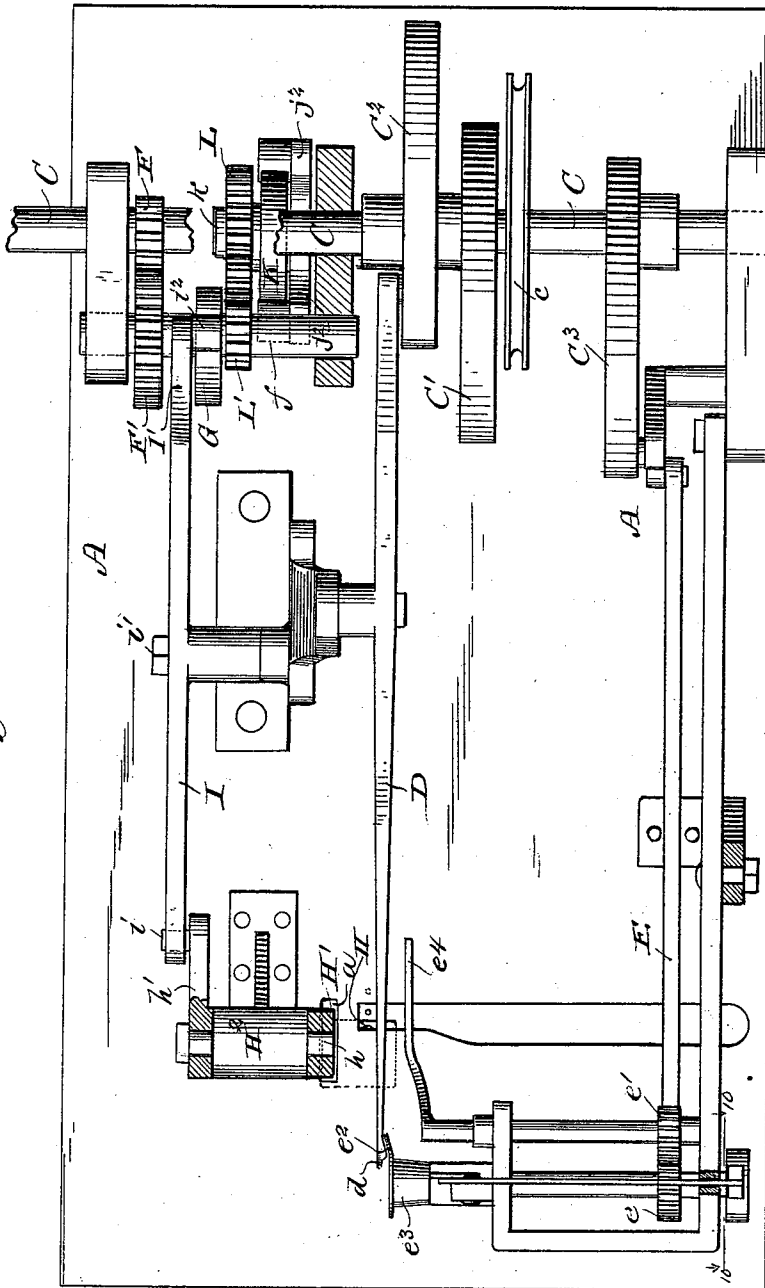


G. A. JUDSON.
SEWING MACHINE FOR FRINGING FABRICS.

No. 521,982.

Patented June 26, 1894.

Fig. 2.



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Fig. 3.

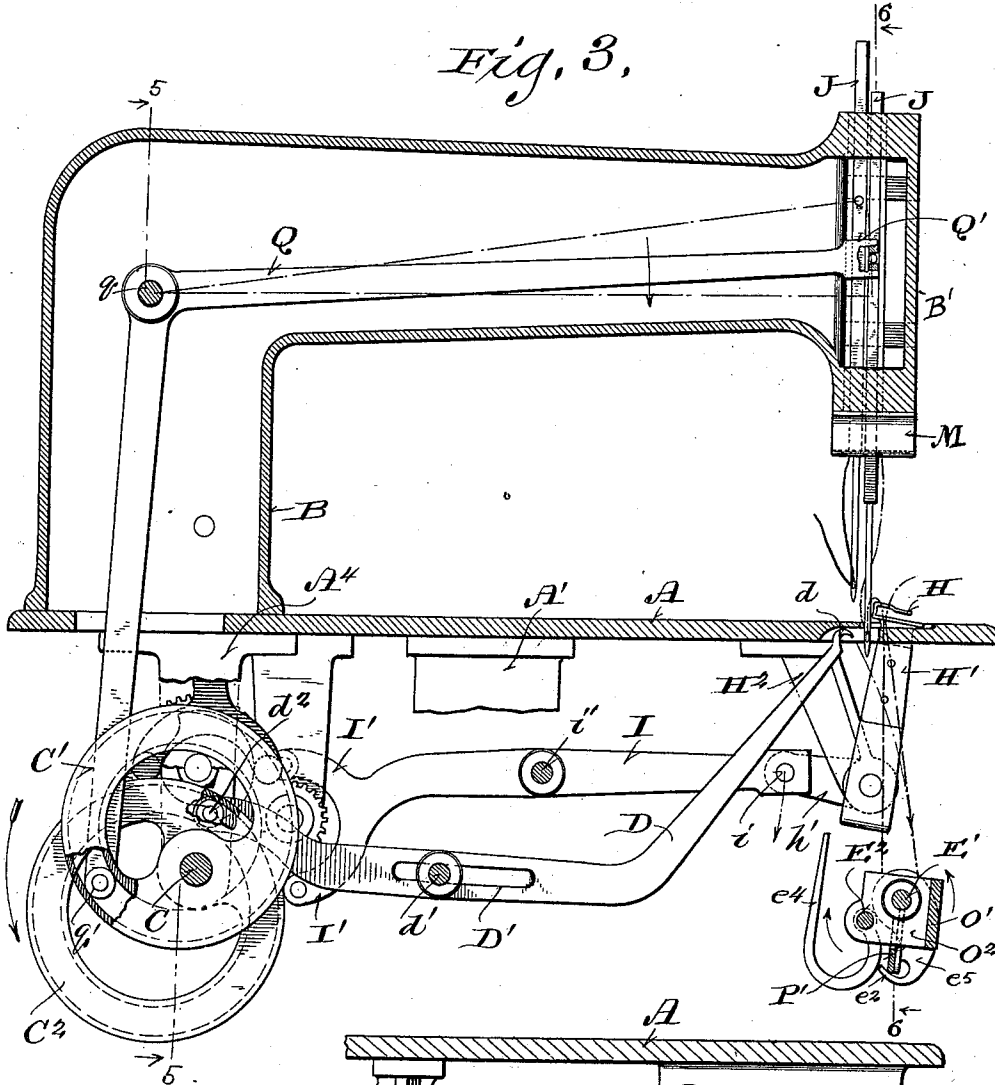
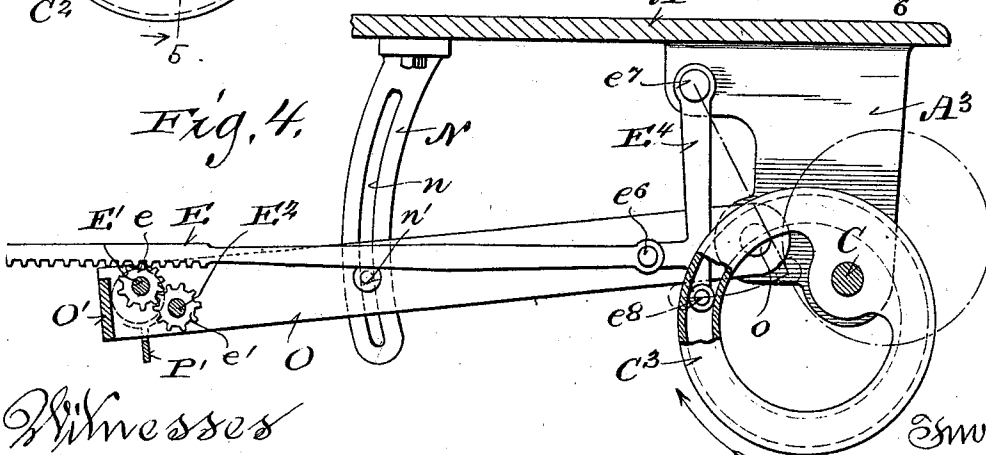


Fig. 4.



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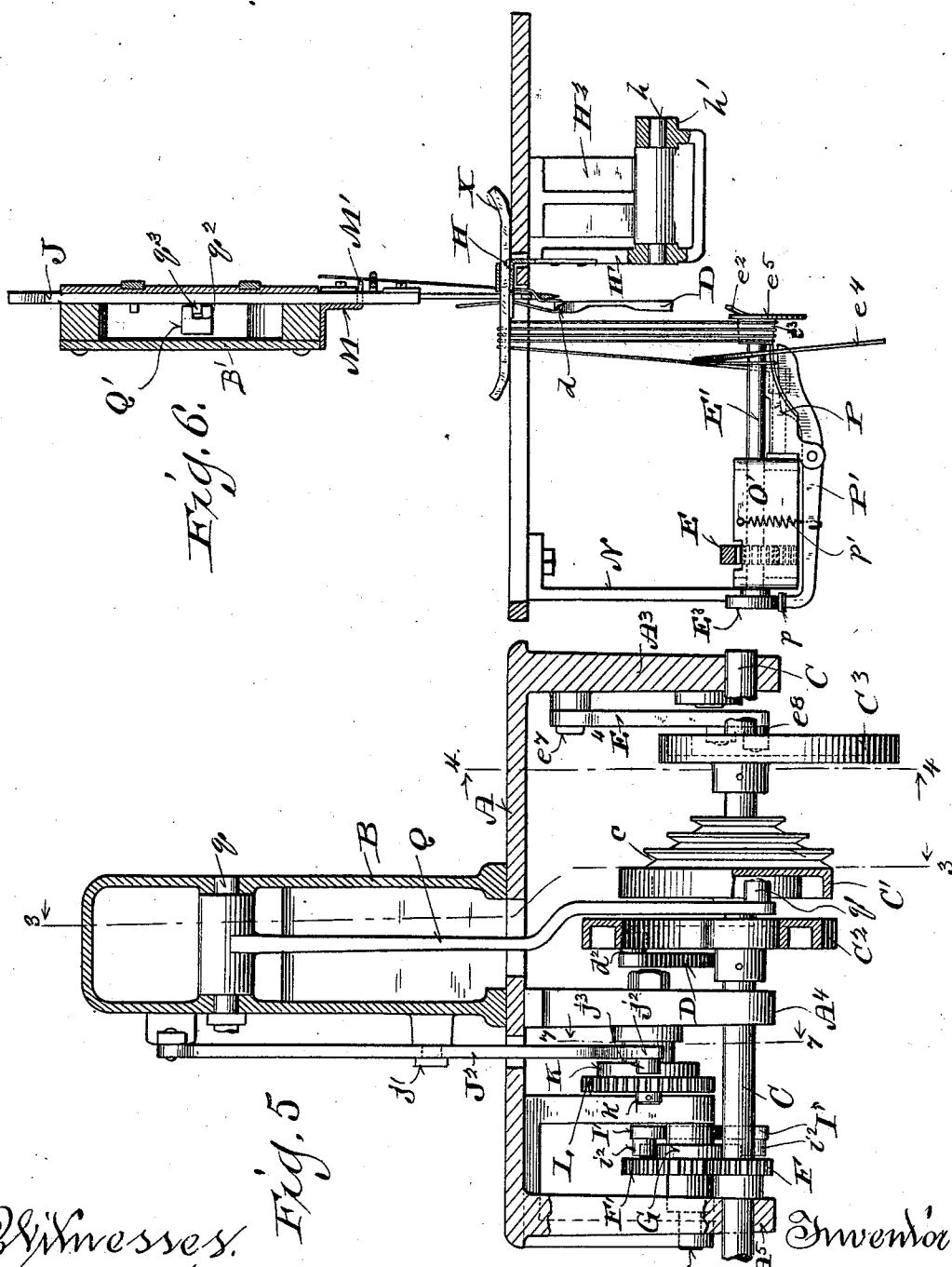
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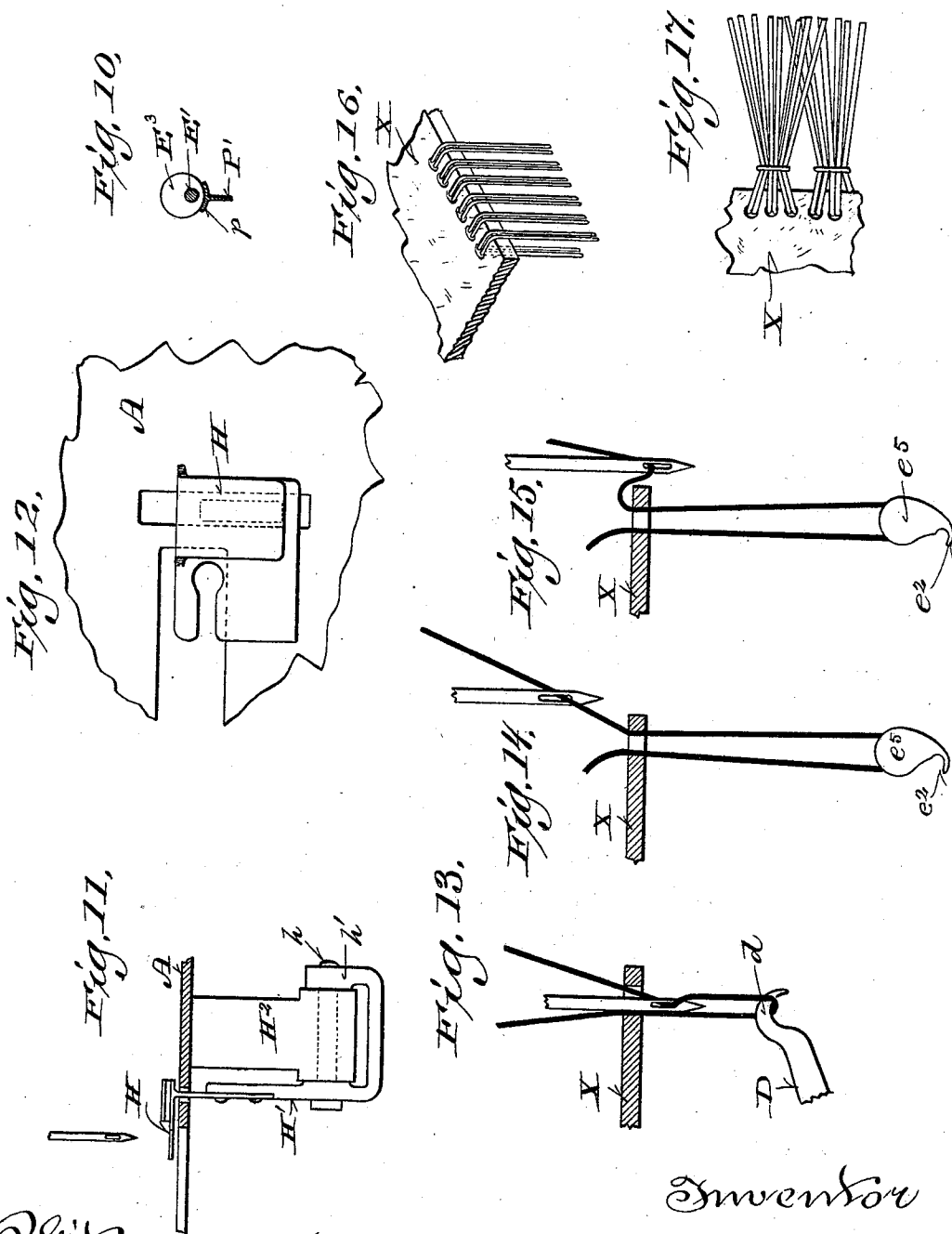
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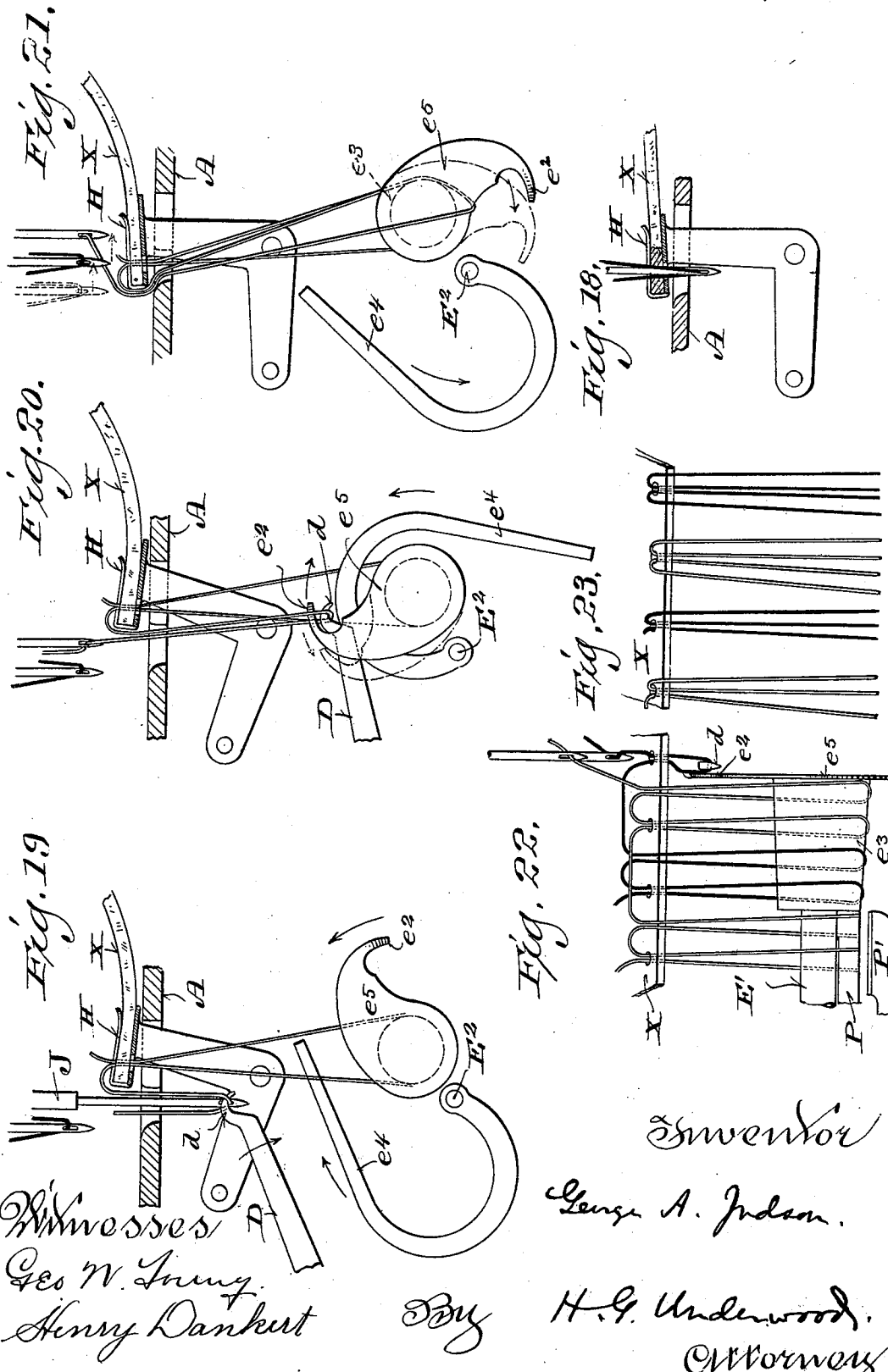
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UNITED STATES PATENT OFFICE.

GEORGE A. JUDSON, OF RACINE, WISCONSIN.

SEWING-MACHINE FOR FRINGING FABRICS.

SPECIFICATION forming part of Letters Patent No. 521,982, dated June 26, 1894.

Application filed March 21, 1893. Serial No. 466,987. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. JUDSON, a citizen of the United States, and a resident of Racine, in the county of Racine, and in the State of Wisconsin, have invented certain new and useful Improvements in Sewing-Machines for Fringing Fabrics; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to new and useful improvements in sewing machines, and relates more particularly to that class of machines which are employed in forming fringes upon the edges of shawls and analogous fabrics.

My invention consists in the matter hereinafter described and pointed out in the appended claims.

In the accompanying drawings illustrating my invention: Figure 1 is a side elevation of my device partly broken away, or in section, to better illustrate details of construction. Fig. 2 is an under side or inverted plan view of said device. Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 5. Fig. 4 is a like view on the line 4—4 of Fig. 5. Fig. 5 is a similar section on the line 5—5 of Fig. 3. Fig. 6 is a similar section on the line 6—6 of Fig. 3. Fig. 7 is a detail sectional view on the line 7—7 of Fig. 5. Figs. 8 and 9 are detail sections on the lines 8—8 and 9—9, respectively, of Fig. 1. Fig. 10 is a detail sectional view on the line 10—10 of Fig. 2, of the cam for actuating the knife to cut the loops. Fig. 11 is a detail view of the vibrating arm and work clamp. Fig. 12 is a detail plan view of said clamp. Figs. 13, 14, and 15 are detail views illustrating the passage of the thread or yarn through the fabric, the table and work clamp being omitted in the views. Fig. 16 is a detail perspective view illustrating a series of threads or yarns stitched through the fabric and then drawn downwardly outside of the edge of the same. Fig. 17 is a detail view illustrating the completed fringe. Figs. 18 to 23 inclusive, are detail views illustrating various steps, and the position of parts of the machine, in the process of making the fringe.

Referring by letter to said drawings, A designates the table of the machine, and B the machine arm, terminating in the machine head B' carrying the needle bars.

C is the drive shaft, journaled in hangers or brackets A³ A⁴ A⁵ beneath the table A, and arranged to be operated in any desired manner, as by a drive-pulley c, and upon this drive-shaft C are mounted suitable eccentrics C' C² C³. The eccentric C' serves to operate the needle bar mechanism, as hereinafter described. The eccentric C² serves to actuate the vibrating arm D, which carries a hook d at its free end, adapted to engage with the loop in the thread or yarn to draw it downwardly beneath the fabric X. The eccentric C³ serves to actuate a reciprocating rack bar E to produce periodical rocking movements of a pinion e which actuates the loop holding devices.

From the under side of the table A there depends a bracket A' having a longitudinal slot (shown at a' in dotted lines Fig. 1) and a hanger A² is adjustably secured in this slotted bracket as also shown in dotted lines in said Fig. 1. The vibrating arm D, above referred to, is provided with a slot D' by means of which it is adjustably pivoted to said hanger, as shown at d'. The rear end of this arm D' is fitted with a roller d² moving in the groove of the eccentric C³ already named.

A curved guide N, provided with a segmental slot n depends from the under side of the table A and to the guide is adjustably secured, as shown at n', a plate O, one end of which is pivoted at o to a bracket A³, which forms one of the bearings of the drive-shaft C. The other end of this plate O is bent at right angles, as shown at O', and then back again, as shown at O², and between and beyond the parts O and O² are small shafts E' E². The shaft E' carries the pinion e which meshes with a pinion e' carried on the shaft E² which latter shaft carries on its inner end, beyond the part O² of the plate, a hook e⁴ while the shaft E' carries on its inner end a tapered hub e³ and disk e⁵ with finger e², and on its outer end a cam E³ for actuating the knife that cuts the loops, as hereinafter explained. The rack-bar E already named, is pivoted at e⁶ to one arm of a lever E⁴ which is pivoted as shown at e⁷ to the bracket A³ and whose other arm carries a roller e⁸ moving in the groove of the described eccentric C³. The pinion e is given a partial rotation by the rack-bar E, as the latter is moved by

the said eccentric. The function of the finger e^2 on the disk e^5 is to take the loop of yarn off from the hook d and slip it onto the tapered hub e^3 . The knife consists of a stationary blade P, and a hinged blade P', the latter having a rounded heel p for engagement with the cam E^3 , and a retracting spring p' . The hook e^4 crowds the loops of yarn off the hub e^3 into the path of this knife, at the proper times.

Upon the drive shaft C, I provide a pinion F arranged to mesh with a gear F' upon a shaft f journaled in suitable hangers f' f' beneath the table A, and upon this shaft f , I provide a cam G for actuating the work clamp in the manner to be presently described.

The work clamp H is made of any suitable or desired form and arranged to engage with the edge of the fabric X to which the fringe is to be applied, said clamp being secured to the upper end of a vibrating arm H' arranged to extend upwardly through an opening or slot a in the table A, and pivotally engaged at h , with a suitable hanger H. A crank arm h' is engaged with the vibrating arm H' as shown, and a lever I is pivotally engaged at i with the free end of said crank arm and has a pivotal support i' upon a hanger A' beneath the table. The other end of this lever is bifurcated as shown in Figs. 1 and 7 and the extremities of its furcations I' I' are provided with suitable rollers i^2 i^2 arranged to extend into the path of the cam G upon the shaft f and arranged to engage with opposite sides of said cam. This cam may be of any desired form for producing alternate upward and downward movements of the bifurcated end of the lever I with periods of rest at the limits of said movements, and for this purpose I find the form of cam shown in the drawings especially well adapted. Said cam G is provided with two rises g g and intermediate concentric faces g' and g^2 , and the arrangement is such that the rotation of the cam will bring the concentric portion g' thereof which has the longer radius into engagement alternately with the upper and the lower rollers i^2 the concentric face g^2 having the shorter radius coming simultaneously into engagement with the roller carried at the end of the opposite furcation of said lever in an obvious manner. In this manner, a reciprocating movement of the lever I upon its pivotal support i' is produced, which motion is communicated to the crank arm h' , the vibrating arm H', and the work clamp H, to produce a reciprocating movement of the margin of the fabric engaged with said clamp, alternately into and out of the path of the needle in an obvious manner.

In the particular form of construction shown in the drawings, two needle bars J J are carried by a movable head J', which is adjustably engaged with the machine head and has an operative connection with a movable bar j which is actuated by a suitable vibrating lever J² pivoted at j' upon the machine head. This vibrating lever J² extends

below the table A and is conveniently bifurcated as shown and its furcations j^2 j^2 provided with suitable rollers j^3 j^3 adapted for engagement with a cam K, similar in construction to the cam G previously described, and mounted upon a stud shaft k . A gear L is located upon this shaft and is arranged to mesh with a pinion L' upon the shaft f as shown, and the proportions of said gear and pinion are such that the gear L driven by the pinion L' will give a rotation to the shaft k and cam K one half as rapidly as the rotation of shaft f and cam G. The proportionate sizes of the pinion F on the drive shaft and gear F' on shaft f , are such that the shaft f shall have a rotation only one half as rapid as that of the drive shaft.

Q is a bell-crank lever, pivoted at q , within the machine arm B, the lower end of said lever carrying a roller q' moving within the groove in the eccentric C'. The other end of lever Q is formed into a head Q' having a horizontal slot q^2 therein. Each of the needle bars J J is provided with a lateral pin q^3 and the machine head B' is provided at its bottom with a plate M having a horizontal flange M' provided with a central slot m of a size to admit the passage therethrough of one of the needle bars J, said slot having extensions m' m' at each side so as to permit of the passage therethrough of a needle when not in use while its bar J rests on the flange M'. By this construction, as the movable bar j , actuated by the lever J² and cam K, moves the head J' back and forth, the slot q^2 in the head Q' of lever Q will embrace first one and then the other of the described pins q^3 and in the downward movement of said lever Q will thereby force the needle bar whose pin q^3 is in engagement as described, downward.

Inasmuch as each needle makes one stitch for every revolution of the drive shaft, and as shaft f with cam G are rotated only one half as rapidly as said drive shaft, it follows that the lever I will be operated by said cam to give a quick motion to the work clamp to carry the edge of the fabric into the line of the needle, as in Fig. 13, where it will remain stationary while the needle takes one stitch, and then gives a quick motion in the opposite direction so as to carry the edge of the fabric out of the path of the needle, where it will remain stationary while the needle takes another stitch, and inasmuch as the movements of the head J' are only one half as frequent as the back and forth movements of the work clamp, it follows that first one needle will be operated to stitch first through and then past the edge of the fabric, and then the head will be adjusted so as to produce a like operation of the other needle.

It will be understood, from the foregoing, that each needle makes its down and up stroke twice (carrying the yarn or thread first through the fabric, and up, and next past the edge of the fabric and up) before the needles

shift, at which time the bar of the needle which has just been twice in operation rests on the described flange M' of the plate M , and the other needle bar is brought into position in line with the central slot m in said flange, and then the slot q^3 in the head Q' of the lever Q receives the pin q^3 on this second needle-bar, and the described down and up motion of this needle-bar takes place, twice, and the mechanism shifts this second-needle bar to its resting position on the flange M' on the other side of the central slot m and the first needle-bar is again in line with the central slot m , and performs its work, twice, and then shifts back to its first resting position, and so on, alternately. The work-clamp operates automatically to carry the fabric alternately under the path, and out of the path, of each needle, but the work of feeding the fabric forward in line for the operation of the next needle is done by hand, after each needle has finished its described second up stroke. Each loop in the yarn or thread is caught by the hook d on the end of the arm D when the needle descends, and drawn downwardly in position to be engaged by the loop holding and cutting devices, so that the threads or yarns will assume the positions shown in Fig. 16. By thus stitching alternately through and past the edge of the fabric so as to form a series of loops embracing the said edge, I am enabled to form a complete fringe by securing the loops in bunches or tufts as in Fig. 17, which will present a finished appearance upon either side of the fabric, this tying or securing of the loops in bunches or tufts, as shown in said Fig. 17, being done by hand.

In order to more clearly explain the relative positions of the various operative parts in the operation of forming the fringe, I have shown a series of detail views, to which reference will now be made. The operation of the device is exactly the same whether both the needles are threaded with the same color of yarn or thread, or with different colors. In Fig. 18 the first needle (therein shown as carrying a dark thread) is making its first plunge down through the fabric. In Fig. 13 the same needle has finished its down stroke and the hook d has caught the loop, and the needle is going back. In Fig. 14 the hook d has gone down and delivered the loop upon the hub e^3 and the needle has gone up its first full upper stroke, and the work-clamp (not shown in Figs. 13, 14 and 15) has shifted the fabric back out of the path of the needle, which latter is just ready to come down on its second stroke, as in Fig. 15, which shows the needle coming down on its second down stroke outside the edge of the fabric, and the just described operation will be repeated, forming the second loop outside the fabric, just as it was shown formed through the fabric in Figs. 13 and 14. In Fig. 19, this needle which carried the dark thread having finished its work, and made the two loops described, has been shifted in the

manner already described, and the other needle which carries the light thread, is shown in the position of its second down stroke outside the fabric, the first down and up stroke having been made and the first loop of light thread which passed through the fabric having been previously caught and transferred to the tapered hub by the finger e^2 and disk e^5 , as shown in said figure, which shows the hook d just catching the second (or outside) loop of the light thread. Fig. 20 shows the position of the parts as the finger e^2 on disk e^5 takes this said second light loop off the hook d , the needle having gone up on its last stroke and remaining stationary. In Fig. 21 is shown the herein above referred to operation of the disk e^5 transferring this said second loop of light thread onto the tapered hub e^3 and as this is being done, the needle which carries the dark thread is being shifted from its former position (full lines Fig. 20 and dotted lines Fig. 21) to its operative position shown by full lines Fig. 21, while the needle carrying the light thread having completed its work, as described, is shifted out of position as shown at the right in said Fig. 21, and while this has been done the work clamp H has been shifted back so that the fabric is now in the path of the said needle carrying the dark thread, which now goes down as shown in Fig. 18, and already described. This operation continues until there are a series of loops on the tapered hub e^3 and the hook e^4 takes the first of these loops into the path of the knife as shown in Fig. 6 (this hook e^4 being in shape one loop of a spiral with its free bent end extended) and so on, each time that a loop is completed and shifted onto the said hub, the said hook e^4 carrying into the path of the knife, the "oldest" or first completed loop on said hub, as shown in said Fig. 6. As shown in Fig. 22, there may be two of these earlier formed loops cut by the knife, at one time, (instead of one) as this is immaterial, so long as there are always a sufficient number of loops on the tapered hub e^3 to prevent the yarn from drawing out of the fabric.

As before stated, the operation of the machine is precisely the same, whether the fringe is to be all of one-colored yarn, as shown on Figs. 16 and 17, or of two contrasting colors, as shown in Figs. 22 and 23, and wherein I have illustrated and described the two needles as carrying yarns of different color, it has been chiefly to aid in a clearer understanding of the operation.

In order to vary the length of the loops of fringe, the pivoted point d' of the arm D is varied, which is accomplished by adjusting said pivot to the desired point in the slot D' in said arm, the hanger A^2 being adjusted similarly to the corresponding point in the slot a' of the bracket A' , thereby lengthening or shortening the throw of the hooked end of said arm D .

It has been common heretofore, to form a fringe by sewing through the edge of the fab-

ric and drawing down and cutting the loops, then turning and hemming down the edge of the fabric, so as to bring the line of stitching exactly in the line of said fold in the fabric and finally securing the loops in tufts or branches. This would bring the fringe to the edge of the shawl or other article in an obvious manner. This operation however requires skillful and careful manipulation of the work after it leaves the machine.

By my improvement I am enabled to entirely do away with the necessity of hemming the edges of the fabric, and I am enabled to form a heavier fringe and one which presents a much neater appearance than can be accomplished by the old style methods.

My improved form of fringe furthermore completely covers and conceals the edge of the fabric to which it is applied.

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

1. In a sewing machine for fringing fabrics, a suitable work clamp for engagement with the edge of the fabric and secured to the end of a vibrating arm pivotally supported beneath the machine table, a suitable crank arm secured to said vibrating arm, and a pivoted lever operatively engaged with said crank arm and with the driving mechanism, for producing a reciprocating movement of said arm and the work clamp to carry the edge of the fabric alternately into and out of the path of the needle, in combination with another vibrating arm carrying a hook at its free end for engagement with the loop in the thread or yarn, substantially as set forth.

2. In a sewing machine for fringing fabrics, a suitable work clamp for engagement with the edge of the fabric and secured to the end of a vibrating arm pivotally supported beneath the machine table, a crank arm secured to said vibrating arm, a pivoted lever operatively engaged at one end with said crank arm, and a cam operated by the driving mechanism and operatively engaged with the other end of said pivoted lever, and adapted to vi-

brate the same to give a reciprocating movement to the arm and the work clamp to carry the edge of the fabric alternately into and out of the path of the needle, in combination with an adjustable vibrating arm carrying a hook at its free end for engagement with the loop in the thread or yarn, substantially as set forth.

3. In a sewing machine for fringing fabrics, a suitable work clamp for engagement with the edge of the fabric and secured to the end of a vibrating arm pivotally supported beneath the machine table, a crank arm secured to said vibrating arm, a pivoted lever operatively engaged at one end with said crank arm, and bifurcated at its other end, and a revolvable cam actuated by the driving mechanism and operatively engaged between the furcations of said lever, said cam being provided with two concentric faces having different radii, and intermediate rises, for producing quick alternate movements of said lever to reciprocate the work clamp so as to carry the edge of the fabric alternately into and out of the path of the needle, with periods of rest between said movements, substantially as set forth.

4. In a sewing machine for fringing fabrics, a suitable work clamp for engagement with the edge of the fabric and suitable means for actuating said work clamp to carry said fabric alternately into and out of the path of the needle so as to be alternately pierced and missed thereby, in combination with a vibrating arm carrying a hook at its free end for engagement with the loop in the thread or yarn, and for drawing said loop downward beneath the fabric in the formation of the fringe.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

GEORGE A. JUDSON.

Witnesses:

JOHN E. WILES,
J. W. LENENBERGER.