(No Model.) 3 Sheets—Sheet 1.

M. GARDNER.

CORD LOOPING ATTACHMENT FOR SEWING MACHINES.

No. 413,853. Patented Oct. 29, 1889.

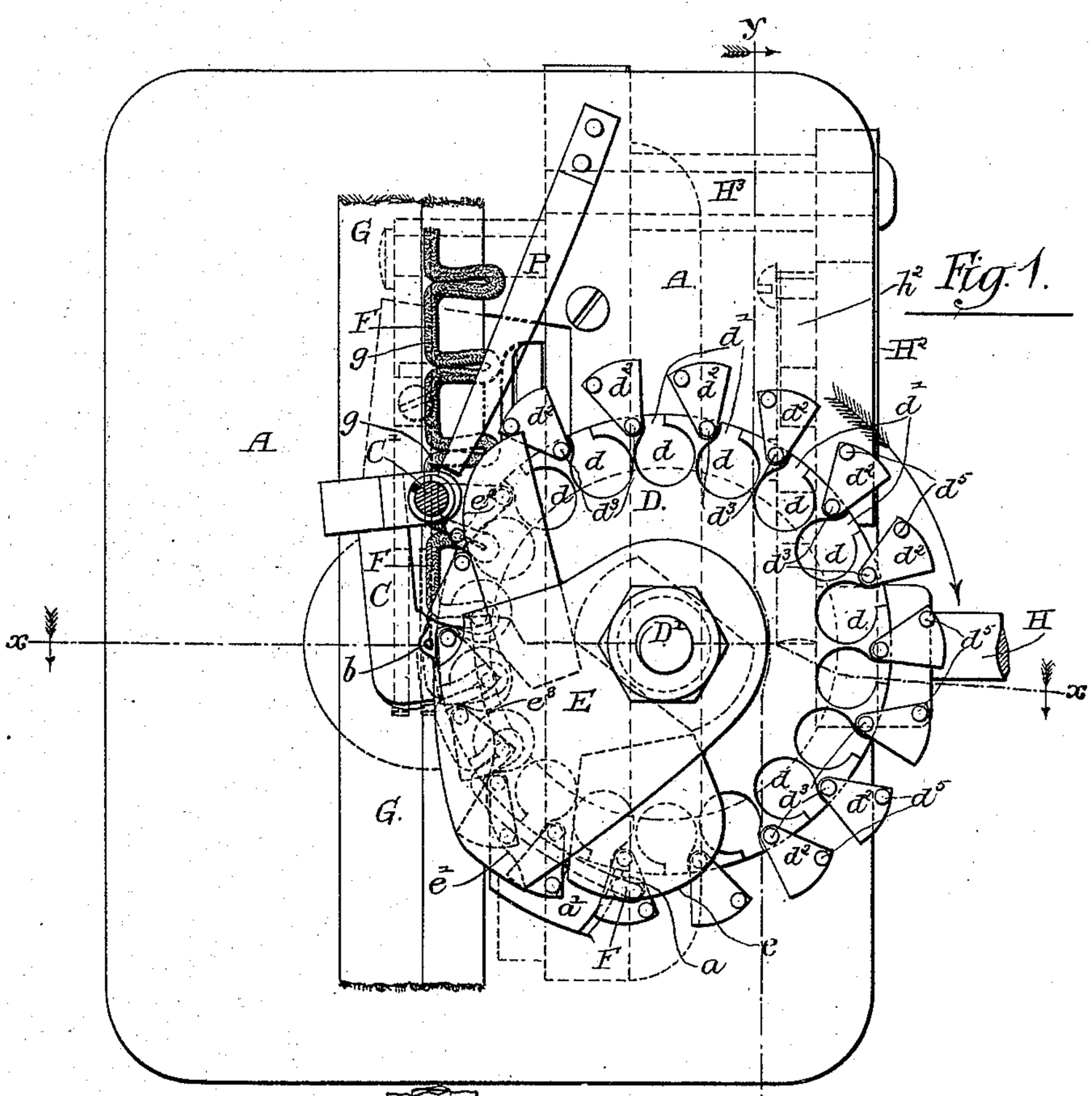

Fig. 1.

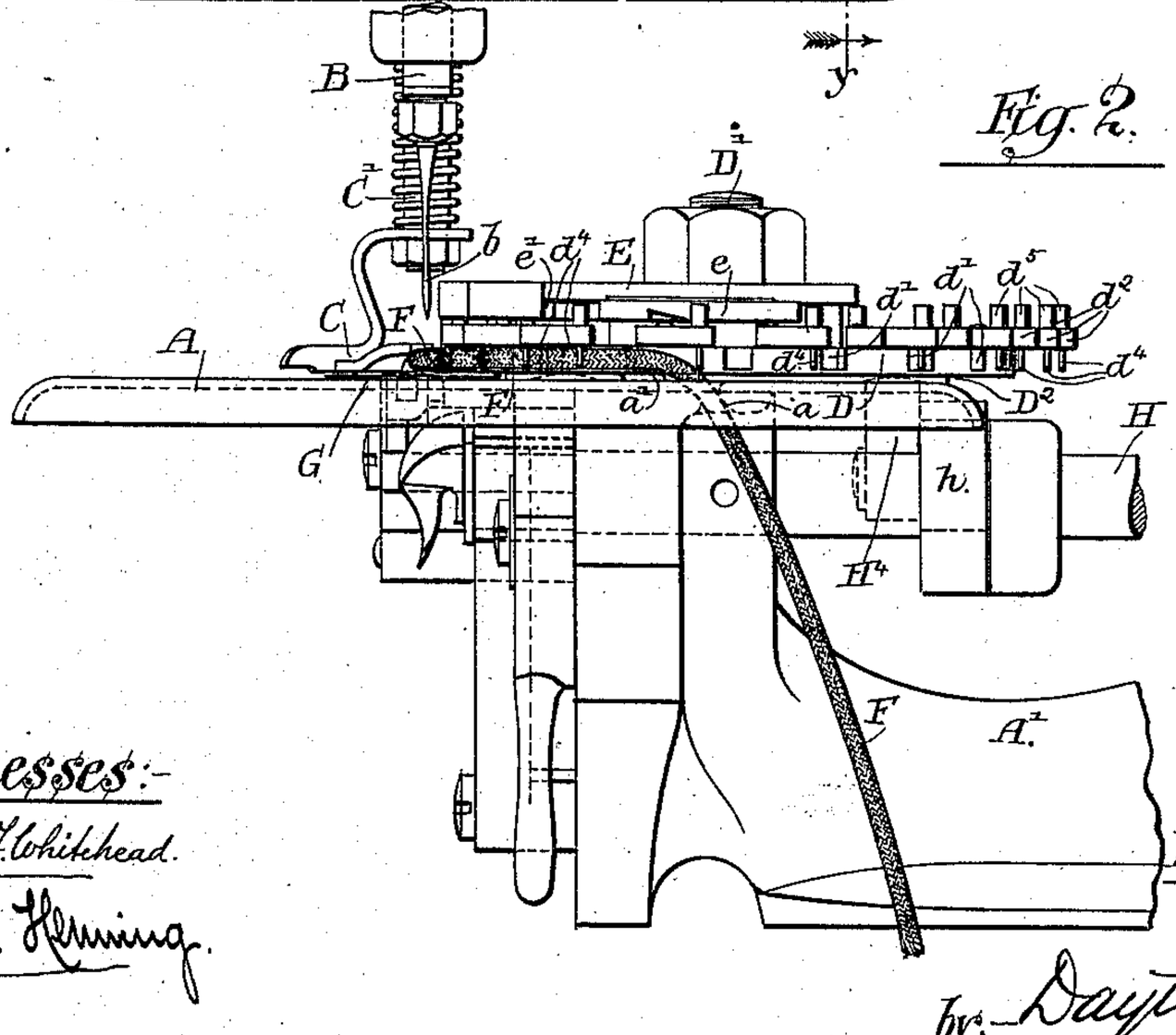

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

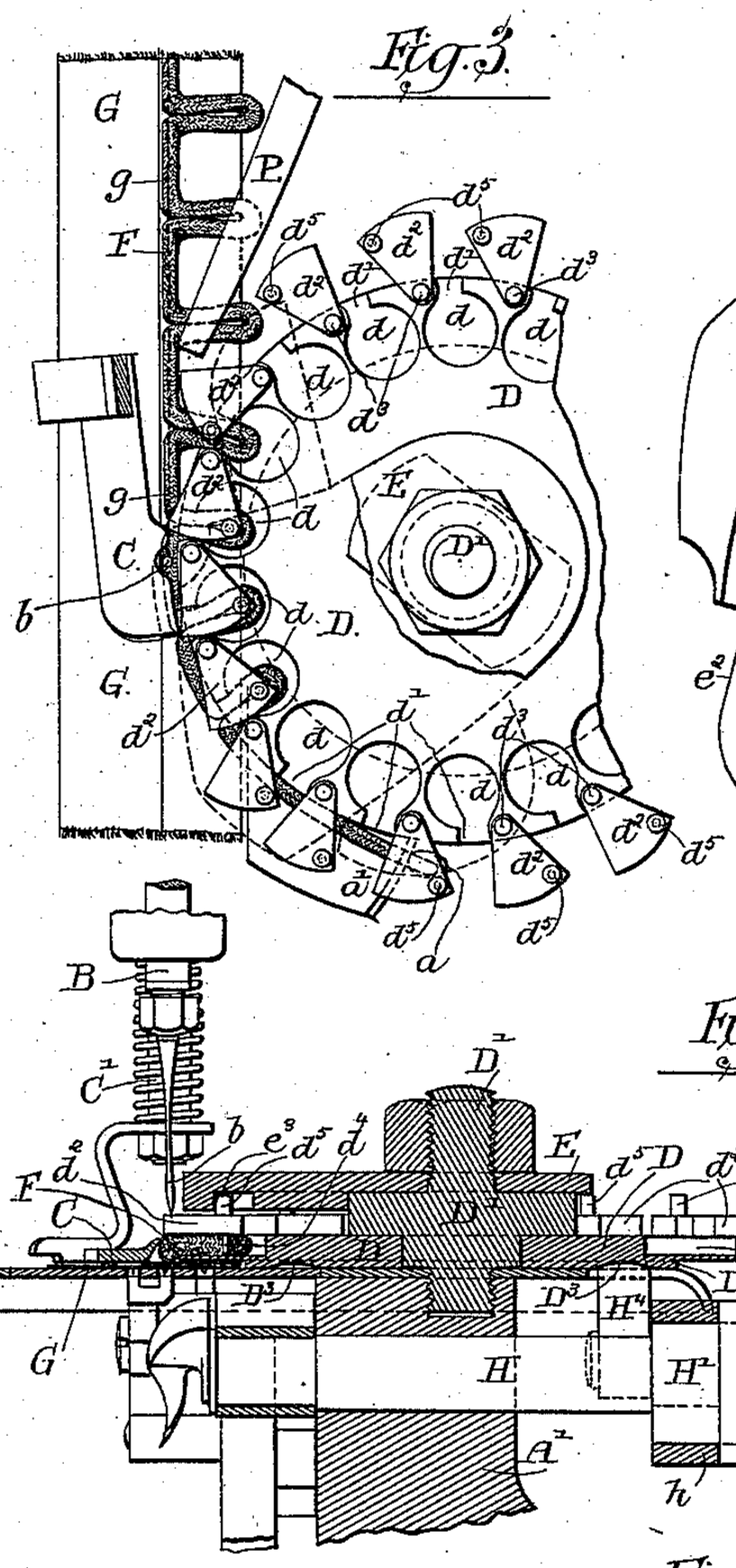


Fig. 4.

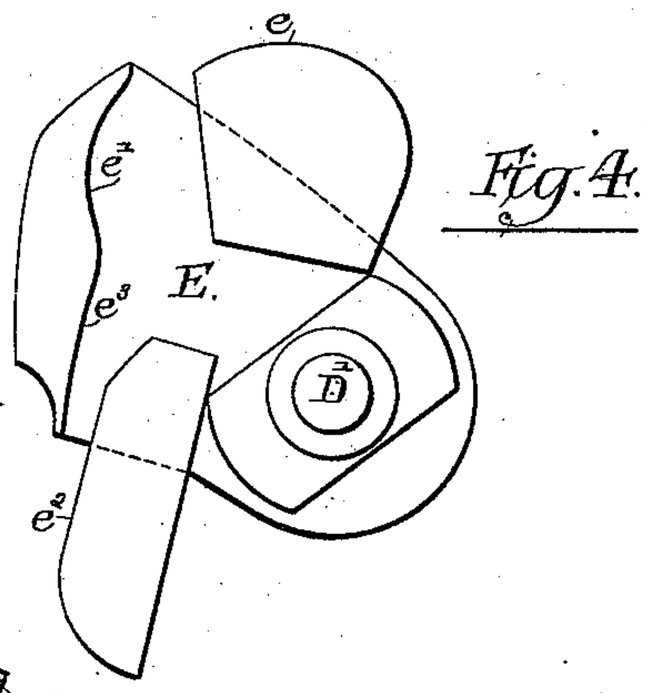


Fig. 5.

Fig. 6.

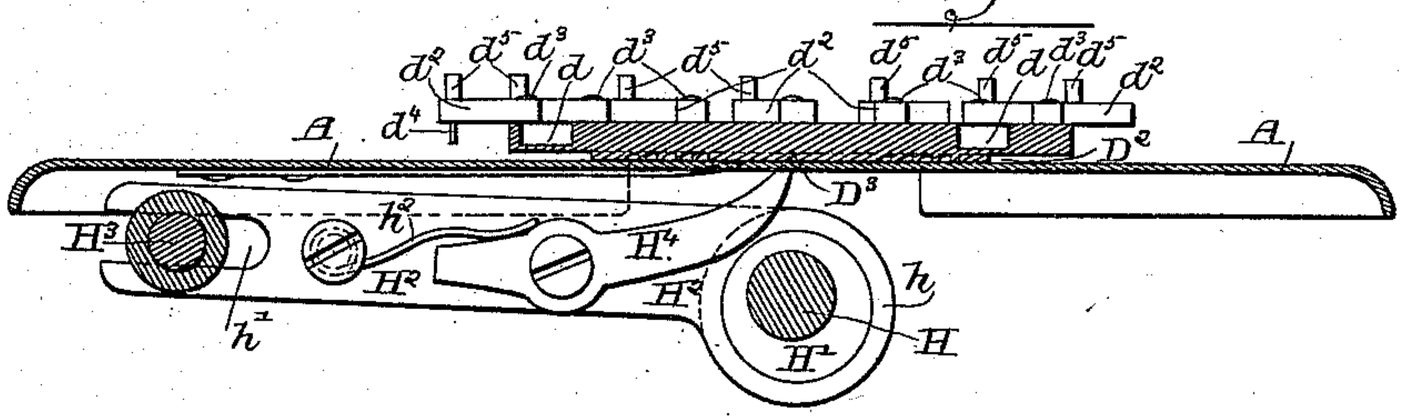
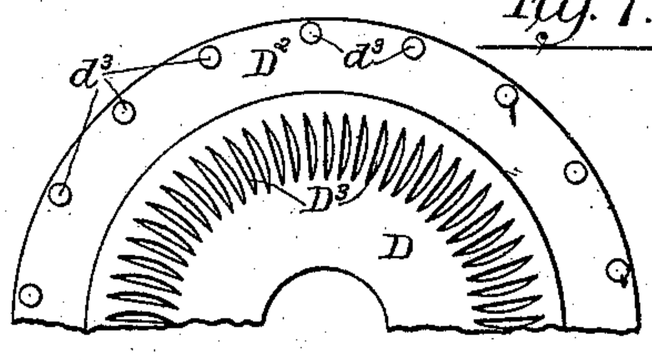


Fig. 7.



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(No Model.) 3 Sheets—Sheet 3.

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CORD LOOPING ATTACHMENT FOR SEWING MACHINES.

No. 413,853. Patented Oct. 29, 1889.

Fig. 8.

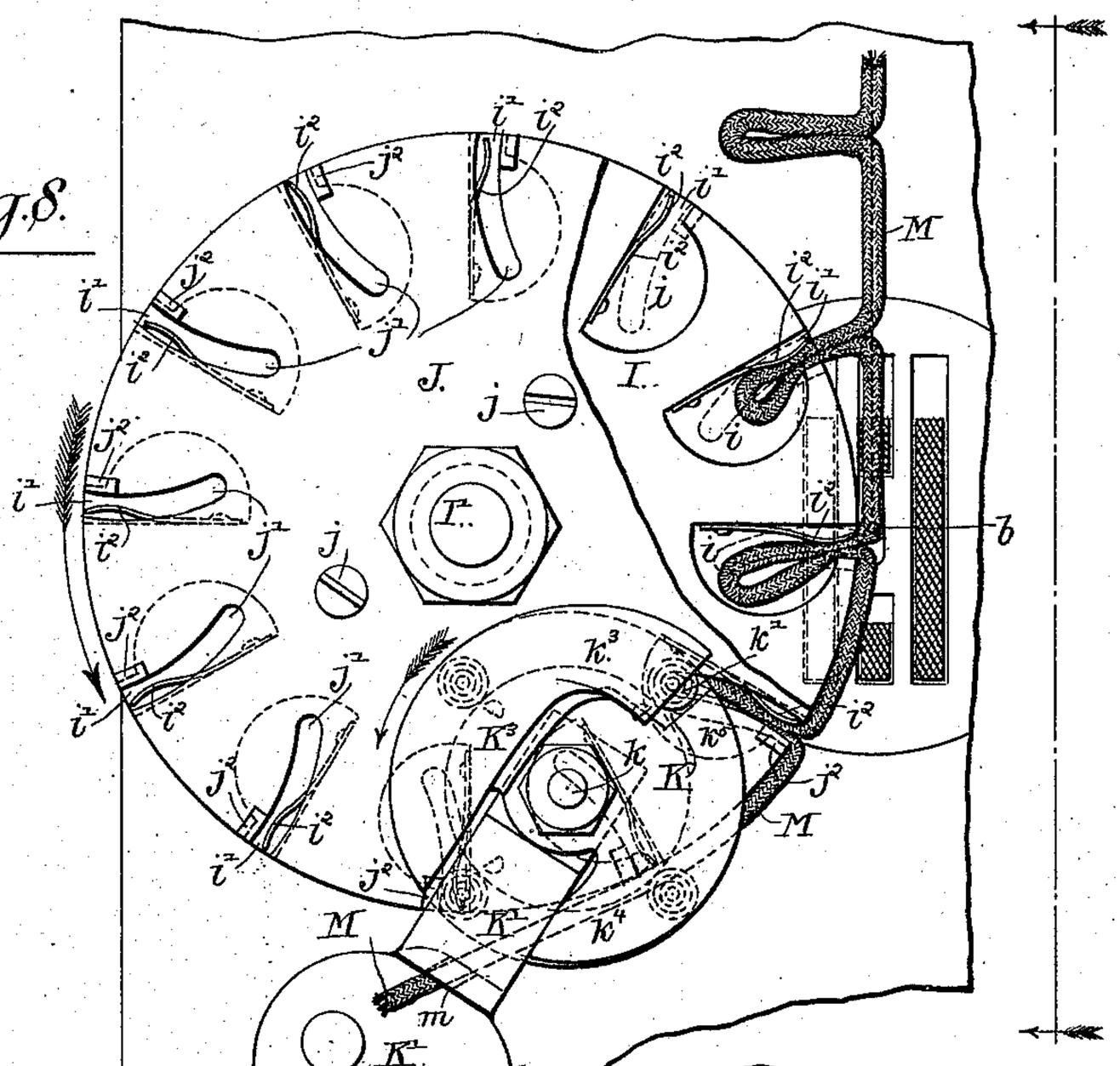


Fig. 10.

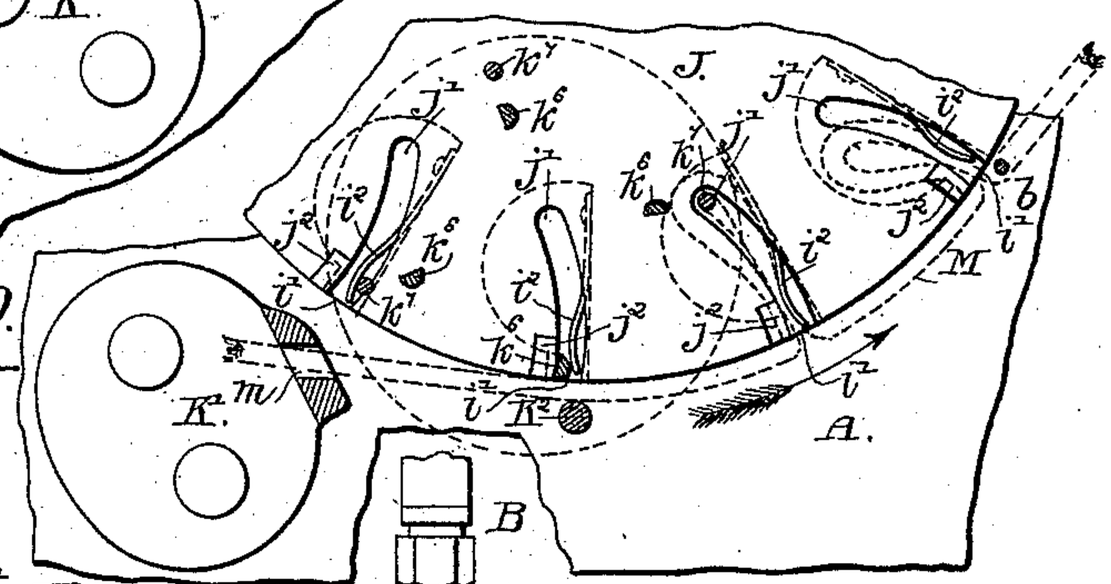
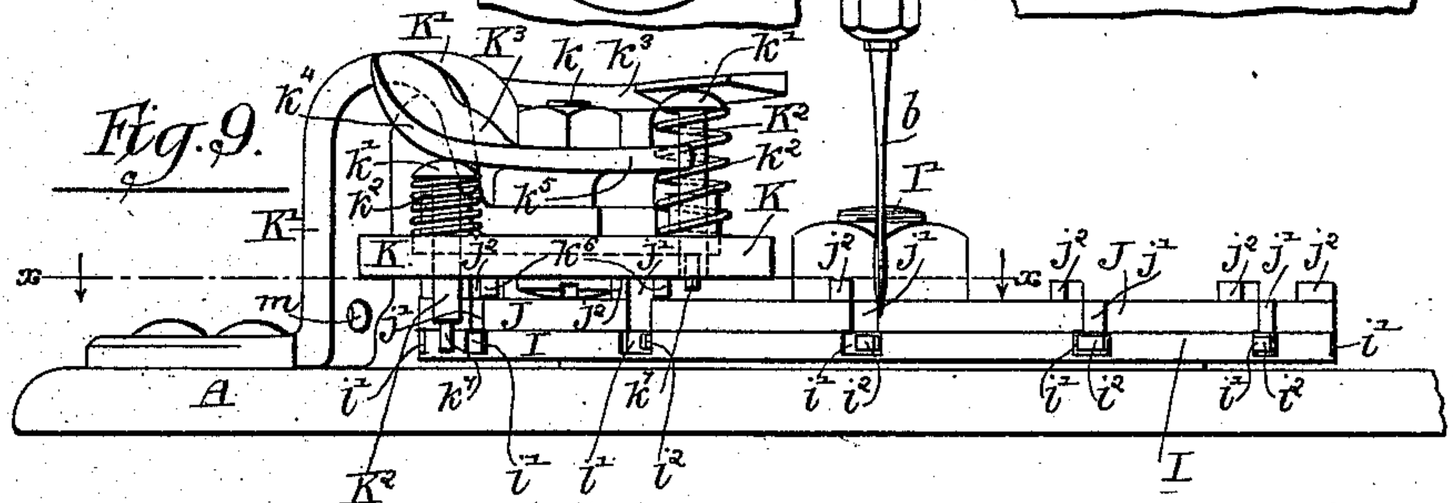


Fig. 9.



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UNITED STATES PATENT OFFICE.

MARSHALL GARDNER, OF AURORA, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO JAMES STONE AND ALICE M. BALL, OF SAME PLACE, AND ELIZABETH FLORSHEIM, OF CHICAGO, ILLINOIS.

CORD-LOOPING ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 413,853, dated October 29, 1889.

Application filed December 1, 1887. Serial No. 256,595. (No model.)

To all whom it may concern:

Be it known that I, MARSHALL GARDNER, of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Cord-Looping Attachments for Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel sewing-machine attachment for use in making a looped cord—such, for instance, as is used in the manufacture of flexible lacing-eyes for corsets and other garments of that kind in which the lacing-eyes are formed by a continuous looped cord or tape secured to the marginal part of the garment.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

A sewing-machine attachment embodying my invention comprises as its principal parts a revolving plate the margin of which is located adjacent to the needle, and which is provided with a series of marginal recesses opening through the edge of the plate, together with means for engaging and holding within the recesses a series of cord-loops, the parts being so arranged that the portions of the cord between the loops will rest against the vertical edge surface of the plate and will be acted upon by the needle as the plate rotates. By the employment of an attachment thus constructed the portions of the cord or tape between the loops may be sewed to a foundation strip of fabric, which may either form one of the cloth layers of the garment or be a separate strip adapted for attachment to or between the cloth layers of the garment; or a line of stitching may be made through those portions of the cord between the loops and across the bases of the loops, so as to hold the cord permanently in loop form without any foundation strip or base, thereby enabling it to be conveniently inserted and secured in the garment.

The manner in which the looped cord or tape made by the attachment herein shown may be applied to a garment is fully set forth in another application for patent made by James Stone, of Aurora, Illinois, and executed upon the 9th day of November, 1887, Serial No. 256,591.

In the accompanying drawings, illustrating my invention, Figure 1 is a plan view of the work-plate of a sewing-machine, showing the needle, presser-foot, and an attachment embodying my invention. Fig. 2 is a side elevation of the parts shown in Fig. 1. Fig. 3 is a plan view of the operative parts of the apparatus, with the superposed cam-plate illustrated in Fig. 1 broken away to show the parts beneath it. Fig. 4 is an elevation of said cam-plate removed from the machine as seen from beneath. Fig. 5 is a vertical section taken upon line $x\ x$ of Fig. 1. Fig. 6 is a transverse vertical section taken upon line $y\ y$ of Fig. 1. Fig. 7 is a view from beneath of part of the revolving plate. Fig. 8 is a plan view of another form of attachment embodying some of the main features of my invention. Fig. 9 is a side elevation of the parts shown in Fig. 8. Fig. 10 is a sectional plan view taken upon line $x\ x$ of Fig. 9.

In the said drawings, A is the work-plate of a sewing-machine; A′, the frame-arm supporting the same; B, the needle-bar; *b*, the needle; C, the presser-foot, and C′ the vertically-movable bar sustaining the same.

In Figs. 1 to 7 D is a circular revolving plate, which is mounted upon a stud D′, affixed in the frame-arm A′, Fig. 5, in such manner as to pivotally sustain the plate D, with its lower surface in contact with the horizontal top surface of the work-plate. The margin of the plate D, in the upper surface thereof, is formed with a series of recesses *d d*, opening by means of radial notches *d′ d′* through the edge surface or vertical face of the said plate. The said plate D is located with its vertical edge surface close to the needle and such distance therefrom that when a cord or tape is laid against the vertical face or edge of the plate and the plate is revolved the cord or tape will pass beneath the needle or will be engaged by the latter, so as to form a line of stitching extending longitudinally through the cord or tape. About the periphery of the

said plate D, upon the upper surface thereof, are pivoted a series of plates or arms d^2 d^2, herein shown as made sectoral in form and mounted at their smaller ends upon pivot-pins d^3 d^3, secured in the upper surface of the plate D near the edge of the latter. At their free or outer ends the several plates d^2 d^2 are provided at their lower surfaces with downwardly-projecting pins d^4 d^4, constructed to pass through the notches d' d' and enter the recesses d d when the plates are swung about their pivots. Said plates d^2 d^2 are further provided at their outer or free ends with upwardly-projecting pins or studs d^5 d^5.

E is a stationary cam-plate located over the plate D and herein shown as rigidly sustained by means of the stud D', upon which the said plate D is pivoted. The working parts or surfaces of the cam-plate E extend from a point adjacent to the needle toward the front of the machine or the side of the latter nearest the operator, and said cam-plate is provided with vertical cam-surfaces e e' e^2 e^3, adapted for engagement with the studs d^5 d^5 of the swinging arms d^2 d^2. The cam-surface e is inclined outwardly and forwardly, (referring to the direction of motion of the plate D as the latter is turned,) and operates to carry or move outwardly the free ends of said arms d^2 d^2, so as to move the pins d^4 d^4 outwardly away or free from the recesses d d. The cam-surface e' is located somewhat in advance of the cam-surface e, (referring to the direction of motion of the plate D,) and is constructed to engage the studs d^5 d^5 in such manner as to move said studs and the free ends of said arms d^2 d^2 inwardly, and to thereby carry the pins d^4 d^4 into the recesses d d. The cam-surface e, by which the arms d^2 d^2 are thrown outwardly, is located at the side of the machine nearest the operator, while the cam-surface e' is located between said plate e and the needle. Said cam-surface e' merges into a concentric surface e^3, which is located opposite or adjacent to the needle, and serves to hold the arms d^2 d^2 at the inward limit of their movement with the pins d^4 d^4 at the inner parts of the recesses d d at the time the said recesses and arms are moving past the needle as the plate D is turned. The cam-surface e^2 of the cam-plate E is located at the rear of the needle, (again referring to the direction of motion of the plate,) and said surface is outwardly and rearwardly inclined, and operates to move or carry the free ends of the arms d^2 d^2 outwardly, and to thereby free the pins d^4 d^4 from the recesses d d.

a is a guide-aperture for the cord or tape to be operated upon, said aperture extending through the work-plate of the machine at a point beneath or adjacent to the cam-surface e and near the vertical edge of the plate D. The presser-foot C is arranged close to the vertical edge or surface of the plate D and is constructed to bear upon or against the upper surface and outer edge of the cord or tape, so as to confine the latter closely against the throat-plate a^2 of the machine, and at the same time to retain it in contact with the said plate D.

The operation of the parts above described is as follows: The cord or tape, as F, Figs. 1, 2, 3, and 4, is led from a spool or reel, or other source of supply upwardly through the guide-aperture a and along the edge of the plate D toward the needle between the said plate and the depending pins d^4 of the arms d^2 d^2. The cord is thus stretched over or across the notches or openings d' d' of the recesses d d. The cord being in the position described, as the plate D is turned, carrying with it the swinging arms d^2 d^2, said arms are, when the studs d^5 d^5 encounter the cam-surface e', swung inwardly thereby, so as to carry the pins d^4 d^4 into the recesses d d. As the said pins move into the recesses they engage and carry inwardly the parts of the cord opposite them, thereby forming a series of loops, as clearly shown in full and dotted lines in Figs. 1 and 3. The concentric surface e^3 of the cam-plate retains the plates at the inward limit of their movement, and thereby holds the cord in its looped form as the exterior part of the cord bearing against the vertical surface of the plate D is carried past or beneath the presser-foot and needle. In case a foundation-strip G is employed, upon which to attach the looped strip, the parts of the cord between the loops are secured to the said strip G by a line of stitching g, as clearly shown in Figs. 1 and 3. In case a foundation-strip is absent, however, a line of stitching, such as is indicated at g, Figs. 1 and 3, will be formed longitudinally through the cord across the bases of the loops in the manner described, so as to hold the cord in looped form. Such looped cord may be employed for the purpose of making flexible lacing-eyes for corsets or other similar purposes—as, for instance, it may be applied in the manner illustrated in the said application of James Stone.

When the device described is employed for securing the looped cord to the foundation-strip G, the cord will commonly be stitched to the strip some distance from the edge thereof, thereby rendering necessary the passage of the strip beneath the marginal part of the plate D at its part opposite the needle. The work-plate may be suitably recessed for this purpose; but in the particular construction herein shown the work-plate is flat and the plate D is provided at its under surface with a shallow marginal rabbet D^2, by which the margin of the plate is lifted somewhat above the adjacent surface of the work-plate. When such rabbet is present, it becomes necessary to sustain the cord F somewhat above the surface of the work-plate, so as to bring it opposite the openings or notches d' d' and between said notches and the pins d^4 d^4, and for this purpose I have herein shown the work-plate as provided with an elevated part a', reaching from the guide-

opening *a* toward the needle to a point past that at which the cord is carried inwardly by the pins d^4 d^4. The plate D may be turned or rotated to carry the looped cord past the needle by any suitable feeding device operated by the feed mechanism of the sewing-machine or otherwise. The margin of said plate is of course desirably driven at the same speed as is given to the work by the feed-dog of the machine, so that the usual feeding device will operate in connection therewith whether the base or foundation strip is present or not. The particular machine shown is of that class embracing a revolving hook for forming the stitch, located below the work-plate, which hook is driven by a revolving shaft H, and the loop-carrying plate D is actuated by means driven from the said shaft. The particular devices herein shown for this purpose are made as follows: In the under surface of the plate D is formed an annularly-arranged series of ratchet-teeth or notches D^3. Upon the shaft H, at a point beneath that part of the plate D which is opposite the needle, is located an eccentric H′, which engages an eccentric-strap *h*, attached to a horizontally-arranged bar H^2, which is movably engaged at its opposite end with a stud H^3 upon the machine-frame by means of a slot *h′* in the arm through which the stud is inserted. The rotative motion of the eccentric H′ obviously gives to the bar H^2 a combined horizontal and vertical reciprocatory motion. Pivoted upon one side of the said bar H^2 is a pawl H^4, the free end of which extends upwardly through a slot in the work-plate and engages the ratchet-teeth D^3. Said pawl is retained in engagement with the teeth by means of a spring h^2, attached to the bar H^2 and engaging a projection upon the pawl. Said pawl H^4 is caused to engage the ratchet-teeth D^3 in the reciprocatory motion of the bar H^2 in such manner as to continually rotate the plate during the operation of the machine, in an obvious manner.

The particular device shown for giving rotative motion to the plate D is obviously one only of a number that may be employed, and when the said plate is provided with ratchet-teeth upon its under surface, in the manner shown, any one of a great number of devices, which will readily suggest themselves in practice, may be employed to give suitable motion to the pawl engaging the said ratchet-teeth. I do not, therefore, desire to be limited to any particular form of actuating devices for the plate, except in the claims in which the particular actuating devices shown are specifically set forth as parts of novel combinations.

For releasing the cord-loops from the pins d^4 d^4 I have herein shown a spring-arm P as attached to the work-plate, with its free end adjacent to the margin of the plate D, and in such position that it will be lifted by contact with the advance edge of each arm d^2 as the latter are swung outwardly in passing the cam-surface e^2 and will become released from the said arms as the latter pass rearwardly from said plate, so as to drop against the loops between each of the plates d^2 d^2, and thus cast off the loops from the said pins.

In Figs. 8, 9, and 10 of the drawings I have shown a somewhat different form of attachment embodying my invention, which embraces the same novel features of a revolving recessed plate for sustaining a cord while the latter is passing the needle, but in which other means than those before illustrated are employed for drawing the cord into the recesses of the revolving plate in forming the loops. As illustrated in said Figs. 8, 9, and 10, I is a circular plate provided with a series of recesses *i* about its periphery and having notches *i′* extending from said recesses through the outer vertical face of the plate. Within each of the recesses *i* is located a spring i^2, the free end of which is located within the notch *i′*, and which operates to hold within the recess a loop drawn into said recess by the means hereinafter described. The plate I is mounted upon a central stud I′, affixed to the work-plate of the machine. Over the said plate I is mounted a second circular plate J, which is attached to and revolves with the said plate I. The means connecting said plates may consist of screws *j j*, Fig. 8. In the marginal part of said plate J are formed a series of curved slots *j′*, open at their outer ends and extending inwardly toward the center of the plate. One of said slots *j′* is located over each of the recesses *i* of the plate I. Adjacent to and at the rear of each slot *j′* is located a tooth or projection j^2.

K is a revolving plate mounted to rotate upon a vertical pivot *k*, which is supported by a rigid bracket K′ from the work-plate of the machine. The plate K is located at the side of the plates I and J, adjacent to the front of the machine or nearest the operator, and as close to the needle as it can be conveniently placed, while the pivot *k* thereof is located inside of the circumferential line of the said plates I and J, so that the main part of said plate K overhangs the said plates I and J.

Mounted to slide vertically in the plate K, near the edge of the latter, are a series of sliding pins K^2, which are provided with heads *k′*, between which heads and the upper surface of the plate are located spiral springs k^2, tending to thrust and hold the said sliding pins upwardly. Attached to the bracket K′, above the plate K, is a circular cam-plate K^3, the lower surface of which is engaged by the upper ends of the pins K^2 K^2. Said cam-plate K^3 is provided with an upper horizontal part k^3, located adjacent to the center of the revolving plates I and J, with a downwardly-inclined part k^4, which merges into a horizontal part k^5, located at the outer part of the cam-plate. Said part k^5 terminates abruptly beneath the end of the upper part k^3. The adjacent ends of the upper and lower

parts k^3 k^5 of the cam-plate are located in alignment with the inner ends of the slots j' of the plate J. The parts are so arranged that the pins which are beneath the lower part k^5 of the cam-plate will extend at their lower ends below the plate K to a point near the bottoms of the recesses i i. When said pins pass from the said lower part k^5 to the upper part k^3 of the cam-plate, however, the lower ends of the pins are lifted above the upper surface of the said plate J. The plate K is in the operation of the device rotated in the same direction as the plates I and J, as indicated by the arrow in Fig. 8. In the lower surface of the plate K, inside of and radially in alignment with the pins K^2, are affixed downwardly-projecting studs k^6, located in position for engagement with the teeth j^2 of the plate J. The vertically-movable pins K^2 are so located as to pass outside of the periphery of the plate J in the rotation of the plate K, as clearly shown in Fig. 10, while the studs k^6 are so arranged as to engage the projections j^2 at the time the said pins are exterior to the said plate J.

The plate K is rotated in the operation of the machine from the plate J by the engagement of the pins j^6 and teeth j^2, and also by the engagement of the lower ends of the pins K^2 with the slots j'. The plate K is turned by engagement of one of the studs j^6 with one of the teeth j^2 at the time the pin K^2 is exterior to the plate J and in the position shown in Fig. 10. As the plate K is turned by the action of said tooth upon the stud j^6, however, the stud j^6 will gradually slip inwardly along the tooth by reason of the circular path taken by the said studs until, finally, the stud k^6 will pass inwardly and become released from said tooth j^2. The parts are so arranged, however, that before the stud k^6 is disengaged from the tooth the lower end of the pin K^2 will enter the slot j', so that the forward rotary movement of the plate K will be continued by the engagement of said pin K^2 with the slot. After the pin K^2 has entered the slot it will be carried inwardly along the latter as the parts are rotated until it reaches a point at or near the inner end of the slot, when the pin will reach the inner end of the lower part k^5 of the cam-plate K^3, and passing from said lower end of the cam-plate will be thrown upwardly by the spring, so that its lower end will be released from the slot. Before the one pin is released from the slot in the manner described, however, the succeeding stud j^2 will encounter another tooth k^6 of the plate K, so that the rotation of the plate K will be uniform and continuous, while one of the pins K^2 will be always passing or moving inwardly along one of the slots j'. The said pins K^2 are prolonged at their lower ends, so as to extend into the recesses i of the plate I, the said lower ends of the pins K^2 K^2 being desirably reduced in diameter, so as to form small cylindric parts k^7. The said lower ends k^7 of the pins are constructed to engage the cord placed against the vertical edge of the plate I, so as to draw the cord into the recesses i of the said plate I, and thereby form a series of loops in the same manner as before described in connection with the machine illustrated in the other figures of the drawings. As the said lower ends of the pins enter the recesses they act to thrust backwardly the springs i^2, which latter spring forward and forcibly compress and hold the cord within the notches i', so that when the pins K^2 are lifted out of the slots and recesses the loops will be held by the springs while those portions of the cord between the loops are passing the needle. The cord is fed to the machine in such manner as to pass inside of or behind the pins k^7 k^7 at the time the latter are depressed and are exterior to the marginal surface of the plates I and J, and are in the position shown in Fig. 10.

M in the drawings is the said tape or cord which passes through a guide-aperture m, herein shown as formed in the bracket K', and which passes from said guide-aperture into contact with the vertical surface of the plate I. As the said plate I, together with the plate J, is turned the cord is drawn forward over or across the notches i', so that as each pin K^2 is swung or carried inwardly through said notches into the recesses the cord will be drawn inwardly to form the loops.

The means employed in the device shown in Figs. 8, 9, and 10 for turning the plates I and J may be made like those shown in Figs. 1 to 7, or may be otherwise constructed, as desired.

I claim as my invention—

1. The combination, with the work-plate and needle of a sewing-machine, of a loop-forming device embracing a revolving plate having a marginal surface located adjacent to the needle and provided with peripheral recesses and movable pins or equivalent means engaging the cord and acting to draw the same into said recesses and to retain the cord-loops therein during the action of the stitching devices upon the cord, substantially as described.

2. The combination, with the stitch-forming devices of a sewing-machine, of a revolving plate provided with a series of marginal recesses, and means for drawing a cord into said recesses to form a series of loops, comprising swinging arms provided with pins entering the recesses and engaging the cord and a cam actuating said arms in the rotation of the plate, substantially as described.

3. The combination, with the stitch-forming devices of a sewing-machine, of a revolving plate D, provided with recesses d d, opening through the vertical marginal surface of the plate, a series of arms d^2 d^2, provided with pins d^4, entering the recesses, and with studs d^5 d^5, and a stationary cam-plate E, provided with cam-surfaces e e' e^2 e^3, substantially as described.

4. The combination, with the stitch-form-

ing devices of a sewing-machine, a revolving plate D, provided with marginal recesses opening through the vertical marginal surface of the plate, of a series of loop-holding pins movable into and out of said recesses, means for actuating said pins, and a guide for the cord directing the latter against the edge of the plate behind the pins, substantially as described.

5. The combination, with the stitch-forming devices of a sewing-machine and a loop-forming device embracing a circular revolving plate provided with peripheral recesses, and means for drawing a cord into said recesses to form a series of loops, of means for actuating said plate, embracing a ratchet on the plate and a reciprocating pawl actuated from the moving parts of said stitch-forming devices, substantialiy as described.

6. The combination, with the stitch-forming devices of a sewing-machine and a loop-forming device embracing a revolving plate provided with marginal recesses, a series of pins movable into and out of said recesses, swinging arms supporting the pins, and means for actuating said arms, of a spring adapted for engagement with said arms and constructed to act upon the finished strip to release the loops thereof from said pins, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

MARSHALL GARDNER.

Witnesses:
WM. WILSON,
CHARLES H. SCHOFBACH.