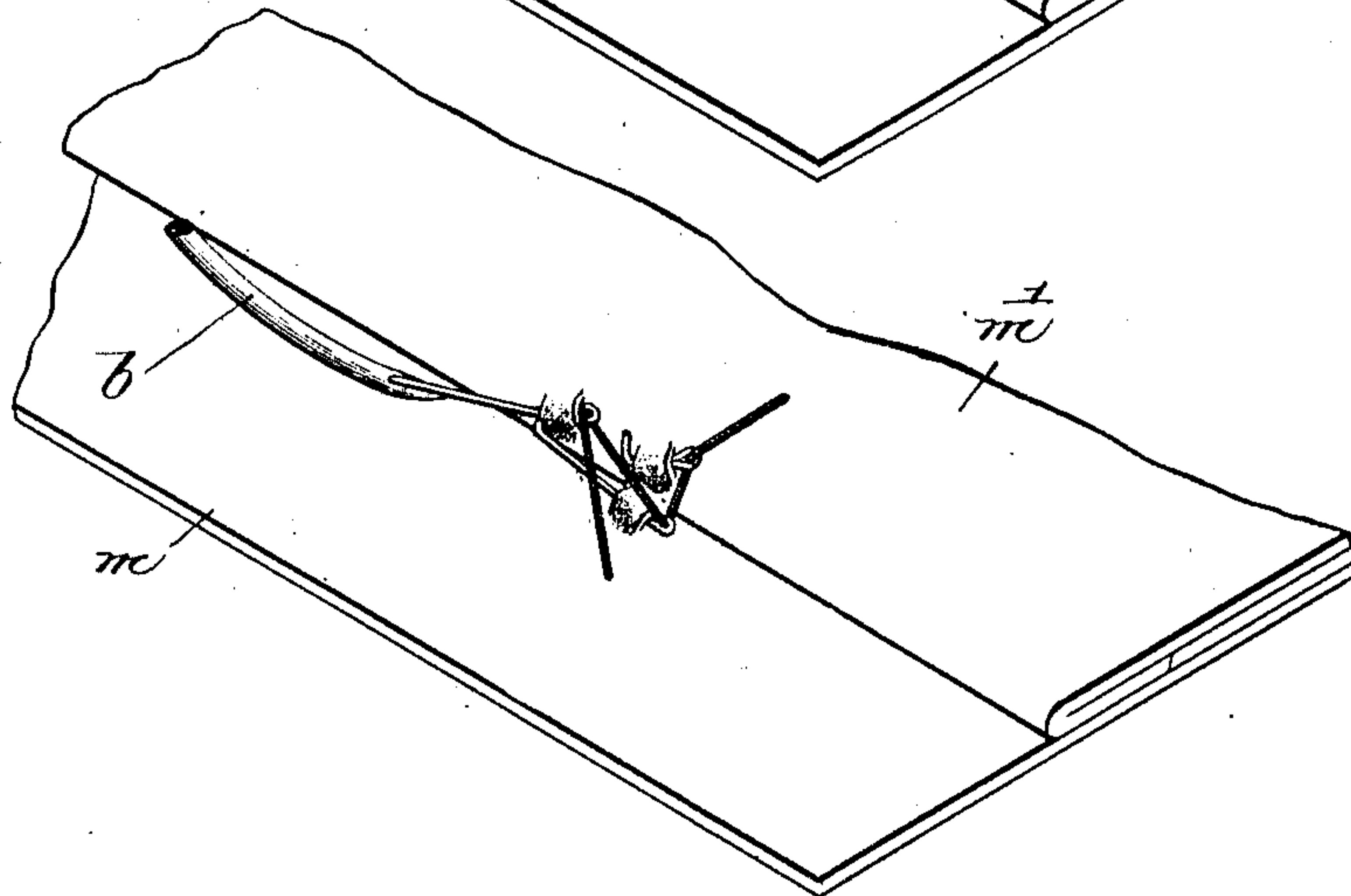


Fig. 16.

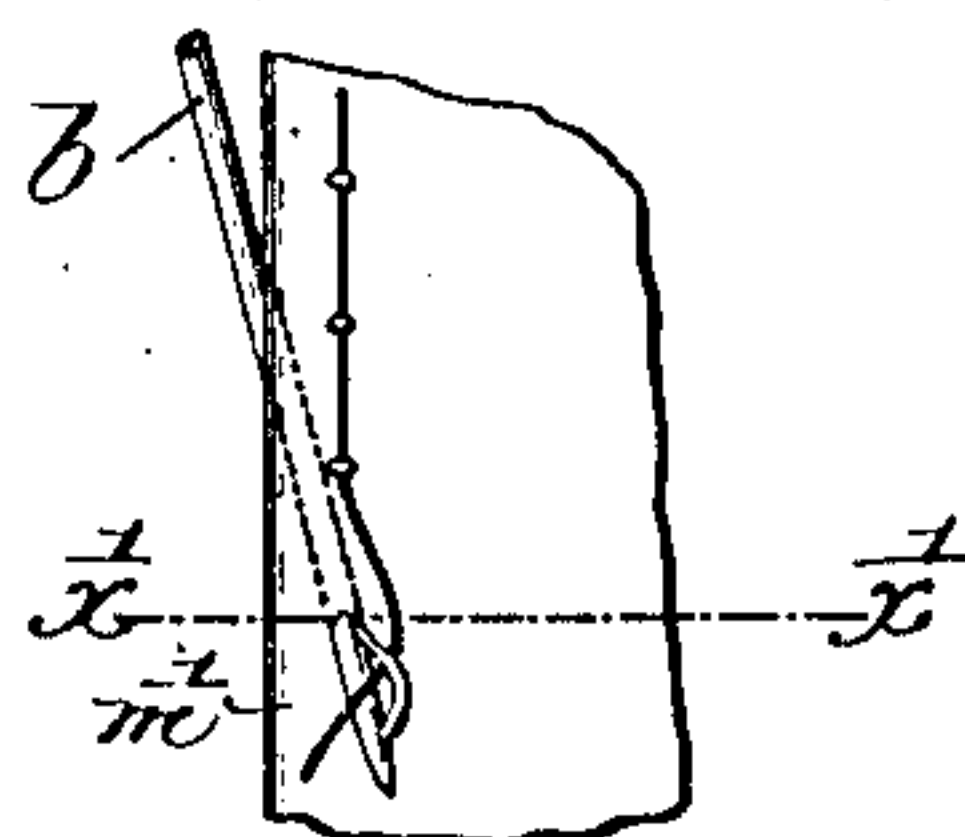
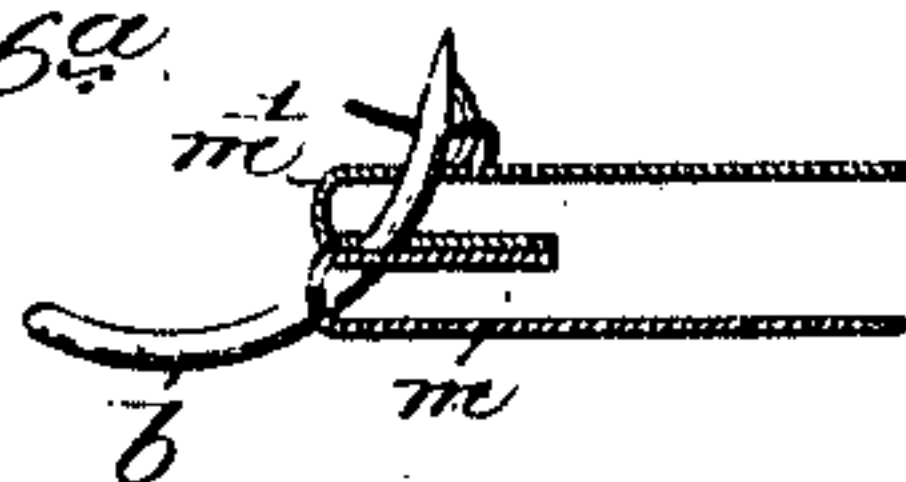


Fig. 16a.



Witnesses:
Fred S. Grunhaft.
W. C. Lunsford.

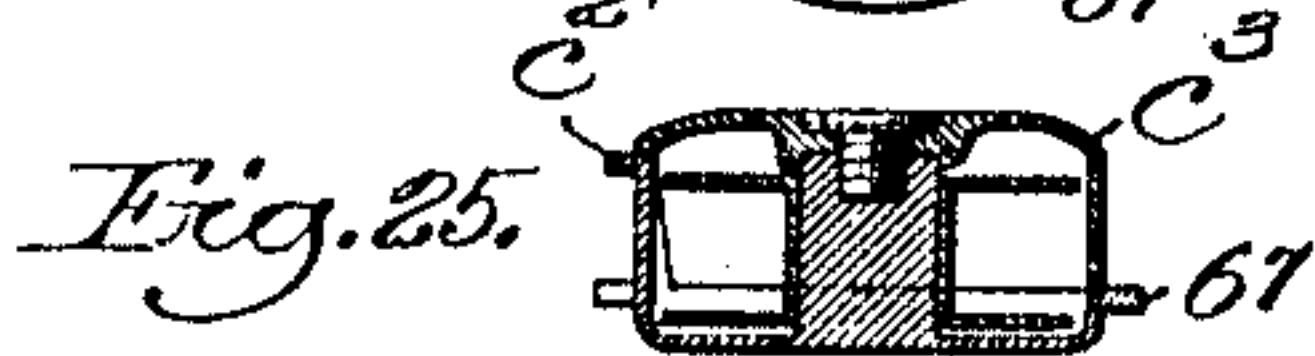
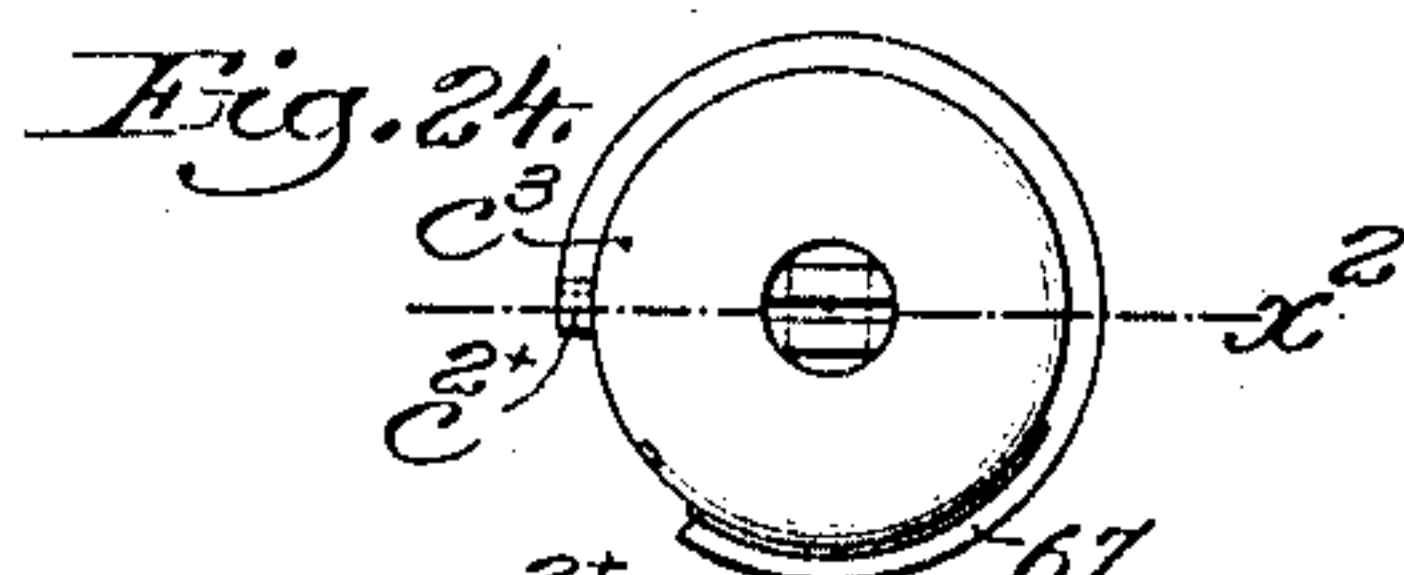
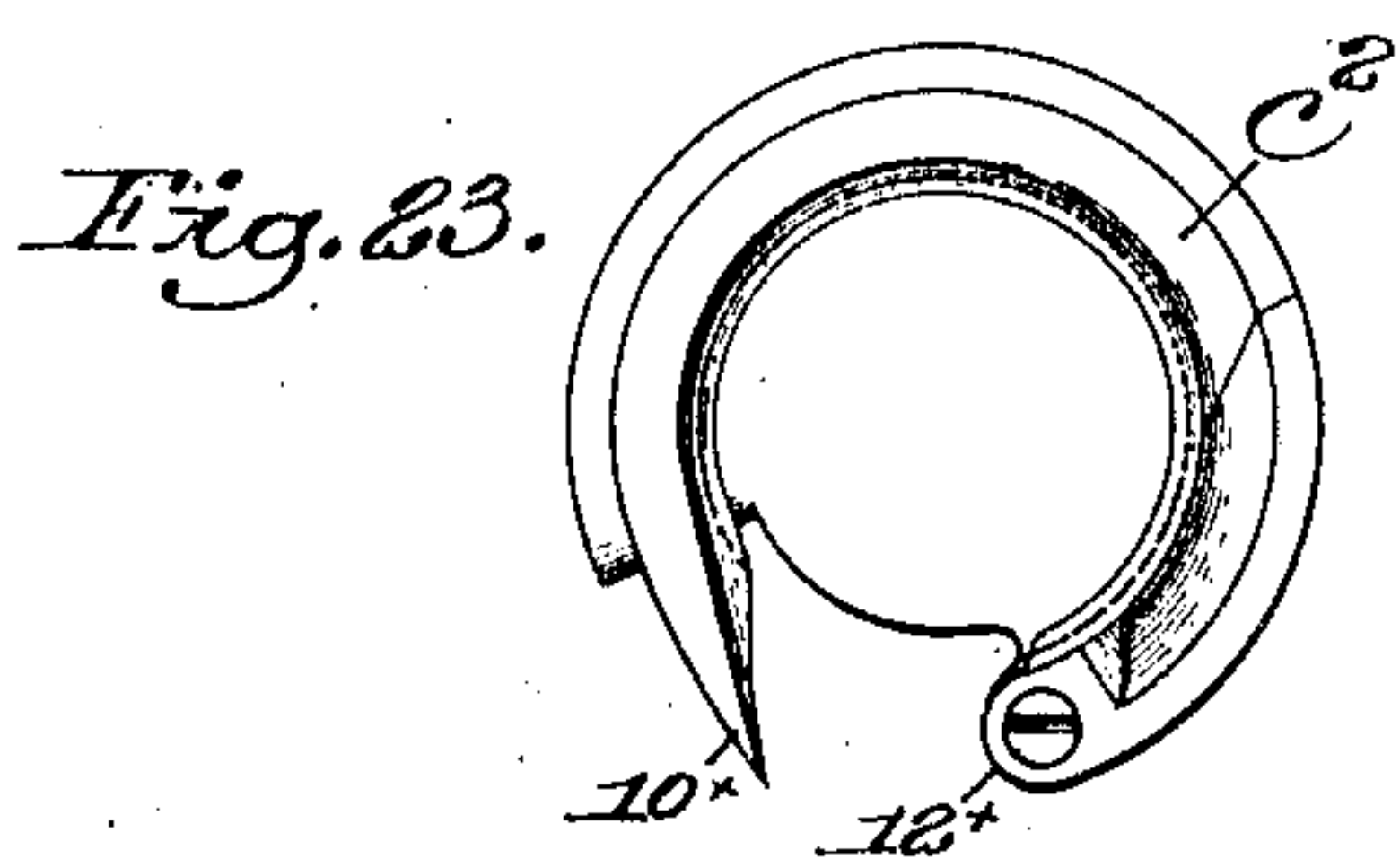
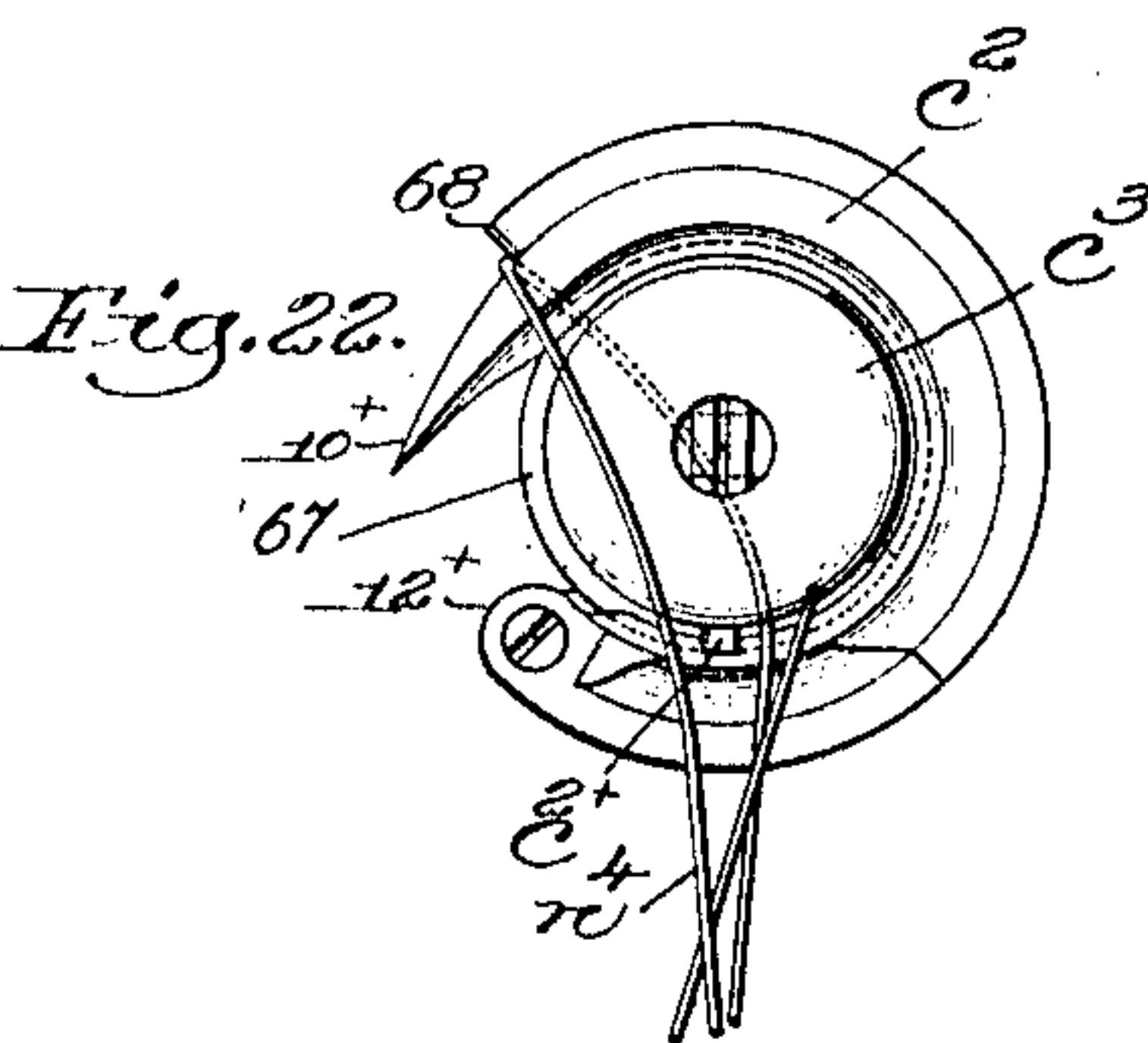
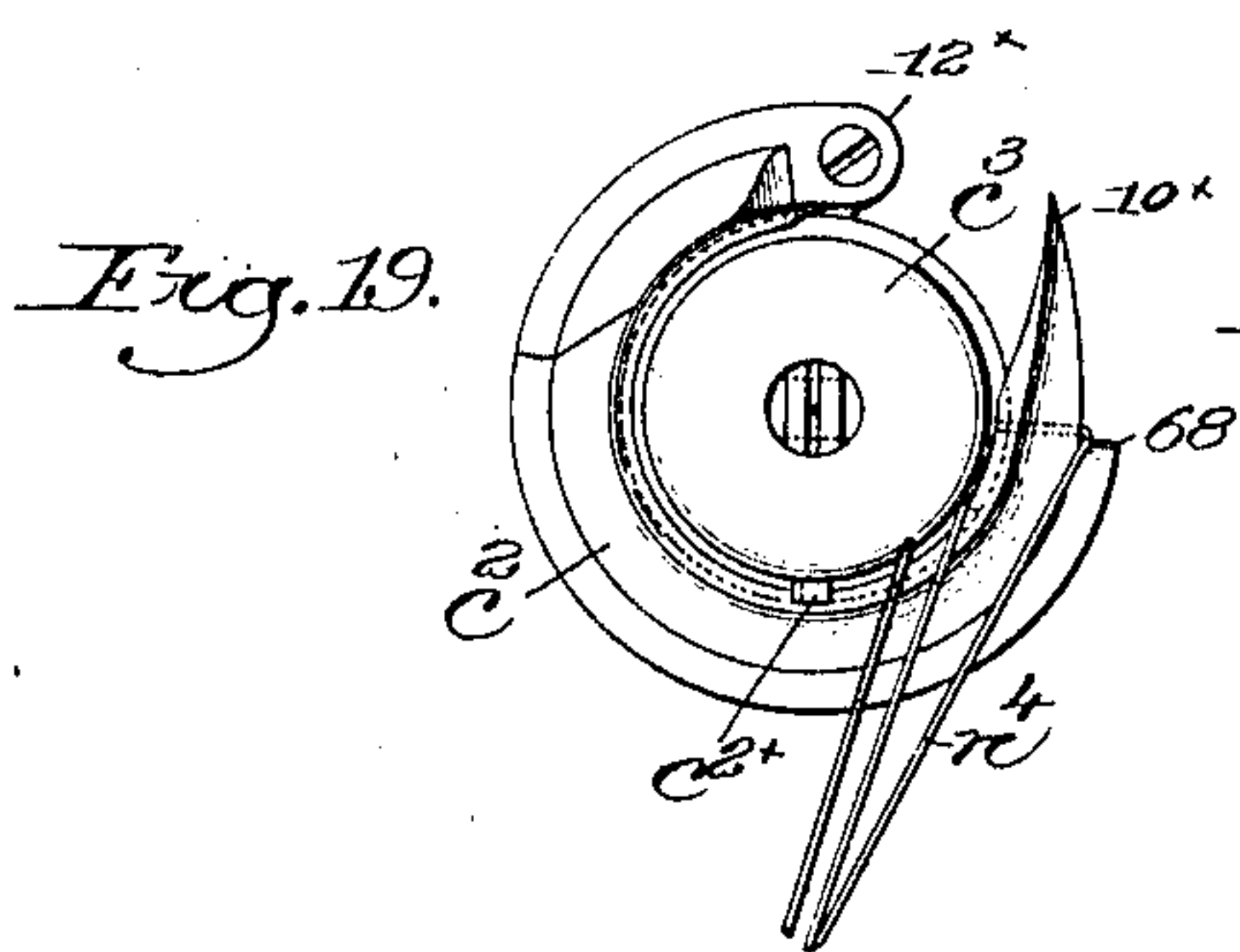
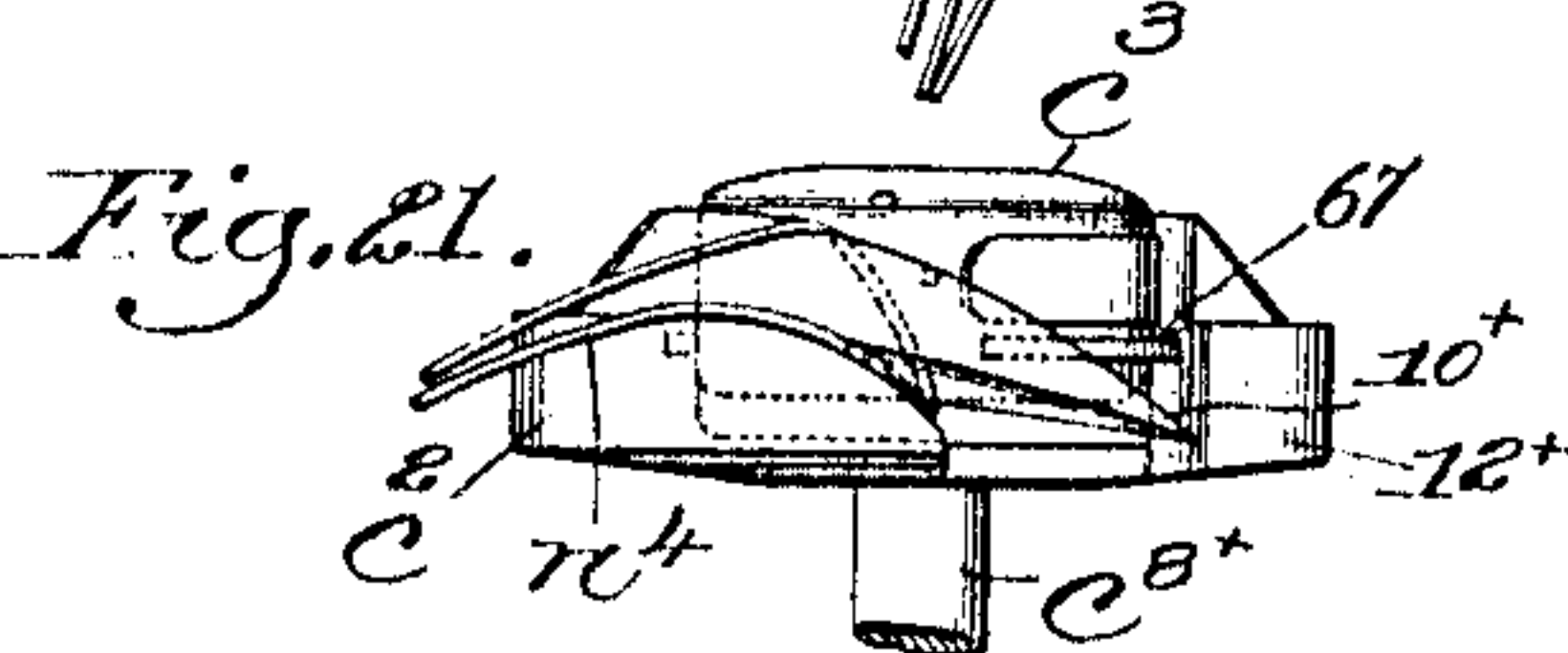
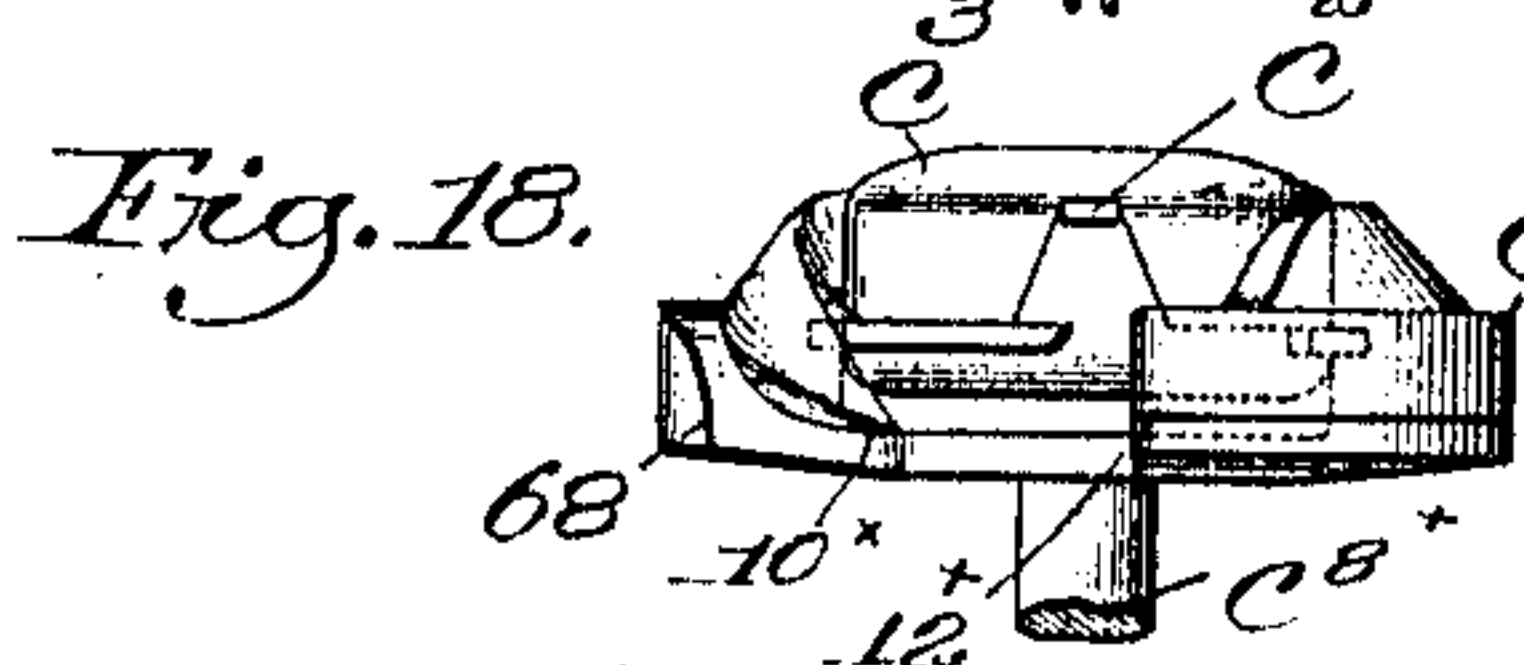
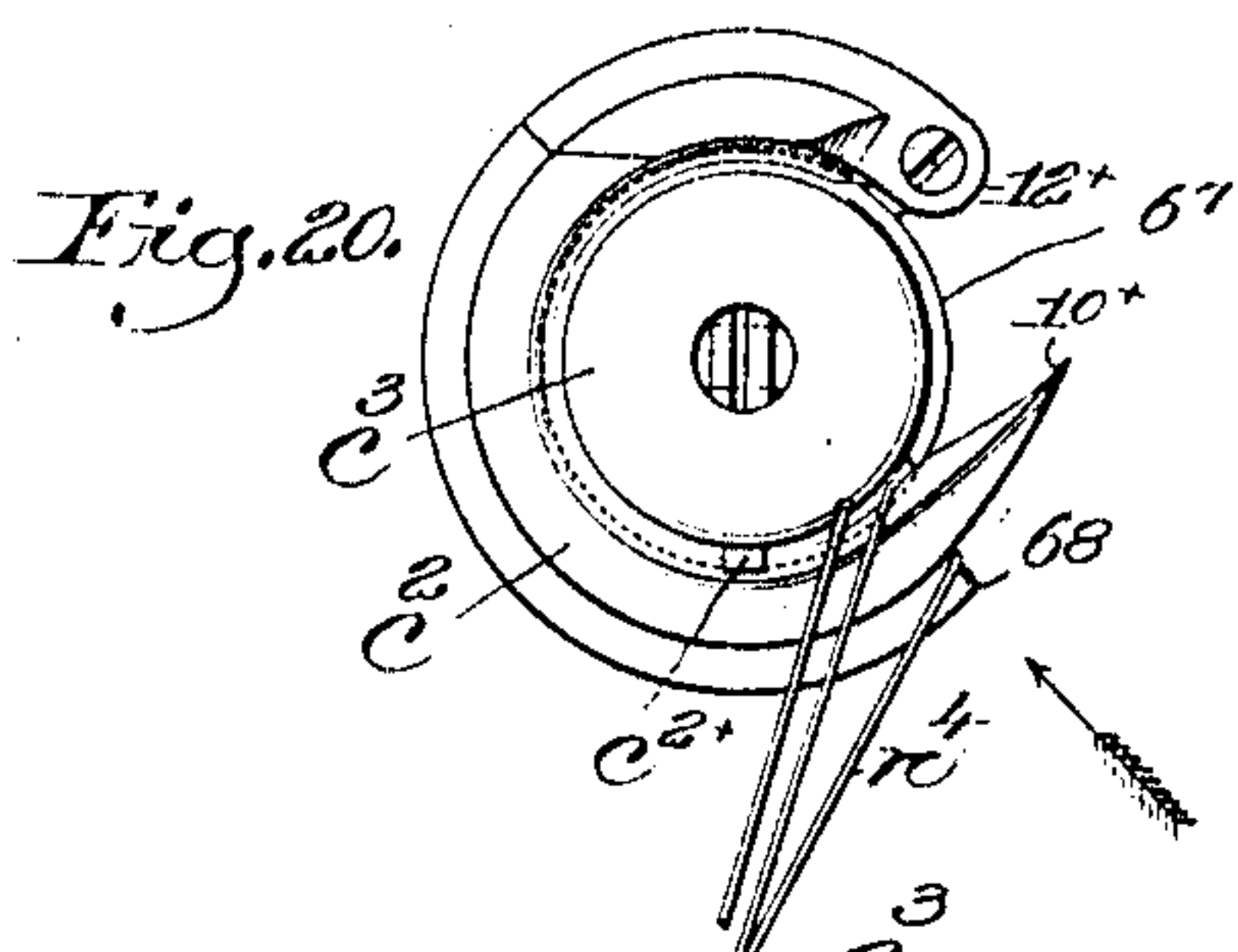
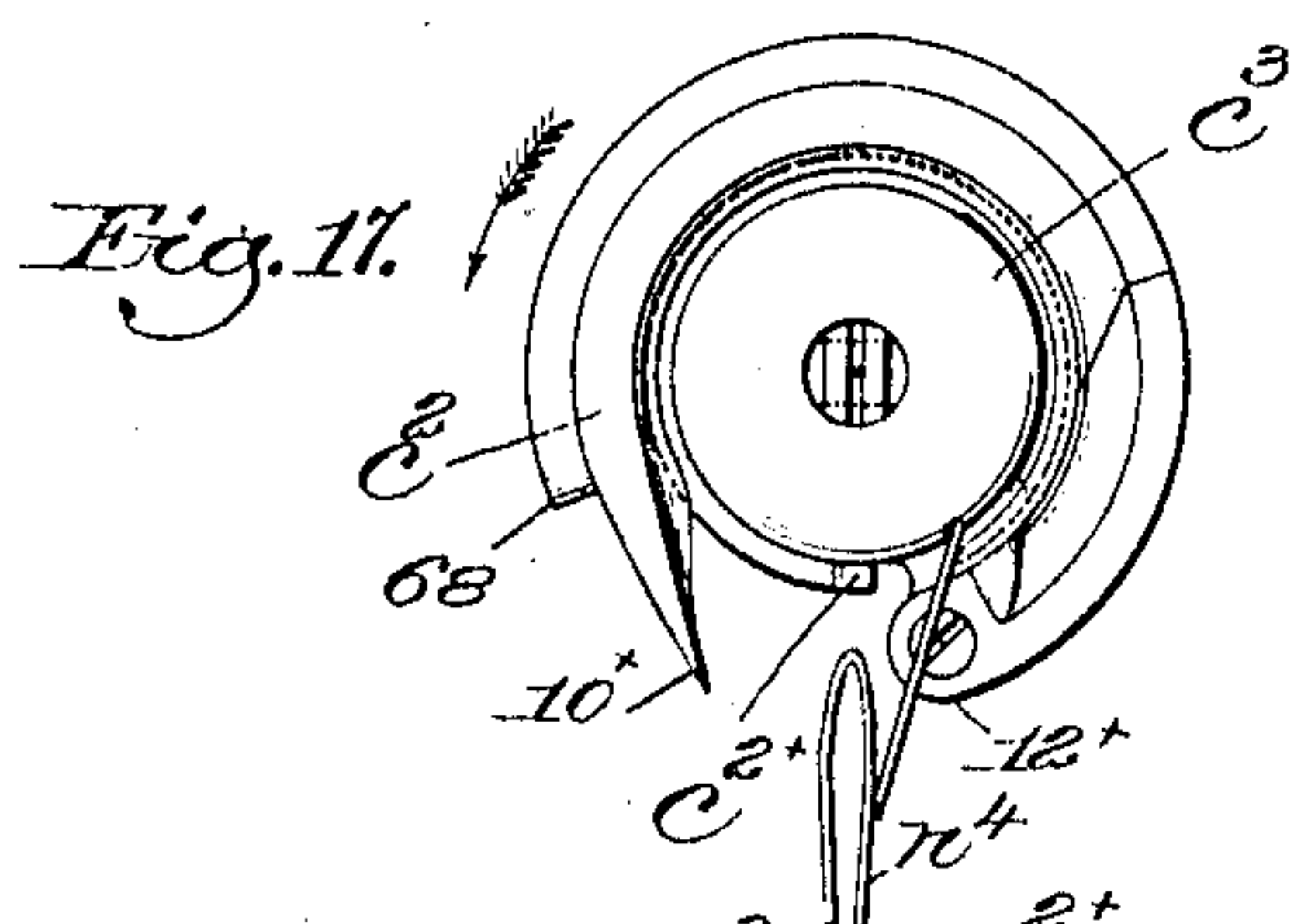
Inventor.
W. Arbetter,
by Lewis D. Gregory,
attys.

W. ARBETTER.
SEWING MACHINE FOR FELLING.
APPLICATION FILED AUG. 23, 1902.

969,740.

Patented Sept. 6, 1910.

5 SHEETS—SHEET 5.



Witnesses:
Fred S. Grunlof.
W. C. Lumsford.

Inventor.
Wolf Arbetter,
by Stanley Gregory
attys.

UNITED STATES PATENT OFFICE.

WOLF ARBETTER, OF CHELSEA, MASSACHUSETTS, ASSIGNOR TO ARBETTER FELLING MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

SEWING-MACHINE FOR FELLING.

969,740.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed August 23, 1902. Serial No. 120,760.

To all whom it may concern:

Be it known that I, WOLF ARBETTER, a citizen of the United States, residing at Chelsea, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Sewing-Machines for Felling, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention is intended as an improvement on the machine shown and described in United States Patent No. 690,385, granted to me January 7, 1902. The patent referred to shows a work support on which is laid material forming part of a garment and hereinafter designated as "body material", and on said body material is laid a lining or what I will hereinafter designate as "superimposed material", its edge being folded. This material is fed away from the operator and the point of the curved eye-pointed needle at one thrust meets the upper side of the body material, and at the next thrust the upper side of the superimposed material back of its edge, and the needle in said patent in its movement to penetrate the material moves from its highest point at the left downwardly toward the right, the point of the needle moving toward the operator, the loop-taker occupying a position next the operator and between the operator and the axis of the lever carrying the curved eye-pointed needle. Owing to the relative positions of the needle and loop-taker shown in said patent, the operation of the stitch-forming elements was in a measure concealed from the eye of the operator and the stitch was apt to be imperfect and irregular as it was impossible at speed to insure the needle penetrating the upper side of the superimposed material at the same distance back from its folded edge, as is essential in this class of work where the stitch must be uniform. In my novel machine to be herein described and claimed, I have reversed the position of the needle and loop-taker so that the loop-taker is located back of the needle in the direction of the feed of the material over the work support, and the needle in its penetrating stroke is moved from the right downwardly toward the left in the direction of the movement of the material by the feeding mechanism, and the needle-carrying lever is so sustained that as the needle

makes its thrust to enter the superimposed layer, it starts from a position above the main layer and its point is moved toward the folded edge of the superimposed layer, the point of the needle entering the latter layer at its folded edge and passing through the upper side of said superimposed layer at a point back from its folded edge, the action of a needle moved in this manner resulting in improving the character and desirability of the felling or blind stitch to be made on the machine, the stitching being more satisfactory in appearance because only the second or loop-taker thread is laid across and exposed on the edge of the superimposed layer while the needle thread is concealed by the edge of the superimposed layer.

In the patent referred to the stitch frame has a vertical shaft provided at its lower end with a bearing in which turns the shaft upon which is mounted the hub of the needle-carrying lever, and said vertical shaft was rocked at alternate stitches to thereby change the line of approach of the curved eye-pointed needle to the work, by a cam having a groove at its top side entered by a roller stud carried by a slide connected at its opposite end with a link in turn connected with a projection from said vertical shaft, and in said patent the needle penetrated the material twice between each feeding movement, and the needle at all times moved first in a straight and then in a diagonal path relatively to the folded edge of the superimposed material, and there was no provision whatever made for operating the machine for stitching with the needle moving only in its diagonal thrust. Herein the cam for moving the vertical shaft sustaining the axis of the needle-carrying arm is made as a face cam sustained by the stitch frame, and provision has been made to suspend the rocking movement of said vertical shaft when it is desired that all the strokes of the needle shall be diagonal with relation to the folded edge of the superimposed material and the length of the seam, as illustrated for example in Figure 16. Provision is also herein made to vary the extent of the oscillation of said vertical shaft to change the path of movement of the needle when making its diagonal thrust into the superimposed material.

One part of my invention, therefore, con-

sists in the combination with a needle and complementary stitch-forming mechanism, of means for maintaining and operating the needle above the work-support in a plane
5 fixed with relation to the work support and diagonal to the line of feed, and to cause it to enter, and emerge from, the upper surface of the material.

Other features of invention will be hereinafter more particularly described and set forth in the claims at the end of this specification.

Fig. 1 is a rear side elevation of a machine embodying my present invention; Fig. 1^a a
15 detail showing the slotted upper end of the body of the stitch frame; Fig. 2 is an end view looking at the machine shown in Fig. 1 from the right; Fig. 2^a is a detail showing the shape of the groove in the disk D'; Fig.
20 2^b is a detail of the link b⁶ and its attached ball-headed stud; Fig. 3 is a partial front side elevation; Fig. 4 is a plan view showing the upper end of the bar in which the shaft carrying the needle is moved together with
25 its arm and coacting part; Fig. 5 is a detail, showing part of the bar C⁸ with its attached cam finger and lifting device; Fig. 5^a shows a detail of the rock shaft carrying the needle; Fig. 6 shows enlarged and in detail a
30 part of the end of the machine looking at the same from the left, Fig. 3; Fig. 7 is an enlarged detail partially in section on the line x, Fig. 6, the work support being omitted; Figs. 8, 9 and 10 are details of the
35 work support and presser foot, with the work in position; Figs. 11 and 12 are plan views showing part of the presser foot and work support; Figs. 13, 14 and 15 are details showing the needle in the act of making
40 stitches in the folded edge of a material being attached to a main layer thereof; Fig. 16 shows a modified stitch. Fig. 16^a is a section of Fig. 16 in the line x'; Figs. 17-22 show the hook and bobbin case in different
45 positions; Fig. 23 shows the face of the loop taker alone, and Figs. 24-26 show the bobbin case detached, Fig. 25 being in section on the line x², Fig. 24.

The bed A has rising from it a goose-neck
50 A' having suitable bearings A², A³, A⁴, for an upright shaft f² and the part A⁶ of a compound shaft to be described, the other parts being a link A⁸ and a shaft A⁷, the link being knuckle-jointed to each of the
55 parts A⁶, A⁷. The part A⁷ of the compound shaft is sustained, see Fig. 1, in bearings A⁵ extended forwardly from a cross-head B clamped to a stitch-frame B' by a block A^x and screws 2^x, see Fig. 3, said stitch-frame
60 being fitted to be slid vertically in bearings B⁴, B⁵, extended forwardly from the goose-neck A'. The cross head B at its outer end has connected with it a depending arm C¹⁰, and attached to its rear side by screws 6 is
65 a depending take-up guide C⁹. The stitch-

frame B' is provided respectively at its upper and lower ends with laterally extended arms B², B³, each bored for the reception of a bar C⁸ that may both slide and rock in said arms, said bar sustaining the
70 stitch forming mechanism to be described. The stitch-frame B' bored centrally from its lower end, as represented in dotted lines Fig. 3, is slotted at a^x, near its upper end see Fig. 1^a. This slot receives a finger extended from
75 a plate B⁹ attached to the bearing B⁴ by screws B¹⁰, see Fig. 3. The finger sustains the upper end of a spiral tension spring 3^x inside the stitch-frame B' and shown by dotted lines Fig. 3, and the lower end of said
80 spring engages the hooked end of a screw C having applied to it a nut C'. The rotation of the nut strains the spring, thus causing the spring to act as a counterbalance to counterbalance substantially the weight of
85 the stitch-frame B' and the parts attached to and carried by it, said stitch-frame having extended from it a stud C² that rests on the cam face of a lifting device C³ that when turned from its position Fig. 3 causes the
90 lifting device to act upon the stud C², and lift the stitch-frame B' and its attached parts including the presser foot to be described, that material may be inserted or removed. The stitch-frame B' is kept in its
95 bearings in the goose-neck by suitable caps 4^x.

The stitch-frame B' has clamped upon it by suitable screws C⁴, see Fig. 1, a block C⁵, having a stud on which is mounted a
100 toothed wheel C⁶ having projecting from one side thereof a needle swinging cam C⁷. The gear and cam are rotated by a pinion C^{7x} fast on the part A⁷ of the compound shaft, and in its rotation the cam C⁷ acts
105 upon a roller 2 of a stud 3 mounted in an arm 4 fast on the bar C⁸, a spiral spring a¹⁰ surrounding the bar C⁸ and fixed at one end to the cross head, see Fig. 3, the other end thereof contacting with the arm 4, keeping
110 said roller normally pressed toward the acting edge of said cam. Below the arm 4 the bar C⁸ has connected with it by a suitable screw a⁷ a block a⁸ having a cam toe 60 that, as the bar C⁸ under the control of the
115 spring, is moved to cause the roller 2 to contact with the part of the cam C⁷ of least height, meets the inclined end of a lifting stud 5^x sustained adjustably in the arm B³. The contact of the toe 60 with this stud
120 causes the bar C⁸ to be raised sufficiently to enable the needle b to be described to be elevated sufficiently to properly penetrate the work of greatest thickness as provided for in said patent and as represented in Fig.
125 14. The bar C⁸ is also free to slide vertically in a suitable bored hole in the cross head B. Above said cross head said bar is provided with a collar a that sustains a spring a' the upper end of which acts
130

against the underside of the arm B^2 the purpose of which will be hereinafter described. The upper end of the bar C^8 has attached to it by a set screw a^2 , see Fig. 2, an arm a^3 that overlaps a plate a^4 connected with the arm B^2 by a screw a^{4x} . The left hand end of this plate, Figs. 1 and 4, is forked to embrace a guide a^6 rising from the bearing B^4 , and to compensate for wear the forked end of the plate is provided with a set screw a^{6x} . The plate a^4 has rising from it a stop a^5 . The lower end of the bar C^8 has connected with it by a pin b^1 a bracket b^2 that sustains a short rock shaft b^{1x} , shown detached in Fig. 5^a. This rock shaft is slotted at its left hand end, Fig. 3, and to its right hand end is connected the hub of the needle carrier b^{2x} having a curved needle b . The end of the needle carrier b^{2x} sustains a thread guide b^{3x} from which the thread is led through the eye of the needle b . The thread comes to the thread guide b^{3x} from the eye of a take-up D , the thread going to the take-up from any suitable usual tension b^{4x} . The slotted end of the rock shaft b^{1x} receives in it one end of a link b^6 , jointed thereto by a stud b^7 . The opposite end of the link b^6 , see Fig. 2^b, has extended from it a stud b^8 having a ball-shaped head. This head is embraced by a two-part clamp b^9 properly shaped to fit the ball loosely. The clamp is carried by a rod b^{10} jointed at its upper end to a stud b^{7x} of a crank b^{12} , shown as a plate having a hole to fit the end of the part A^7 of the compound shaft, said plate being slotted at 10 to receive a screw 12 entered into a threaded hole of disk D' whereby by changing the position of the plate the crank pin may be varied to provide for a greater or less throw of the needle, as required. The disk D' is fast on the end of the part A^7 of the compound shaft.

As shown the curved needle starts from its highest position at the right and moves downwardly toward the left to enter the material, which latter is fed practically in the direction of the movement of the needle as it enters the material, said needle entering the body material at one thrust while at the next thrust the needle enters the edge of the superimposed material and passes through the upper side thereof, the material being fed preferably after each diagonal thrust of the needle.

The portion C^{10} depending from the cross head B receives a stud 7 over which is fitted the end of the take-up lever D . This lever has a roller stud 8 that enters the cam groove 8^x cut in the rear face of the disk D' , see Fig. 2^a.

The arm B^3 receives at its rear side, see Fig. 1, screws c that serve to attach to said arm a frame c^{12} , see Fig. 2, the lower end c^{12x} of which receives the shaft c^{8x} carrying

the loop-taker or hook c^2 containing a covered bobbin case c^3 having a rib 67, said case in practice being supplied with a bobbin or ball of thread. The rib 67 enters a groove in the inner wall of the bobbin case. The exterior of the loop-taker has a shoulder 68 that catches one-half of the loop of needle thread n^4 and carries it about the bobbin case. The bobbin case has a projection c^{2x} , see Fig. 18, that co-acts with a suitable notch, see Fig. 6, at the rear side of a bar 30, thus preventing the rotation of the bobbin case with the loop-taker, the latter having a point 10^x and a heel 12^x , the point of the loop-taker depending or being bent downwardly so that it lies nearly flush with the under side of the part of the loop-taker of larger diameter. The shank c^{8x} of the loop-taker is provided with a beveled gear c^5 that is engaged by a bevel gear c^6 at the lower end of the diagonal shaft c^7 sustained in suitable bearings c^8 . The upper end of the shaft c^7 has a bevel gear c^9 that is engaged and rotated by a bevel gear c^{10} fast on the shaft A^7 , said loop-taker in practice being rotated constantly and having two complete rotations to each thrust of the needle. The loop-taker and the needle are both located above the work-support, the needle occupying a position between the operator and the presser-foot, while the loop-taker is located at the rear side of the presser-foot and behind the axis of motion of the needle-carrying arm, and the axis of rotation of the loop-taker is in the vertical plane in which the feeding device is moved when feeding the work over the work-support.

The arm B^3 has depending from it a rod 32 to the lower end of which is connected in suitable manner the presser-foot 31. This presser-foot, shown enlarged in Figs. 8-12, has at its side nearest the operator a projection 34 the under side of which acts on the body material m of single thickness, the same resting directly upon the work-support, the latter, as herein shown, being composed of two plates h, h' , suitably attached to a part of the frame-work by screws h^2 , said plates being represented as so located as to present an apex at their upper ends over which the material to be stitched is fed to present an angle that the needle may enter and emerge from the same side of the material as when blind stitching is being done. The upper side of the projection 34 of the presser-foot is so located with relation to the apex of the work support as to serve the purpose of a needle-guide, said guide preventing the point of the needle under any circumstances from springing outwardly in action due to rapid movements of the needle in stitching, the needle-guide insuring that the needle properly penetrates the material during the stitching of the

same. The end 35 of the projection 34 from the presser-foot serves as an edge guide for the folded edge 36, see Figs. 11 and 12, of the superimposed material m' , it being understood that said folded edge is to be attached by blind stitches to the body material m . The presser-foot, see Figs. 11 and 12, is notched or cut away to form a space 340 in which the material m to be penetrated by the needle is presented by the apex of the work support that the needle may enter and emerge from the upper side of the material as when making blind stitches. As herein shown, the top of the work support serves to present the material m in the space 340 of the presser-foot, and the presser-foot at the rear side of said space has a projection 38 shown as provided with a concavity 341, the deepest and widest part of which is next said space in which the needle enters after having passed through the material, the under side of said projection 38 acting on the superimposed layer m' sustained by the body layer, the latter resting on the work-support, and said projection 38 has attached to it by a screw 13 \times a spring 37 which thus becomes a part of the presser-foot and is extended forwardly over the apex of the work-support, said spring acting on the ridge made in the superimposed material formed by bending the same over the apex of the work support, said material entering the space 340 of the presser-foot.

The dotted lines Fig. 10 show part of the needle b or the arc in which it moves, and said figure represents the needle as passing through the body material m present over the apex of the work support, the needle entering and emerging at such time from the same side of the material, the needle during each thrust crossing and being guided by the upper side of the projection 34 of the presser-foot, the point of the needle after passing through the material entering the concavity before referred to. Viewing Figs. 8, 11 and 12, it will be seen that the folded edge of the superimposed material m' rests on the upper side of the body material m , and that the needle may enter a bight of the body material resting on the work support, the apex thereof serving to present the material upwardly and hold the same in the space 340 of the presser-foot and above the top of the projection 34 of the presser-foot. Figs. 8, 9, 11 and 12 show the folded edge of the superimposed layer m' as occupying a position in or above the guide over which the point of the needle travels in its diagonal thrust, as shown in Fig. 12, where the path of the needle is represented by dotted lines, and starts from a position above the body material and moves toward the folded edge of the superimposed material presented in said space 340 of the presser-foot, the needle entering said folded edge close to the

body material and passing through said superimposed material emerges therefrom from its upper side back of its edge, making the stitch shown in Figs. 13 and 14, where it will be remembered the parts are much enlarged to better illustrate the interlooping of the threads in making the stitch.

It will be understood that the cam C^7 carried by the stitch frame B' having the arms B^2 , B^3 , acting through the roller 2, serves to turn the rod C^8 and the stitch-forming mechanism so that the needle b may enter the material m at one thrust, see Fig. 13, the needle at that time working in a circle preferably parallel with the folded edge of the material m' , and at the next thrust the needle will enter said folded edge, as shown in Fig. 14, the path of movement of the needle at this thrust, that it may enter the edge of the fold, being changed so that the arc in which the needle moves is diagonal to the folded edge, and it is while the needle is working in its diagonal path and about to enter the folded edge that the lifting stud 5 \times operates to raise the bar C^8 upwardly in its guideways in the stitch frame against the action of the spring a' , said spring yielding more or less according to the position occupied by said stud.

It will be understood that the bar C^8 is free to slide in its bearings, and as the needle b penetrates the material it might jump and fail to properly enter the material, were it not for the pressure of the spring a' . The latter spring acts to enable the needle to enter uniformly and steadily the material of whatever thickness and density. The spring a' therefore performs the purpose of not only keeping the cam toe pressed in contact with the lifting stop when the needle is about to enter the edge of the folded material, but also will insure a defined position for the point of the needle and prevent the needle from rising unduly as the point of the needle is about to enter the material.

The cross bar 30 connected with the shank. 32 of the presser foot is united at its opposite ends with the frame c^{12} carrying the hook. The axis of the shaft c^{8x} of the hook occupies a position in the vertical plane in which the feeding device works and if prolonged would intersect substantially the longitudinal axis of the rock shaft b'^x constituting the center of motion of the curved needle.

The bar C^8 is turned axially by the cam C^7 to place the needle b in position to enter the material with a diagonal thrust as shown in Fig. 14. When the roll 2 contacts with the straight face of the disk-part of the cam C^7 the needle is actuated to make its so-called parallel thrust, Fig. 13, but as soon as the point of the cam C^7 first to act meets the roller 2 the bar C^8 is turned to secure for the needle its proper diagonal position with re-

lation to the infolded edge of the material m' . While the roller acts on the straight part 64 of the cam of greatest throw, see Fig. 1, the needle is thrust into the material and emerges therefrom, as in Fig. 13, and at this time the incline 65 of cam C^7 lets the roller and bar C^8 be turned by the spring a^{10} sufficiently to turn the point end of the needle about a center coincident with the longitudinal axis of the bar C^8 . This swinging movement of the needle in the material just preparatory to the point of the loop-taker entering the loop of needle thread has been found very advantageous in preventing any possibility of skipping stitches. The point of the loop-taker having entered the loop of needle thread the needle is retracted while the roller 2 bears on the second straight part 66 of the edge of cam C^7 , and the needle having been withdrawn, the incline 67 at the heel of cam C^7 passes the stud and immediately the spring a^{10} acts to further turn bar C^8 and put the needle in position to enter the fabric at its next thrust as in Fig. 13.

It is very desirable for some kinds of stitching that the needle at each stitch approach the line of the folded edge of the material diagonally, making a stitch as shown in Figs. 16 and 16^a. To provide for stitching with the needle moving only in a diagonal direction with relation to the edge of the superimposed material and diagonally with relation to the direction in which the material is moved by the feed, I turn the bar C^8 into such position that its roller 2 will be entirely out of the range of movement of the cam C^7 and while in this position I loosen the screw a^2 , see Fig. 2, and turn the arm a^3 connected with said bar by said screw until said arm meets the side of a stud a^5 carried by the plate a^4 , and I then turn in the screw to fix the arm a^3 in said position, said arm thereafter acting to prevent any oscillation of the bar C^8 , and consequently the needle at each thrust will penetrate the superimposed material at its folded edge and emerge from the upper side of said material, the stitch being shown in Fig. 16 much exaggerated. The needle when held in its diagonal position and moved to penetrate the material will first catch into the body material m , and then enter the superimposed material back of and under its folded edge, the needle passing out from the upper side of said superimposed material where the loop of thread carried by the needle will be locked by a thread from the loop-taker, thus felling the folded edge of the superimposed material m' to the body material m .

Viewing Fig. 16^a I have shown the body material and the superimposed material laid thereupon to be united, and the edge of both materials as infolded, and in said figure the point of the needle enters the undermost

material and then passing therethrough enters the under side of the uppermost material where bent inwardly and lying on the undermost material, and passes through the uppermost material at its upper side back from its edge.

The part A^6 of the compound shaft has a bevel gear f that acts on a bevel gear f' on a shaft f^2 . The shaft f^2 has a bevel gear f^3 that engages a bevel gear f^4 on a short shaft f^5 held in suitable bearings depending from the bed A . The framework has a bearing f^{2x} , see Fig. 7, that receives a short shaft f^7 provided with two cams f^{10} , f^{12} . The shafts f^7 and f^5 are connected by a link f^6 through knuckle joints as represented by dotted lines in Fig. 1. An extension A^x of the framework has erected upon it a guideway 14^x held in position by a screw 14^a . This guideway receives the shank of a slide 14 provided with a pin 15, and the slide has extended from it an adjustable stud 13 that bears on the cam f^{10} . The slide 12 has a stud 18 with which is connected one end of a spring g' , the opposite end of said spring being connected with a stud 19 extended from the guideway. The spring g' acts to keep the stud 13 always in contact with the cam f^{10} . The stud 15 receives upon it loosely a lever g having connected with it two serrated or toothed surfaces 16, 17, substantially or nearly circular in shape, as represented in Fig. 6, that rise through slots in the plates h , h' , forming the work-support, said toothed surfaces rising to contact with the work feeding the same over the under side of the projection of the foot plate of the presser-foot, the latter being inserted between the material being stitched and the loop-taker, the toothed surfaces rising through the slots of the work-support to engage and feed the material, said surfaces thereafter descending, retiring from the material and moving backwardly thereon, preparatory to again engaging the material for another feeding action. The cam f^{10} provides for the vertical movement of the feeding device. The lever g is provided at its lower end with a stud 20 that enters a slot in an elbow lever g^2 pivoted at g^3 . The short arm of said elbow lever g^2 is adapted to be acted upon by a screw g^4 , and by rotating the screw and turning it inwardly the upper end of the lever g^2 may be moved to the right, viewing Fig. 6, to thus place a projection 45 of said lever farther from the cam f^{12} , so that the effective action of the cam f^{12} is lessened and the length of stitch shortened, as will be readily understood. The lever g^2 has connected with it a spring 21 that tends always to hold the lever g^2 pressed toward the face of the cam f^{12} . The sooner the cam f^{12} in its rotation meets the lever g^2 the longer will be the length of stitch.

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

1. A blind-stitch sewing machine comprising a work-support; a reciprocating needle and complementary stitch-forming mechanism located above the work-support; means for feeding the material across the work-support; and means for maintaining and operating the needle above the work-support in a plane fixed with relation to the work support and diagonal to the line of feed and to cause it to enter, and emerge from, the upper surface of the material.

2. A blind-stitch sewing machine comprising a work-support; a reciprocating curved needle and complementary stitch-forming mechanism located above the work-support; means for feeding the material across the work-support; and means for maintaining and operating the needle above the work-support in a plane fixed with relation to the work support and diagonal to the line of feed and to cause it to enter, and emerge from, the upper surface of the material.

3. A blind-stitch sewing machine comprising a work-support; a reciprocating needle and complementary stitch-forming mechanism located above the work-support; means for feeding the material across the work-support from the needle toward the complementary stitch-forming mechanism; means for maintaining and operating the needle above the work-support in a plane fixed with relation to the work support and diagonal to the line of feed and to cause it to enter, and emerge from, the upper surface of the material.

4. A blind-stitch sewing machine comprising a work-support; a reciprocating curved needle and thread carrying looper cooperating therewith located above the work-support; means for feeding the material across the work-support from the needle toward the thread-carrying looper; means for maintaining and operating the needle above the work-support in a plane fixed with relation to the work support and diagonal to the line of feed and to cause it to enter, and emerge from, the upper surface of the material.

5. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening for the material; means for feeding the material over the work-support; a reciprocating needle and complementary stitch-forming mechanism located above the presser-foot; means for maintaining and operating the needle above the presser-foot in a plane fixed with relation to the work support and diagonal to the line of feed and to cause it to enter, and emerge from, the upper surface of the material presented at the presser-foot opening.

6. A blind-stitch sewing machine comprising a work-support; a reciprocating needle and complementary stitch-forming mechanism located above the work-support; means for feeding the material across the work-support; and means for maintaining and operating the needle above the work-support in a plane fixed with relation to the work support and diagonal to the line of feed and to cause it to enter, and emerge from, the upper surface of the material; means for adjusting toward and from the work-support the position of the path of the needle through the material.

7. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening for the material; means for feeding the material over the work-support; a reciprocating curved needle and a thread-carrying looper cooperating therewith located above the presser-foot; means for maintaining and operating the needle above the presser-foot in a plane fixed with relation to the work support and diagonal to the line of feed and to cause it to enter, and emerge from, the upper surface of the material presented at the presser-foot opening; means for adjusting toward and from the presser-foot the position of the path of the needle through the material.

8. A blind-stitch sewing machine comprising a work-support; a reciprocating needle and complementary stitch-forming mechanism located above the work-support; means for feeding the material across the work-support; and means for maintaining and operating the needle above the work-support in a plane fixed with relation to the work support and diagonal to the line of feed; means for guiding material comprising a superimposed layer or layers presenting an edge past the stitching point with the material on both sides of said edge in the path of the needle, whereby the edge is felled to the underlying layer by a series of diagonal stitches entering and emerging from the upper surface of the material.

9. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening for the material; means for feeding the material over the work-support; a reciprocating curved needle located above the presser-foot; operating means therefor to cause the needle to enter in the general direction of the feed, and emerge from the upper surface of the material presented at the presser-foot opening; a thread-carrying looper mounted above the presser-foot at the rear of said opening, and operating means therefor to cause it to cooperate with the needle; and means for moving the needle angularly with respect to the looper and the line of feed to form alternately diverging stitches.

10. A blind-stitch sewing machine com-

prising a work-support; means for feeding the material over the work-support; a reciprocating needle located above the work-support; means for operating the needle to cause it to enter, and emerge from, the upper surface of the material; means for changing angularly the path of reciprocation of the needle at alternate stitches; and complementary stitch-forming mechanism located above the work-support, fixed in position with respect to the angular movement of the needle and cooperating therewith in both positions thereof.

11. A blind-stitch sewing machine comprising a work-support; means for feeding the material over the work-support; a reciprocating curved needle located above the work-support; means for operating the needle to cause it to enter, and emerge from, the upper surface of the material; means for changing angularly the path of reciprocation of the needle at alternate stitches; and complementary stitch-forming mechanism located above the work-support, fixed in position with respect to the angular movement of the needle and cooperating therewith in both positions thereof.

12. A blind-stitch sewing machine comprising a work-support; means for feeding the material over the work-support; a reciprocating needle located above the work-support; means for operating the needle to cause it to enter, and emerge from, the upper surface of the material in the general direction of the feed; means for changing angularly the path of reciprocation of the needle at alternate stitches; and complementary stitch-forming mechanism located above the work-support, fixed in position with respect to the angular movement of the needle and cooperating therewith in both positions thereof.

13. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening for the material; means for feeding the material over the work-support; a reciprocating needle located above the presser-foot; means for operating the needle to cause it to enter, and emerge from, the upper surface of the material presented at the presser-foot opening; means for changing angularly the path of reciprocation of the needle at alternate stitches; and complementary stitch-forming mechanism located above the presser-foot, fixed in position with respect to the angular movement of the needle and cooperating therewith in both positions thereof.

14. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening for the material; means for feeding the material over the work-support; a reciprocating curved needle located above the presser-foot; means for operating the needle to cause it to enter, and emerge from,

the upper surface of the material presented at the presser-foot opening; means for changing angularly the path of reciprocation of the needle at alternate stitches; and complementary stitch-forming mechanism located above the presser-foot, fixed in position with respect to the angular movement of the needle and cooperating therewith in both positions thereof.

15. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening for the material; means for feeding the material over the work-support; a reciprocating needle located above the presser-foot; means for operating the needle to cause it to enter, and emerge from, the upper surface of the material presented at the presser-foot opening in the general direction of the feed; means for changing angularly the path of reciprocation of the needle at alternate stitches; and complementary stitch-forming mechanism located above the presser-foot, fixed in position with respect to the angular movement of the needle and cooperating therewith in both positions thereof.

16. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening for the material; means for feeding the material over the work-support; a reciprocating curved needle located above the presser-foot; means for operating the needle to cause it to enter, and emerge from, the upper surface of the material presented at the presser-foot opening in the general direction of the feed; means for changing angularly the path of reciprocation of the needle at alternate stitches; a thread-carrying looper located above the presser-foot at the rear of said opening and fixed in position with respect to the angular movement of the needle; and means for operating said looper to cause it to cooperate with the needle in both positions thereof.

17. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening in which is presented the material to be stitched and a needle guard in front of said opening; a curved needle; means to move the same in a curved path away from the operator and across said presser-foot; the needle penetrating the material presented at the space of the presser-foot; combined with a loop-taker located at the rear side of the presser-foot and above the work-support controlling a second thread; and means to cause said loop-taker to cooperate with the needle.

18. A blind-stitch sewing machine comprising a work-support; a presser-foot having an opening in which the material to be stitched is presented; said presser-foot having a needle guard in front of said opening; a curved needle located above and in front of said presser-foot opening; and com-

plemental thread-carrying means located behind said presser-foot and above the material; and means to actuate the needle to penetrate the material presented in the space of said presser-foot, said needle passing over said needle guard on its way into the material.

19. A blind-stitch sewing machine comprising a work-support adapted to sustain a layer of body material and upon it a superimposed layer of material having its edge infolded; a presser-foot having an opening in which the body material and the folded edge of the superimposed material is presented; a curved needle; and complementary thread-carrying means; and means to actuate said needle to cause it at one thrust to enter the body material and emerge from the same side thereof, and at its next thrust to start with its point above the body material and move toward the folded edge of said superimposed material, penetrating said edge and passing through the upper side of said superimposed material at a point back from its edge.

20. A blind-stitch sewing machine comprising a work-support; means for feeding the material over the work-support; a stitch-frame; means for moving the same vertically; means to guide the same in its vertical movement; a bar free to slide and oscillate in said stitch-frame; a rock-shaft journaled in said bar and having a connected needle; means sustained in said stitch-frame to actuate the said needle and oscillate said bar at times to change the direction of approach of the needle with relation to the direction of feed and complementary stitch forming mechanism carried by said stitch frame.

21. A blind-stitch sewing machine comprising a work-support; a rock-shaft; a needle carrier pivotally mounted on said rock-shaft and provided with a needle; means to actuate said carrier; an arm fixed to said rock-shaft; a cam acting on said arm to turn said rock-shaft about its longitudinal axis; a device acting normally to maintain said arm in the path of movement of said cam; and a device to retain said rock-shaft in position where the arm will not be acted upon by said cam to turn said rock-shaft during the rotation of the cam, thus permitting the oscillation of the rock-shaft to be suspended and the needle to make only what are designated as the diagonal stitches.

22. A blind-stitch sewing machine comprising a work-support; an overhanging arm; a stitch-frame slidably mounted in the end of said arm; stitch-forming mechanism

sustained in said stitch-frame, including a rock-shaft; a needle-carrier mounted on said rock-shaft and provided with a curved needle; a thread-carrying looper, said looper being sustained by said stitch-frame independently of the rock-shaft; means to move the needle-carrier to oscillate the needle; means to move said stitch frame vertically; and means sustained by said stitch-frame to oscillate said rock-shaft that the needle may approach the work-support in alternate thrusts in different vertical planes.

23. A blind-stitch sewing machine comprising a stitch-frame; means to guide the same and allow of its vertical movement; a bar free to slide in said stitch-frame; a needle-carrying rock-shaft sustained by, and moving with, said bar and provided with a connected needle; means to move said stitch frame vertically; means sustained by said stitch-frame to actuate said needle and to oscillate said bar to change the direction of approach of the needle to the folded edge of the material in which stitches are to be made and complementary stitch forming mechanism carried by said stitch frame.

24. A blind-stitch sewing machine comprising a work-support; a stitch-frame; a bar mounted loosely in said stitch-frame; a needle-carrying rock-shaft sustained by said bar and having a pivoted needle-carrier provided with a curved needle; means sustained in said stitch-frame to oscillate said bar to change the direction of approach of the needle to the work-support at alternate stitches; means to actuate said carrier; and means whereby the oscillation of said bar may be suspended and complementary stitch forming mechanism carried by said stitch frame.

25. A blind-stitch sewing machine comprising a work-support; a stitch-frame; means to move the same vertically; a sliding bar; a needle-carrying rock-shaft sustained at the end of said bar; means to move said rock-shaft; a spring surrounding said sliding bar and acting normally to hold the same toward the work-support as the needle is about to enter the material; said spring also insuring a defined position for the needle and preventing the same from jumping as the point of the needle meets the material and complementary stitch forming mechanism carried by said stitch frame.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WOLF ARBETTER.

Witnesses:

GEO. W. GREGORY,
EDITH M. STODDARD.