

No. 614,085.

Patented Nov. 15, 1898.

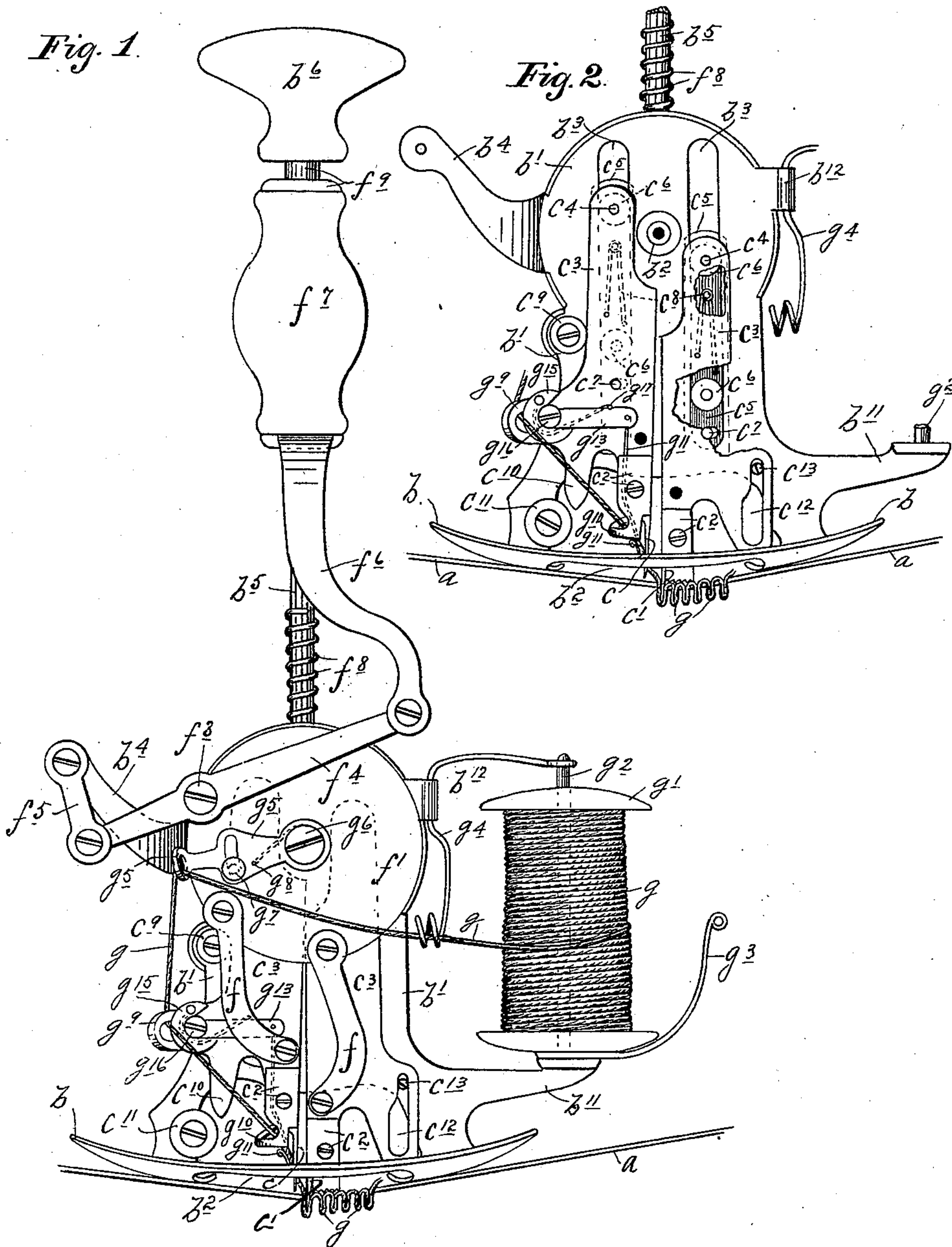
M. CAMERON.
FABRIC TURFING MACHINE.

(Application filed Nov. 23, 1896.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



Witnesses.
C. F. Kuyper
R. D. Merchant

Inventor.
Murdick Cameron
By his Attorney
Jas. F. Williamson

No. 614,085.

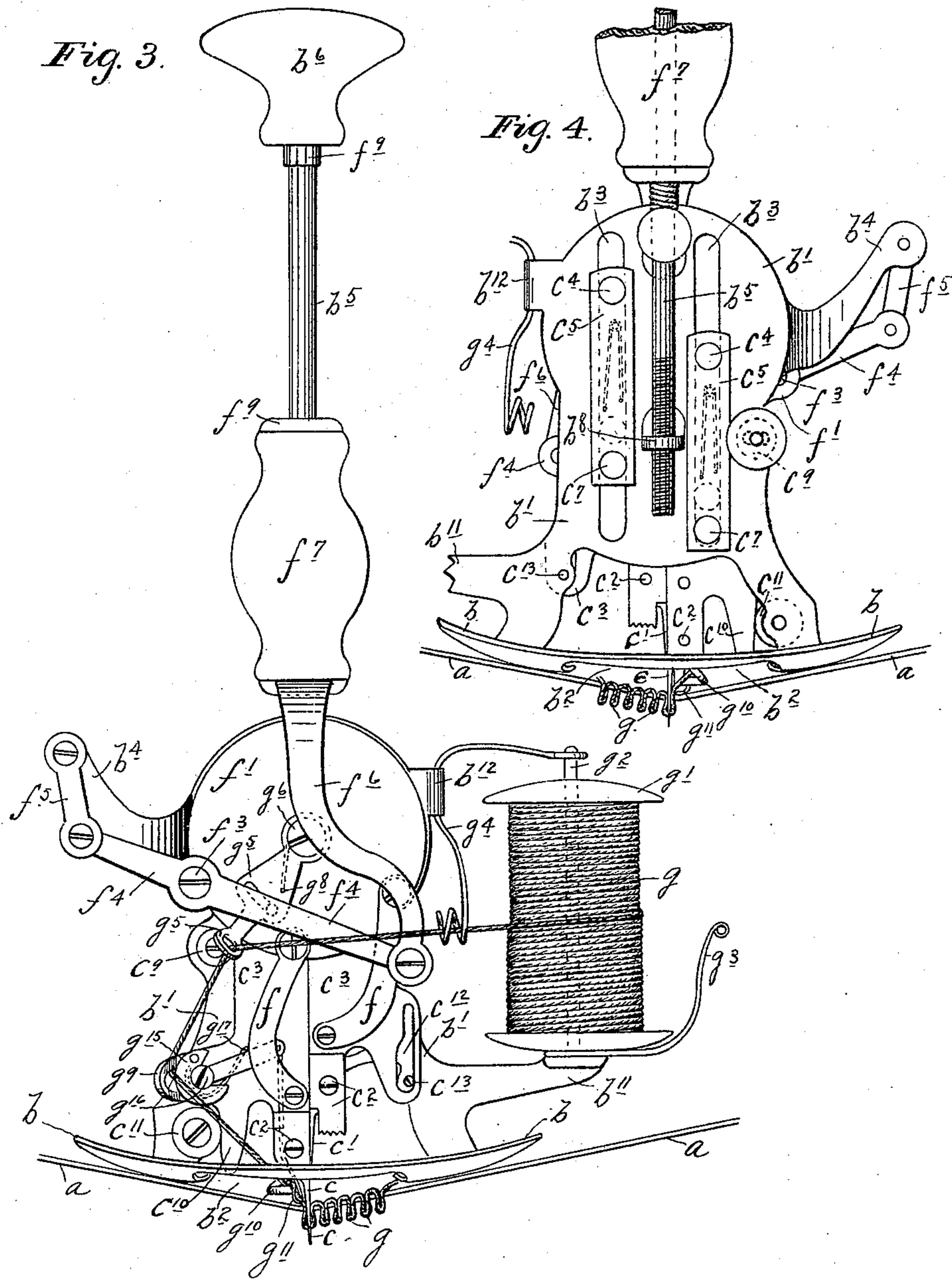
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3 Sheets—Sheet 2.



Witnesses

C. F. Kilgus

A. J. Merchant

Inventor

Murdick Cameron

By his Attorney

Jas. F. Williamson

No. 614,085.

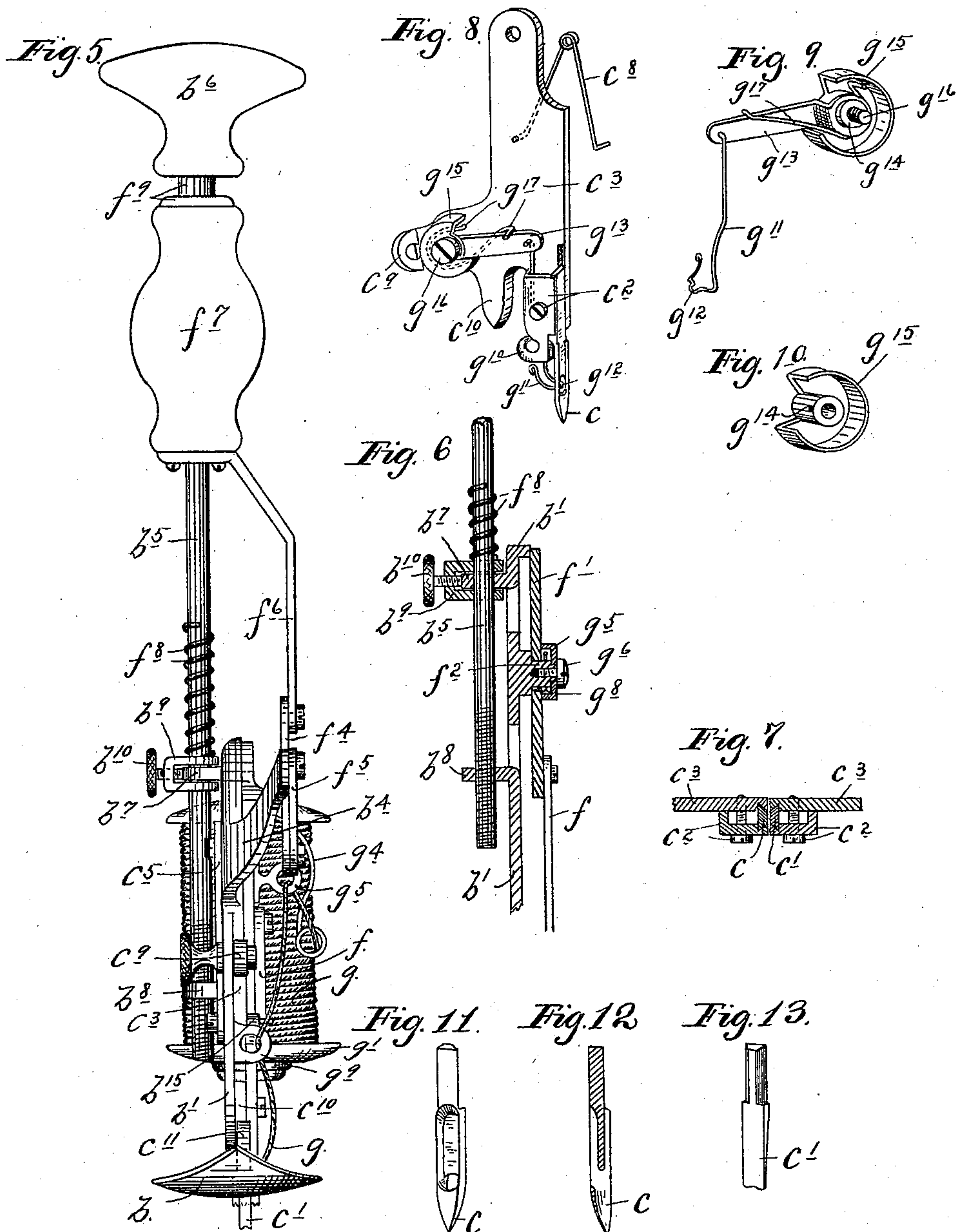
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3 Sheets—Sheet 3.



Witnesses.

C. F. Kilgore

R. D. Merchant.

Inventor
Murdoch Cameron
By his Attorney

Jas. F. Williamson

UNITED STATES PATENT OFFICE.

MURDICK CAMERON, OF MINNEAPOLIS, MINNESOTA.

FABRIC-TURFING MACHINE.

SPECIFICATION forming part of Letters Patent No. 614,085, dated November 15, 1898.

Application filed November 23, 1896. Serial No. 613,089. (No model.)

To all whom it may concern:

Be it known that I, MURDICK CAMERON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Fabric-Turfing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Foreign patents have been taken out on the mechanism herein disclosed in the following countries, to wit: patent of France, No. 261,820, of date December 2, 1896, published March 10, 1897; patent of Canada, No. 54,334, of date December 11, 1896; British patent, No. 27,289, dated December 1, 1896, and patent of Germany, No. 95,928, dated December 8, 1896, published January 28, 1898.

My invention has for its object to provide an improved fabric-turfing machine for hand use in the manufacture of rugs and other articles.

To this end my invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The preferred form of my invention is illustrated in the accompanying drawings, wherein like notations refer to like parts throughout the several views.

Figure 1 is a side elevation showing the machine in working position as the same will appear when the needle is in its uppermost position and the loop-holder in its lowermost position. Fig. 2 is a similar view of the machine with the needle and loop-holder in the same relative positions as in Fig. 1, but with some of the parts removed and others broken away for better illustrating the construction. Fig. 3 is a view similar to Fig. 1, but with the needle shown in its lowermost position and the loop-holder in its uppermost position. Fig. 4 is a view with the parts shown in the same position as in Fig. 3, but looking at the opposite side of the machine. Fig. 5 is a front elevation of the machine with the parts in the position shown in Fig. 1. Fig. 6 is a detail in verti-

cal section through the center of the oscillating disk and the center plate of the frame with some parts removed. Fig. 7 is a detail in horizontal section through the needle and loop-holder clamps and the parts connected together thereby. Fig. 8 is a detail in perspective, showing the needle-carrying arm detached. Fig. 9 is a perspective view showing the tension device carried by the needle-arm detached. Fig. 10 is a perspective view showing a detail of the parts illustrated in Figs. 8 and 9. Figs. 11 and 12 are details in perspective and longitudinal section, respectively, showing the needle detached. Fig. 13 is a perspective view of the loop-holder detached.

A part of the fabric to be tufted is shown at *a* in Figs. 1 to 4, inclusive. This fabric or groundwork may of course be of any suitable kind and is held properly distended in a suitable support. (Not shown.)

The frame of the machine is composed of a suitable base-plate *b* and a suitable standard or vertical plate *b'*. The base-plate *b* is cut away at its central portion to afford a suitable passage *b²* for such of the working parts as move through the base-plate. The said base-plate *b* is of convex form on its under surface and is turned up at its ends, so as to permit the same to move freely over the fabric. The said frame *b b'* may be conveniently and cheaply made by stamping the same up from sheet metal. The frame shown in the drawings is of this kind, and when so stamped up the base-plate *b* is of concavo-convex form in cross-section. The center-plate portion *b'* of said frame is provided with various projecting parts, which will be noted when considering the operative parts supported thereby.

The needle *c* is of the form shown in Figs. 11 and 12, and the loop-holder *c'* is of the form shown in Fig. 13. The groove on the face of the needle, intersecting the eye of the same, serves as a recess or seat to cover the yarn, so that the yarn will not make any additional opening beyond that made by the needle in passing through the fabric. The groove or guideway formed by the side flanges on the back of the needle serves to guide the lower

end of the loop-holder c' , which bears against the face of the needle when making its down-stroke into the fabric.

It will be noted by reference particularly to Fig. 12 that the needle-eye is formed between two web portions of the needle, which web portions stand vertically one over the other and laterally out of line with each other, so as to give the needle-eye an opening substantially longitudinal of the needle, as well as transversely thereof. In virtue of this construction the turfing material may be drawn through the needle-eye in a direction nearly parallel to the axis of the needle without putting a bend or kink in the said turfing material at the point where it passes said eye, as is the case with old forms of needles. Hence it follows that when the turfing material is held down by the loop-holder the needle may make its upstroke with the least possible frictional resistance from the turfing material, which under this upstroke must be drawn through the needle-eye. It will be further noted that the grooves which lead to the needle-eye from the opposite faces of the needle extend on lines which run parallel to the axis of the needle. Hence the turfing material will not be kinked or turned in any direction in passing through the needle-eye. This construction makes it possible to pass such turfing material as rags and torn strips of cloth, which are very uneven and which are connected in sections by knots or rough joints, through the needle-eye without causing such frequent breakages as to render the operation impracticable, as is the case with needles otherwise constructed. In fact I have found by an extended use of my improved needle that breakages of the turfing material will seldom, if ever, be caused in passing the same through the needle. The said needle c and the said loop-holder c' are secured by suitable clamping devices c^2 to the lower ends of a pair of carrying-arms c^3 . The clamping-plates c^2 also serve as presser-feet, as will be later noted. The said arms c^3 are pivotally secured at their upper ends by pins c^4 or otherwise to the upper ends of a pair of sliding carriages, composed of plates c^5 and anti-friction-rollers c^6 . The said plates c^5 bear against the back of the center plate b' of the frame, and the said rollers c^6 work in vertical guideways or slots b^3 , cut through said center plate b' . The carrying-arms c^3 bear against the face of said center plate b' and are pivotally held by the same pins c^4 which support the upper members of the rollers c^6 . The carrying-arms c^3 have slot-and-pin connection, as shown at c^7 , with the lower end portions of the said sliding plates c^5 . The said carrying-arms c^3 are also subject to spreading-springs c^8 , which are applied with one end thereof secured to the carrying-arms c^3 and the other end thereof secured to the plate c^5 . These springs c^8 tend, therefore, to throw the carrying-arms forward in respect to the frame.

The action of the particular spring c^8 which is applied to the needle-carrying arm is limited by a laterally-adjustable stop-roller c^9 . This stop c^9 may be of any suitable kind and rendered adjustable in any suitable way; but it is shown as in the form of said roller c^9 , secured by a clamping-screw which works through a lateral slot in the center plate b' and which will therefore permit the roller to be adjusted laterally at will in respect to the needle-carrying arm. The position of the said stop c^9 determines the forward throw of the needle under the action of the spring c^8 , thereby fixing the length of the stitch. The needle-carrying member of the arm c^3 is provided near its lower end with a cam-surface c^{10} , adapted to come in contact with a cooperating cam-roller c^{11} , suitably secured to the center plate b' of the frame. The cooperation of the said cam-surface c^{10} on the arm c^3 and the said cam-roller c^{11} on the frame causes the downward movement of the needle-carrying arm to move the frame forward in respect to the needle, as will later more fully appear. The loop-holder-carrying member of the said arms c^3 is provided near its lower end with a cam-slot c^{12} , which engages with a pin or screw c^{13} , projecting from the center plate b' of the frame. This cam-slot c^{12} is contracted to the width of the pin c^{13} in its upper end portion, but is laterally expanded in its lower portion. The function of the said parts c^{12} and c^{13} is to prevent the machine from moving forward until exactly the right time, or, otherwise stated, until the needle has made its feed and has reentered the fabric at the proper point for the next stitch. This prevents slippage of the machine and secures uniformity in the stitch, as will later more fully appear. The said needle and loop-holder arms c^3 are connected by links f with an oscillating lever f' , which is shown as in the form of a disk overlying the upper parts of the said arms c^3 and mounted on a shouldered pivot-stud f^2 , projecting from the center plate b' of the frame. The said disk f' is held on its pivot-stud f^2 by means which also serve an additional function and will be noted later on. The stud f^2 is of the proper form to hold the said disk f' properly spaced apart from the said carrying-arms c^3 . The said disk or oscillating lever f' is pivotally connected by a screw f^3 or other means to a lever f^4 . The lever f^4 is pivotally connected at its lower end by a link f^5 to a fixed arm b^4 , projecting forward from the center plate b' of the frame. The upper end of the lever f^4 is connected to the lower end of an arm f^6 , which is carried by a handpiece f^7 . This handpiece f^7 is mounted on a guide-rod b^5 , which is supported from a center plate b' of the main frame. The said guide-rod b^5 is provided at its upper end with a handpiece b^6 , by which the machine is held and guided with one hand, while the handpiece f^7 is moved up and down on the rod b^5 by the

other hand for imparting the required motions to the turfing mechanism. The said rod b^5 passes freely through an upper guide-keeper b^7 and has screw-threaded engagement with a lower guide-keeper b^8 , projecting from the back of the center plate b' , as best shown in Figs. 5 and 6. The said rod b^5 also passes through a U-shaped clamp b^9 , which embraces the keeper b^7 and is subject to a clamping-screw b^{10} , bearing against the outer end of the keeper b^7 . By this clamping device the guide-rod b^5 can be secured against rotary motion after it has been set in proper position for coöperation with the handpiece f^7 . By loosening the said clamping device the rod b^5 may be screwed up or down in respect to the keeper b^8 on the frame. This vertical adjustment of the rod b^5 determines the length of stroke permitted to the carrying-arms c^3 . The guide-rod b^5 is shown as provided with a spring f^8 for cushioning the handpiece f^7 on the downward stroke. Either the upper end of the handpiece f^7 or the lower end of the handpiece b^6 may be provided with a rubber buffer f^9 for cushioning the upper stroke of said handpiece f^7 .

The links f , which connect the carrying-arms c^3 with the oscillating disk or lever f' , connect the said lever f' at such points thereon that the said arms always occupy positions on the opposite sides of a vertical line drawn through the center of said lever or disk. Hence it is obvious that when the needle c is moving down the loop-holder c' will be moving up, and vice versa.

The yarn g is shown as supplied from a spool g' . The said spool g' is mounted on a spindle g^2 , rising from an arm b^{11} , projecting rearward from the center plate b' . The said spindle g^2 is also provided with a guard-arm g^3 at its lower end and is engaged at its upper end by the horizontal portion of a tension device g^4 , which is swiveled in a keeper-lug b^{12} , projecting rearward from the top of the center plate b' . The guard-arm g^3 serves to prevent the turfing material from falling below the spool. The yarn g passes through an eye formed by the coil in the lower arm of the said tension device g^4 and goes thence through the eye of a slack-adjuster g^5 , which is carried by the disk or oscillating lever f' . The said slack-adjuster g^5 has a flanged hub which is adapted to engage over the outwardly-projecting part of the bearing-stud f^2 , on which the disk f' is mounted, as shown in Fig. 6. A clamping-screw g^6 passes through the hub of said slack-adjuster g^5 and has screw-threaded engagement with the bearing-stud f^2 . The said screw g^6 is therefore made to secure both the said slack-adjuster g^5 and the said disk or lever f' to the center plate b' in their proper working positions on the stud f^2 . The slack-adjuster g^5 has slot-and-pin engagement with the disk f' , as shown at g^7 , and is subject to the action of a spring g^8 , which tends to throw the adjuster g^5 into its

uppermost position in respect to the disk f' . From the slack-adjuster g^5 the yarn passes through an eye g^9 on the needle-carrying member of the arms c^3 and passes thence to the hook-eye g^{10} on the combined presser-foot and clamping device c^2 , which secures the needle c to its carrying-arm c^3 . From this point the yarn g passes directly through the eye in the needle. When the needle is thus threaded, the yarn is subject to the lower end of a spring-rod g^{11} . The lower end of this rod is bent into the proper form to afford a hook which may be engaged under the yarn when the needle is threaded and to afford a projecting tongue or part g^{12} , which will ride in the groove on the face of the needle. The stem of the rod g^{11} passes upward through the combined presser-foot and clamping device c^2 and is attached at its upper end to a lever-arm g^{13} . The said lever-arm g^{13} is pivoted on the hub portion g^{14} of a flanged segmental cap g^{15} . The cap g^{15} is secured to the needle-carrying arm c^3 by means of a screw g^{16} , and the lever g^{13} extends out through the gap in the cap-flange, so that the pivotal movement of the lever will be limited by the ends of the segmental flange. A spring g^{17} is secured at one end to the arm c^3 , passes around the hub of the lever, and has its other or opposite end turned outward so as to overreach the top of the lever-arm g^{13} , and hence said spring tends to throw the said parts g^{11} and g^{13} downward to their limit in respect to the needle-carrying arm c^3 .

In virtue of the position of the spring-rod g^{11} within the parts c^2 and the shape of the parts of said rod g^{11} the tongue g^{12} thereof will always hug the face of the needle and will hold the yarn to the needle with sufficient friction or tension to make the yarn move with the needle instead of permitting the needle to move on the yarn, as might otherwise be the case. This always insures enough yarn at the back of the needle for making the rearward half of the loop, as will later more fully appear.

All of the parts of the machine have now been specified. The relative actions thereof will be rendered distinct by tracing the operation of the machine as an entirety. This will now be briefly stated.

Operation: Suppose the fabric a is properly distended in a suitable support in a horizontal position. The operator then holds and guides the machine, with the use of one hand gripping the handpiece b^6 while with the use of the other hand he drives the turfing mechanism by reciprocating the handpiece f^7 up and down on the guide-rod b^5 . The clamping-pieces c^2 , which secure the needle and the loop-holder to their respective carrying-arms c^3 , are of the proper construction to serve as presser-feet, as hitherto noted, and the stroke which is given to the needle and the loop-holder is of such a length as to cause the said presser-feet c^2 to move downward

through the passage b^2 of the base-plate and carry downward the fabric to a point below the horizontal level, or below the margins of the said passage b^2 in the base-plate b . Hence
 5 when the needle and the loop-holder are being withdrawn the elasticity of the distended fabric itself will make the fabric follow the said presser-feet upward for a short distance. In virtue of this fact and the peculiar disposition of the driving connections $f f'$, by which
 10 the reciprocating motion is imparted to the carrying-arms c^3 , the needle c never leaves the loop until the loop-holder c' has taken hold of the bottom of the loop, and the loop-
 15 holder will then hold the said loop last made until the needle has moved upward to its limit, made its forward throw, and has reëntered the fabric to its limit for forming the next stitch or loop. The loops must there-
 20 fore be uniform in depth. While the loop-holder is down to its limit, as shown in Fig. 1, the needle moves upward, as before stated, and as soon as the needle in its upward movement reaches a point where it is clear of the
 25 fabric its spring c^8 will throw its carrying-arm c^3 forward against the stop c^9 , thereby bringing the needle in proper position for the next stitch. During all this time, however, the frame could not move forward because it
 30 was held stationary by the engagement of the frame-pin c^{13} with the upper or contracted part of the cam-groove c^{12} in the loop-holder-carrying arm, as shown in said Fig. 1. Hence no slippage of the frame could occur. On
 35 the downstroke of the needle the cam-surface c^{10} on its carrying-arm does not come in contact with the cam-roller c^{11} on the frame until after the needle has penetrated the fabric to its limit, and by this time the loop-
 40 holder will have moved upward sufficiently far to bring the frame-pin c^{13} into engagement with the wide part of the slot c^{12} in the loop-holder-carrying arm. Hence under the continued downward movement of the needle-
 45 carrying arm and while the presser-foot is carrying the fabric on downward below the horizontal level the cam-surfaces c^{10} and c^{11} will coöperate to move the frame forward in respect to the needle. While the frame thus
 50 moved forward, the loop-holder was held by the fabric; but the wide part of the slot c^{12} in the loop-holder-carrying arm permitted the frame to make said forward feed movement in respect thereto. After the said frame move-
 55 ment has taken place the loop-holder continues to move upward, and as soon as it clears the fabric its spring c^8 will throw the same forward in respect to the frame against the back of the needle or into the position
 60 shown in Fig. 3. The loop-holder will then be guided by the back of the needle on the downward stroke of the loop-holder into the loop just made by the needle. These actions are repeated over and over again under the
 65 reciprocation of the handpiece f^7 on the guide-rod b^5 , and under the same it is obvious that

the machine will automatically travel over the fabric and tuft the same. It is also obvious that with the construction above described the loops must be of uniform depth 70 and the stitches of uniform length.

Directing attention now to the tension devices, it will be clear from a comparison of Figs. 1 and 3 that on the upstroke of the needle the slack-adjuster g^5 will unwind or pull 75 from the spool g' a certain amount of the yarn g , which will become slack on the downstroke of the needle and the said adjuster g^5 . This slack will be sufficient to afford the yarn required for the loop being made by the needle. 80 As the needle moves downward the yarn will be held to move therewith by the clamping action of the tongue g^{12} of the tension device $g^{11} g^{13}$. Hence whatever part of the yarn was pulled through the eye of the needle, so 85 as to be at the back of the needle when the needle was in its uppermost position, will remain on the loop-holder side of the needle, so as to be available for the rearward half of the loop. Whenever the lower end of the spring-rod g^{11} touches the fabric, the whole tension 90 device $g^{11} g^{13}$ will yield against the spring g^{17} , thereby permitting the needle to move on downward through the fabric. As soon as the needle clears the fabric on its upward 95 movement the spring g^{17} will throw the tension device $g^{11} g^{13}$ downward until it reaches its normal position in respect to the needle. Throughout all these movements of the needle and the tension device $g^{11} g^{13}$ in respect to 100 each other the tongue g^{12} yieldingly presses the yarn against the needle, for the purposes and with the results above noted. From the foregoing statement it is obvious that the described devices for controlling the feed of 105 the yarn positively insure the proper supply at the proper times and under the required tension.

Having regard to the connections for imparting the reciprocating motions to the arms 110 c^3 , which carry the needle and the loop-holder, it will be seen that a large leverage is afforded, thereby rendering the machine easy to operate, and that the connections are so applied that there is no tendency to oscillate or tilt 115 the machine under the hand action required to operate the turving mechanism. The machine is steadied and guided with one hand, while the turving mechanism is driven with the other. The rod b^5 guides the reciprocating handpiece f^7 . The points at which the transfer-lever f^4 is connected to the hand- 120 piece-arm f^6 and the oscillating disk or lever f' , respectively, are on opposite sides of the center of the said disk f' and move in opposite directions. Hence their motions compensate to a considerable extent, thereby permitting a substantially straight-line motion to the reciprocating handpiece f^7 . The 125 travel of the transfer-lever f^4 with the oscillating disk f' is compensated for by the link f^5 . These connections might be varied in de- 130

tail while securing the same results. The arrangement shown, however, is very satisfactory, and the use of the transfer-lever f^4 or equivalent thereof is necessary in order to afford a large leverage, and thereby render the machine easy to operate. The gripping-piece f^7 should have a loose fit on the rod b^5 and may be provided with a little extra clearance at the lower end of the opening therein to prevent binding.

Returning to the adjustments of the parts of the machine, it will be noted that both the needle and the loop-holder are adjustably secured to their respective carrying-arms, so that they may be projected downward therefrom to a greater or less extent. The distance which the eye of the needle is projected below the presser-foot portion of its clamp c^2 will determine the depth of the stitch, or, in other words, the depth of the turfed body.

By loosening the screw g^{16} the cap g^{15} may be turned so as to give the proper tension on the arm g^{13} and to bring said arm g^{13} into the proper relation to the eye of the needle for each adjustment thereof.

As already stated, the throw or vertical movement of the carrying-arms may be varied by adjusting the guide-rod b^5 so as to bring the upper end or stop portion thereof a greater or less distance above the support. The throw which these carrying-arms should be given is determined by the distance which the eye of the needle is projected below the presser-foot portion of its clamp and should be sufficient to withdraw the needle clear of and above the fabric on the upstroke of the needle-carrying arm without any unnecessary vertical movement or lost motion. The limit of the downward throw of the carrying-arms c^3 is determined by the positions which the said parts occupy when their connecting-links f are thrown to a dead-center with the center of the oscillating lever f^1 . A slight variation in the movement of the said links f in the vicinity of their dead-centers will neither materially raise nor lower the said carrying-arms. Hence it follows that the said carrying-arms will always be thrown substantially to the same extreme downward positions and that their upward strokes alone will be varied by the adjustment of the guide-rod b^5 , as above described. Obviously this action is just what is desired.

From the foregoing specification of the parts and the detailed description of the operation hereinbefore given it must be obvious that the machine herein disclosed is reliable and efficient in its action and easy to operate.

It will be understood, of course, that minor changes in the construction might be made without departing from the spirit of the invention.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with the support and

the reversely-reciprocating needle and loop-holder arms, of the oscillating disk or lever having connections to said arms, for reciprocating the same, in reverse order, a guide-rod rising from said support, a hand-grip mounted for straight-line reciprocating movements on said guide-rod, and an intermediate transfer-lever pivoted, at its intermediate portion, to said disk or lever, having one end pivoted to a part of said hand-grip and its other end connected to the fixed frame, by means of a joint which will permit a limited longitudinal movement of said transfer-lever, substantially as described.

2. The combination with the frame $b b'$ having the guide-rod b^5 , of the needle and loop-holder arms c^3 , mounted as described, the oscillating disk f^1 , the links f connecting said disk to said arms, the transfer-lever f^4 pivotally connected to said disk, the fulcrum-link f^5 and the hand-grip f^7 mounted on said rod, and having an arm f^6 connected to the upper arm of said transfer-lever, substantially as described.

3. The combination with the reversely-reciprocating needle and loop-holder carrying arms, having a step-by-step advancing movement, with respect to each other, of a spring tension device carried by said needle-arm, involving a pivoted spring-held arm provided, at its free end, with a tension foot or piece operating to yieldingly clamp the yarn to the needle, substantially as and for the purposes set forth.

4. The combination with the reversely-reciprocating needle and loop-holder carrying arms, having a step-by-step advancing movement with respect to each other, and having respectively, a needle and a loop-holder, adjustably secured thereto, of a spring tension device, operating to yieldingly hold the yarn to the needle, and adjustably secured on said needle-arm, to compensate for the adjustment of the needle, substantially as described.

5. The combination with the reversely-reciprocating needle and loop-holder carrying arms, having a step-by-step movement, with respect to each other, of a spring tension device carried by said needle-arm, involving the pivoted arm g^{13} subject to the spring g^{17} , and the tension-foot g^{11} bent at its lower end g^{12} to form a guide for the turfing-yarn and to press the same against the needle, substantially as described.

6. The combination with the reversely-reciprocating needle and loop-holder carrying arms, having a step-by-step advancing movement with respect to each other, of a spring tension device carried by said needle-arm, involving the adjustable cap, the pivoted arm g^{13} pivoted in said cap and subject to the spring g^{17} , and the tension-foot g^{11} , bent at its lower end g^{12} to form a guide for the turfing-yarn and to press the same against the needle, substantially as described.

7. The combination with a support and the
needle and loop-holder arms mounted as de-
scribed, of the oscillating disk or lever, with
connections to said arms for reversely recip-
5 rocating the same, and a slack-adjuster car-
ried by said disk, involving the slack-lever
 g^5 pivoted on the center of said disk, having
the slot-and-pin engagement g^7 therewith, pro-
vided at its free end with a guide-eye and

subject to the action of the spring g^6 , sub- 10
stantially as described.

In testimony whereof I affix my signature
in presence of two witnesses.

MURDICK CAMERON.

Witnesses:

WARREN N. DRAPER,
FRANK HICKS.