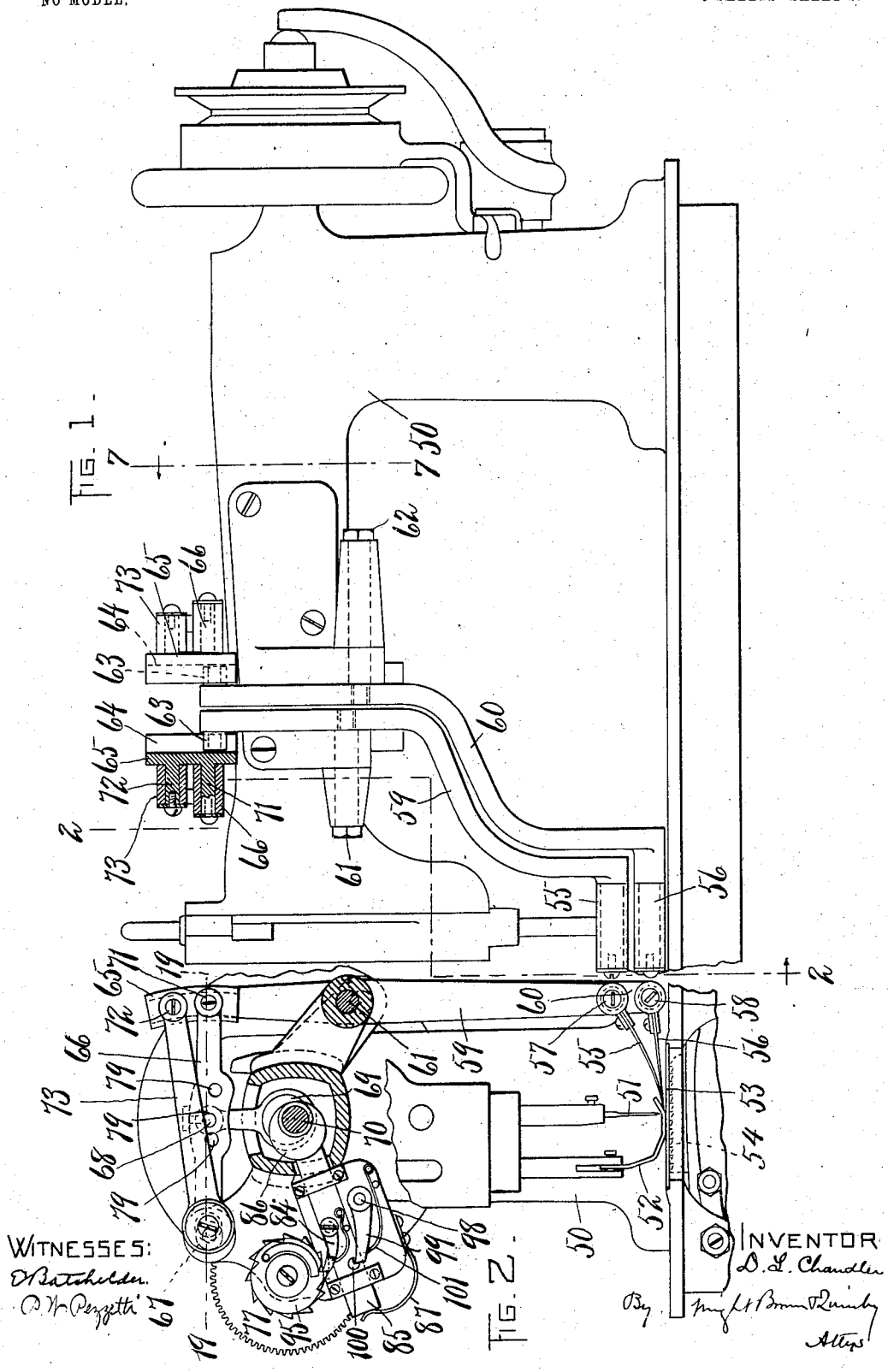
No. 737,077. PATENTED AUG. 25, 1903.

D. L. CHANDLER.

PLAITING MACHINE.

APPLICATION FILED SEPT. 21, 1901.

NO MODEL. 5 SHEETS—SHEET 1.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 5 SHEETS—SHEET 2.

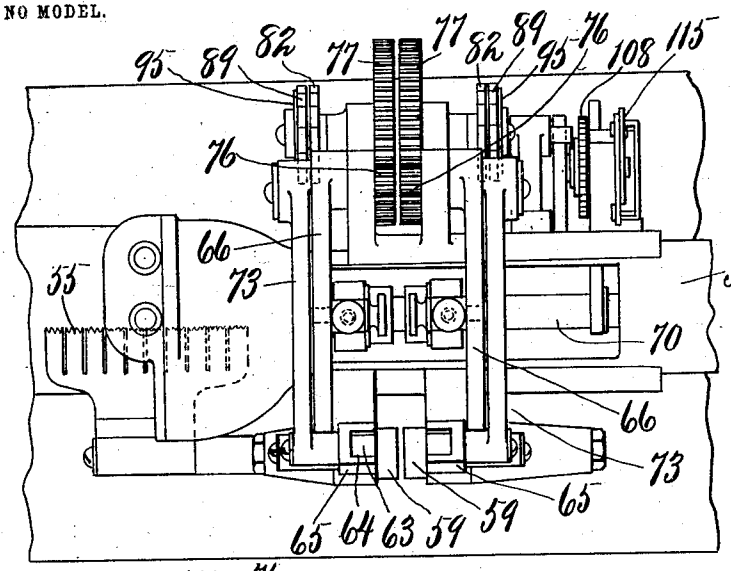


FIG. 3.

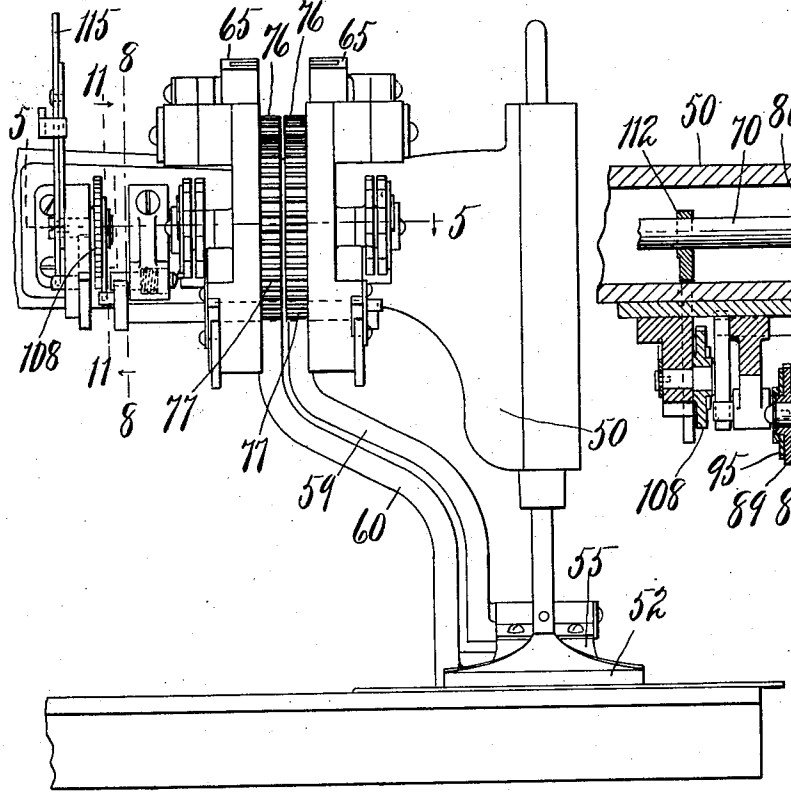


FIG. 4.

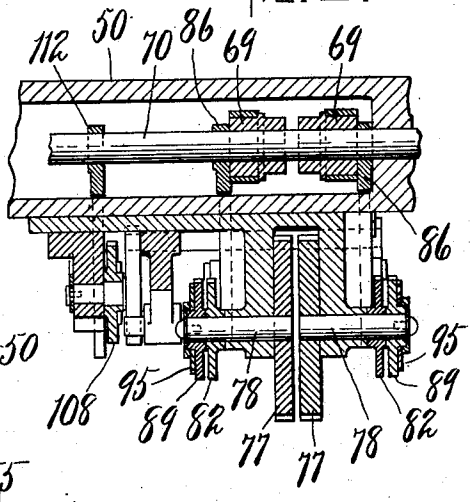


FIG. 5.

WITNESSES:
E. Batchelder
P. W. Pezzetti

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By Wright Brown Quinby & Atty's.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 5 SHEETS—SHEET 3.

FIG. 6.

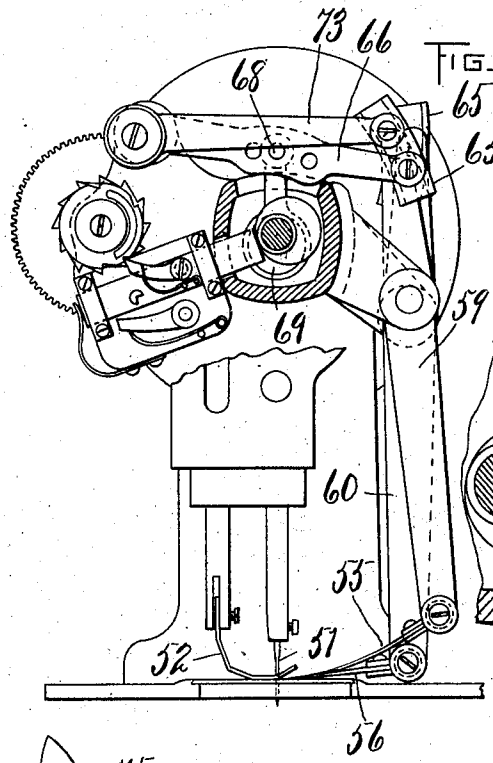


FIG. 7.

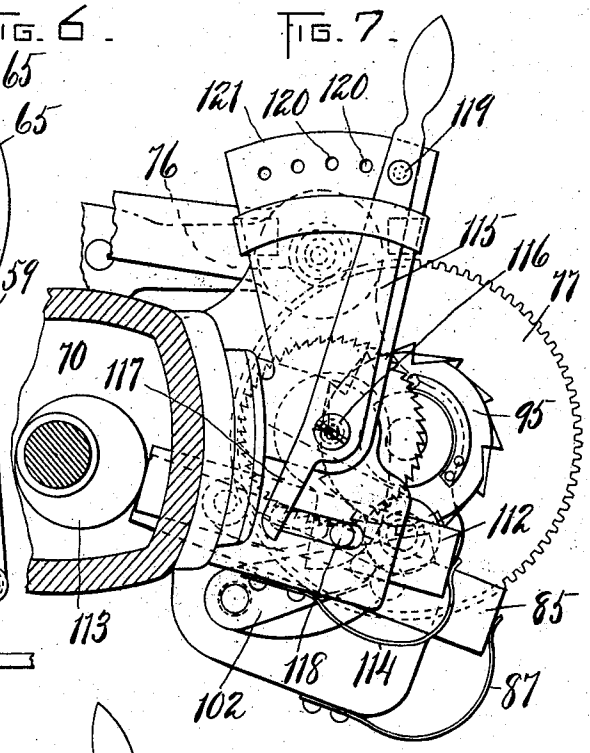


FIG. 8.

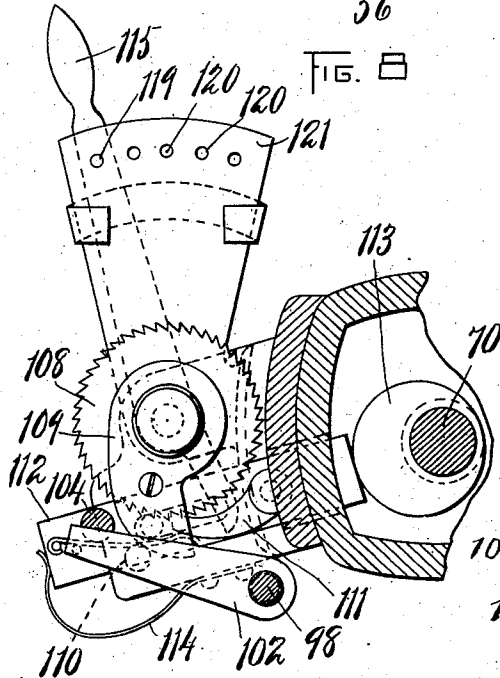
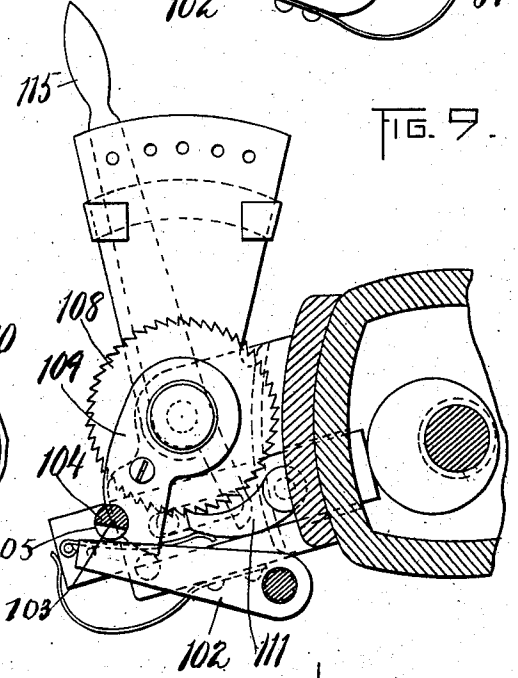


FIG. 9.



WITNESSES:

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NO MODEL. 5 SHEETS—SHEET 4.

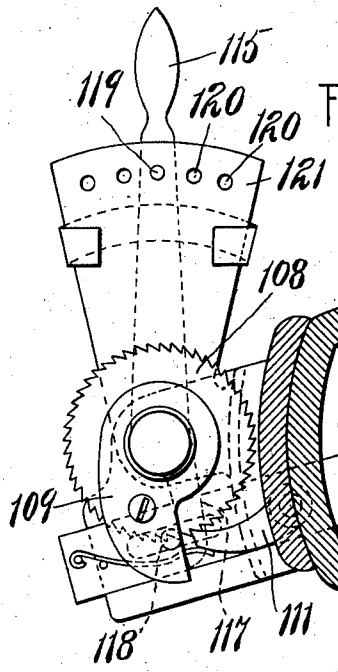


FIG. 10.

FIG. 11.

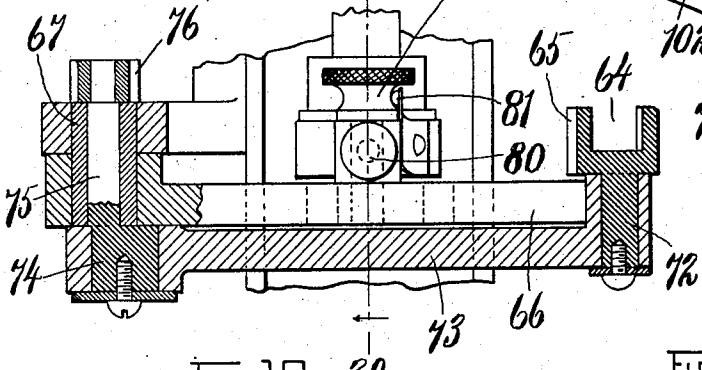


FIG. 19.

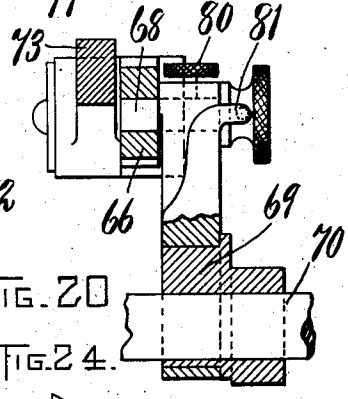


FIG. 20

FIG. 21.

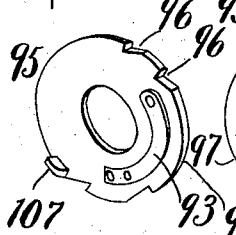


FIG. 22.

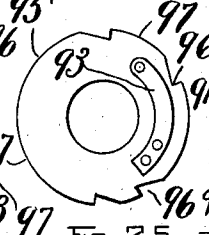


FIG. 23.

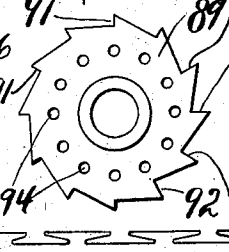


FIG. 24.

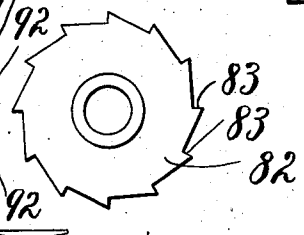


FIG. 25.

FIG. 26.

FIG. 27.

FIG. 28.

FIG. 29.

WITNESSES:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 737,077. PATENTED AUG. 25, 1903.

D. L. CHANDLER.

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APPLICATION FILED SEPT. 21, 1901.

NO MODEL. 5 SHEETS—SHEET 5.

FIG. 12.

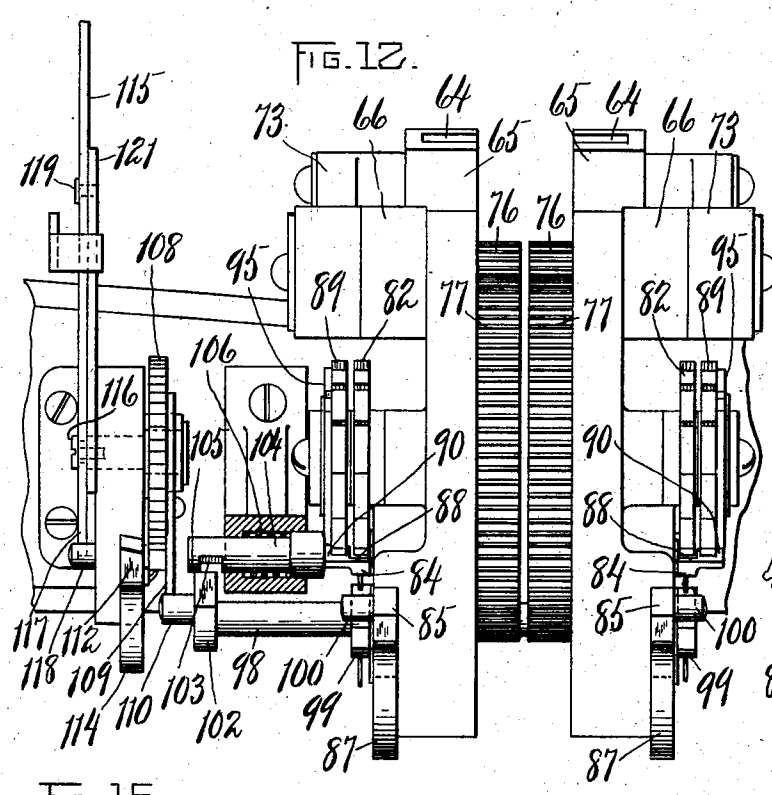


FIG. 18.

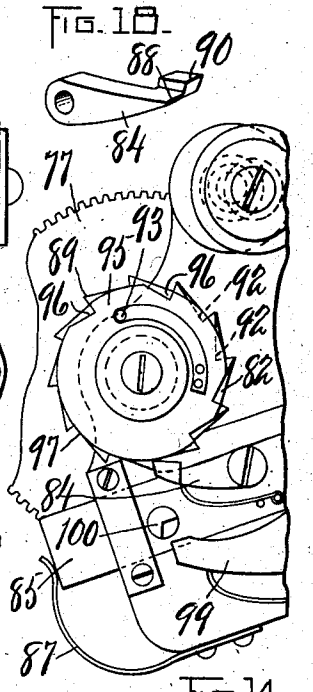
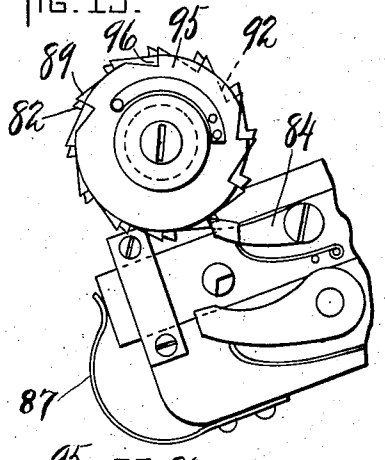


FIG. 14.

FIG. 15.



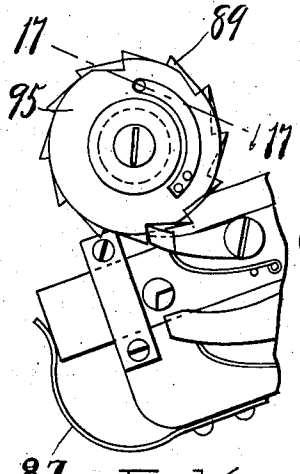


FIG. 16.

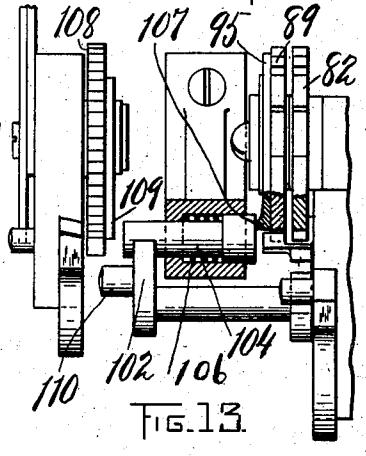


FIG. 13.

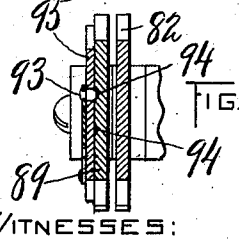


FIG. 17.

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INVENTOR:
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By Wright Brown & Quinby
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THE NORRIS PETERS CO., PHOTO-LITHO. WASHINGTON, D. C.

No. 737,077. Patented August 25, 1903.

UNITED STATES PATENT OFFICE.

DANIEL L. CHANDLER, OF AYER, MASSACHUSETTS, ASSIGNOR TO GEORGE J. BURNS, OF AYER, MASSACHUSETTS.

PLAITING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 737,077, dated August 25, 1903.

Application filed September 21, 1901. Serial No. 76,058. (No model.)

To all whom it may concern:

Be it known that I, DANIEL L. CHANDLER, of Ayer, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Plaiting-Machines, of which the following is a specification.

This invention relates to machines for plaiting fabric; and its principal object is to so improve this class of machinery as to provide for making different styles of plaiting on the same machine by merely rearranging the controlling devices of the machine, the variation in style consisting in altering either the number of plaits in each group or the spacing of the groups, or both.

Of the accompanying drawings, Figure 1 represents a front elevation of a sewing-machine plaiter constructed in accordance with my invention. Fig. 2 represents a section on the line 2 2 of Fig. 1. Fig. 3 represents a partial plan view. Fig. 4 represents a partial rear elevation. Fig. 5 represents a section on the line 5 5 of Fig. 4. Fig. 6 represents a view similar to Fig. 2, showing the parts in another position. Fig. 7 represents a section on the line 7 7 of Fig. 1. Fig. 8 represents a section on the line 8 8 of Fig. 4. Fig. 9 represents a similar view with the parts differently positioned. Fig. 10 represents a view of parts shown in Fig. 8, but differently timed. Fig. 11 represents a section on the line 11 11 of Fig. 4. Fig. 12 represents an enlarged rear elevation, partly in section. Fig. 13 represents a view of parts shown in Fig. 12 differently positioned. Figs. 14, 15, and 16 represent face views of the ratchet mechanism in different positions. Fig. 17 represents a section on the line 17 17 of Fig. 16. Fig. 18 represents a detail perspective view of the ratchet feed-pawl. Fig. 19 represents a section on the line 19 19 of Fig. 2. Fig. 20 represents a section on the line 20 20 of Fig. 19. Fig. 21 represents a detail perspective view of the notched disk on the left-hand side of the machine as viewed in Fig. 12. Figs. 22, 23, and 24 represent detail face views of the notched or ratchet disks. Figs. 25 to 29 represent different styles of work which the machine is capable of producing.

The same reference characters indicate the same parts in all the figures.

In the drawings, 50 represents the arm of a sewing-machine, having the usual stitching mechanism, comprising needle 51 and presser-foot 52, which coöperates with a work-plate 53 and a feeder 54.

55 56 represent the upper and lower plaiter-blades, between which the fabric to be plaited and stitched is fed, said plaiters being adapted to be operated alternately to make "knife" or "side" plaits in the fabric, slanting in opposite directions. As the plaits are formed they are pressed between the presser-foot and work-plate and fed along by the feeder of the sewing-machine, the stitching mechanism and plaiters being so related in operation that each plait has a stitch passing over its edge, whereby the subsequent unraveling or pulling out of any of the plaits is prevented. The plaiters 55 56 are pivoted on studs 57 58 on the lower ends of two vertical plaiter-operating levers 59 60, pivoted at 61 62 to brackets on the sewing-machine arm. The upper ends of the plaiter-levers carry roller-studs 63 63, which operate in grooves 64 64, formed in a pair of segmental links or guides 65 65, which I term "cams." The two cams and their operating mechanisms are duplicates of each other, and a description of one will answer for both. Each cam is continuously reciprocated by means of an oscillating lever 66, fulcrumed on a stud 67 and pivotally connected by a wrist-stud 68 to the strap of an eccentric 69 on the main shaft 70 of the machine. The outer end of the lever 66 is pivoted to a stud 71 near the lower end of the cam 65. The upper end of said cam is provided with a stud 72, to which is pivoted the outer end of an arm or link 73, having its inner end attached to a wrist-stud 74 (see Fig. 19) on the end of a shaft 75, which passes through an axial hole in the stud 67. The opposite end of the shaft 75 carries a pinion 76, meshing with a gear 77, mounted on a shaft 78, (see Fig. 5,) the rotation of which revolves the short crank formed by the wrist-stud 74. The wrist-stud 74 has two positions of rest one hundred and eighty degrees apart, into which it is moved by the intermittent rotation of the gear 77 and which have the effect of positioning the cam 65 either concentric to the stud 67, as shown

in Fig. 2, or eccentric thereto, as shown in Fig. 6. The groove 64 of the cam being curved on a radius from the center of stud 67 to the center of stud 71, it is obvious that in the concentric position of the cam its vertical reciprocation will have no effect in oscillating the plaiter-lever 59 or 60; but in the eccentric position of the cam the sides of its groove will exert a cam action on the stud 63 and cause the latter to oscillate transversely to the path of the cam, thereby reciprocating the plaiter 55 or 56 and forming plaits in the fabric. The normal position of the plaiter-blade when the cam is in concentric position is with its operating edge slightly back of the needle. In forming a plait the link or arm 73 starts to retract as the lever 66 is about half-way on a downward stroke and becomes fully retracted by the time the bottom of the stroke is reached. This causes the plaiter to retreat and gather up the fabric for a fold. The link 73 remains in its retracted position while the cam makes a complete upward stroke and part of a downward stroke, whereby the plaiter is advanced underneath the presser-foot and is again retracted to normal position, completing one plait. If another plait is to follow, the cam still remains in eccentric position during a cycle similar to the foregoing. If no further plait is to be made, the link 73 starts to advance as the cam begins its downward stroke and the cam is brought into concentric position near the middle of said stroke. A series of holes 79 79 are formed in the lever 66 at different distances from its fulcrum, and the wrist-stud 68, which is removably held in the eccentric-strap by a set-screw 80 and spring-catch 81, (see Figs. 19 and 20,) is adapted to be placed in any one of these holes to vary the throw of the cam 65, and thereby vary the length of the plait.

Provision is made for automatically repeating the cycles of the plaiter-operating mechanism and for adjusting this mechanism to make a greater or less number of plaits in a group in a manner which I shall now describe. The machine as herein arranged is adapted to make what is known as "rose-plaiting" or "ruching" in a narrow fabric, the right and left handed plaits being alternated in equal numbers and a single line of stitching placed down the middle of the fabric. The machine is arranged to make one, two, or three plaits in a group; but its capacity may be increased by merely increasing the number of units in the plaiter-controlling devices. Fast to the shaft 78 of the gear 77 is the notched wheel or ratchet 82, which I term the "position-wheel," inasmuch as its movement determines the position of the cam 65. This wheel is provided with a series of notches 83 83 of equal depth and is rotated by means of a compound feed-pawl 84, mounted on a slide 85, continuously reciprocated by an eccentric 86 on the shaft 70 and returned by the action of a spring 87. The pawl 84 has a portion 88 on its end which engages the teeth 83 of the position-wheel 82 and rotates said wheel. The pawl is not allowed to engage the wheel 82 at every stroke, but is controlled by a notched wheel 89, which I term the "selecting-wheel," mounted loosely on the shaft 78 alongside of the wheel 82. The pawl 84 has a portion 90, engaging the notches of wheel 89, and the latter is provided with a series of shallow notches 91 91 and a series of four deep notches 92 92 in succession. The pawl 84 remains in engagement with the selecting-wheel 89 and rotates it one-tooth distance at every stroke. When the portion 90 of the pawl is in the shallow notches 91 of the wheel 89, the portion 88 of said pawl is not permitted to engage the teeth of wheel 82; but when the portion 90 enters a deep notch 92 the portion 88 engages the wheel 82 and rotates it one-tooth distance. The effect of rotating the wheel 82 the distance of one tooth is to revolve the wrist 74 through an angle of one hundred and eighty degrees from one of its positions of rest to the other. It requires two deep notches 92 of the wheel 89 to make one plait in the fabric, and provision is made for uncovering only two of the deep notches at a time. The engagement of the pawl 84 with the first deep notch retracts the link 73 and moves the cam 65 into eccentric position. The entrance of the pawl into the succeeding deep notch brings the cam back into concentric position. Loosely mounted on the shaft 78 and frictionally engaged with the selecting-wheel 89 by a slip connection comprising a spring-stud 93, engaging notches 94 94 in the face of the wheel 89, as seen in Fig. 17, is a third notched wheel 95, which I term the "filler-wheel," whose periphery is provided with notches 96 96 and intervening concentric portions 97 97. The notches 96 are so arranged that by rotating the wheel 95 manually with respect to the wheel 89 the deep notches 92 will be exposed in pairs in different orders. If the first two deep notches immediately succeeding each other are exposed, the plaiter controlled by this group of wheels will make one plait. If the first and third deep notches are exposed, one stroke or cycle of the machine will intervene between the setting of the cam 65 in eccentric position and its return to concentric position, and the said plaiter will therefore make two plaits. If the first and fourth deep notches are uncovered, two strokes will intervene and three plaits will be made. The concentric portions of the filler-wheel 95 are of less diameter than the selecting-wheel, so that a sufficient portion of all of the teeth of the wheel 89 is exposed to cause the pawl 84 to engage each tooth and step the wheels 89 and 95 ahead at each stroke. The distance on the fabric intervening between the plaits made by one plaiter and those made by the other plaiter is regulated by shifting the relative rotary positions of the selecting-wheels 89 corresponding to the two plaiters.

I further make provision for stopping the

action of the plaiter-operating mechanisms for periods of greater or less length, during which the sewing-machine feed mechanism continues to operate and plain or unplaited fabric is fed and stitched, and for automatically starting said plaiter-operating mechanisms in operation again at the ends of said periods. This mechanism may be termed a "timing" device and is herein constructed as follows:

98 is a stationarily-journaled shaft carrying two dogs 99 99, which are adapted to be oscillated by the partial rotation of the shaft into and out of the paths of two notched studs 100 100, carried by the slides 85. Springs 101 yieldingly press the dogs 99 into the paths of the studs 100. The opposite end of the shaft 98 carries an arm 102, which is adapted to enter a notch 103, formed in a bolt 104, or to rest on a cylindrical portion 105 of said bolt adjacent to the notch, according to the longitudinal position of the bolt. The bolt is projected by a spring 106 to the right, as viewed in Figs. 12 and 13, and is retracted in the opposite direction once in every rotation of the selecting-wheels 89 by a cam projection 107, Figs. 13 and 21, on the left-hand filler-wheel 95. When the bolt is thus retracted, as shown by the position of parts in Figs. 2, 7, 8, and 13, the arm 102 will enter notch 103 if it is permitted to do so by the timing-wheel and cam, presently described, and will cause the dogs 99 to lock the slides 85 in their outward positions and prevent the further reciprocation of the feed-pawls 84 until the arm 102 is moved out of the notch.

108 is a timing ratchet-wheel carrying a timing-cam 109, which engages a stud 110 on the arm 102 once in every revolution of the ratchet 108 and tends to move the locking-dogs 99 out of locking position. To rotate the ratchet 108, there is provided a timing-pawl 111, mounted on a slide 112, which is reciprocated outwardly by an eccentric 113 on the shaft 70 and returned by a spring 114.

115 is a controlling-lever pivoted upon a stud 116 and having a heel 117 adapted to engage a pin 118 on the slide 112 and limit the length of the return stroke of said slide. The lever is moved manually into a number of different positions, in which it is fixed by a pin 119, adapted to enter apertures 120 in a segment-plate 121. The timing-ratchet 108 has four times the number of teeth of the position and selecting wheels 82 89, and when the pawl 111 has its greatest length of stroke it takes four teeth of the ratchet at every stroke, and hence rotates said ratchet in the same time as the ratchet 89. The notched wheel 95 and the ratchet 108 are so related that when the ratchet is thus fed the cam 109 will be in engagement with the stud 110 at the same time that the bolt is retracted by the cam projection 107. Therefore although the notch 103 is alined with the arm 102 said arm 102 will not enter the notch and the slides 85 will continue to be reciprocated. The lever 115 may also be set so that the timing-pawl 111 takes three, two, or only one tooth at a time of the ratchet 108. It is obvious that under these conditions the ratchet 108 and cam 109 will fall a greater or less distance behind the projection 107. The said projection therefore encounters the bolt 106 before the cam 109 has reached the stud 110, and when the bolt is retracted by the projection the arm 102 enters the notch 103 and the slides 85 are locked until the cam 109 catches up. During this period of locking the machine feeds and stitches unplaited fabric. When the cam 109 has caught up with the projection 107, the slides 85 are unlocked and the machine automatically resumes its plaiting action. The number of strokes which the feeding and stitching mechanism will make while the plaiting mechanism is out of action of course depends upon the rapidity of feed of the ratchet-wheel 108.

The work-feeder 54 is of the intermittently-acting or four-motion type and is reciprocated by well-known mechanism at a predetermined rate or number of strokes with relation to the rotation of shaft 70. The above-described timing device therefore varies the recurrence of the plaiting cycles of the plaiters 55 56 in respect to the operation of the feed without varying the number of strokes in each cycle.

It will be observed that the labor of operating the plaiter-blades 55 56 is entirely performed by the cams 65, and the notched wheels 82 have merely to shift the position of said cams. The said notched wheels and their controlling and operating mechanism may therefore be made light and durable in construction.

Figs. 25 to 29 illustrate different styles of work which the machine as herein represented is capable of turning out. Figs. 25, 26, and 27 show, respectively, one, two, and three plaits in each group, the right-hand and left-hand groups alternating. Figs. 28 and 29 represent work having a greater space of plain fabric between the plaited portion.

Various modifications may be made in the herein-described construction without departing from the spirit of my invention.

I claim—

1. In a plaiting-machine, a plaiter, a continuously-reciprocating actuator for imparting plaiting movement to said plaiter, and a connection between said actuator and plaiter comprising members connected respectively thereto and having a sliding cam action on each other which imparts a reciprocating plait-producing movement to said plaiter, one of said members being a cam device movable to vary its angular relation to the path of the actuator for adjusting the length of stroke of the plaiter.

2. In a plaiting-machine, a plaiter, a continuously-reciprocating actuator for imparting plaiting movement to said plaiter, a connection between said actuator and plaiter comprising members connected respectively

thereto and having a sliding cam action on each other to reciprocate the plaiter, one of said members being a cam device movable to vary its angular relation to the path of the actuator, and means to automatically move said cam device into and out of parallel relation to said path.

3. In a plaiting-machine, a plaiter, a stud connected therewith, a cam-actuating lever, a segmental cam connected with the lever and having an operative portion engaged with the stud and curved to the radius of the lever, a crank to position said cam axially alined with the fulcrum of said lever, and a link pivoted to said crank and to the cam.

4. In a plaiting-machine, a plaiter, means to throw the same into and out of action, a device to automatically alternate the active and inactive positions of said means, and mechanism coöperating with said device for varying the time between alternations.

5. In a plaiting-machine, a plaiter, plaiter-controlling means having operative and inoperative positions, a notched position-wheel to automatically alternate said positions, a regularly-reciprocated pawl to propel said wheel, and a selecting-wheel having deep and shallow notches controlling the action of the pawl on the position-wheel.

6. In a plaiting-machine, a plaiter, plaiter-controlling means having operative and inoperative positions, and means to automatically alternate said positions, said means including a notched position-wheel, a regularly-reciprocated pawl to propel said wheel, a selecting-wheel having deep and shallow notches controlling the action of the pawl on the position-wheel, and a filler-wheel having provisions for exposing the deep notches in different combinations.

7. In a plaiting-machine, a reciprocating plaiter, intermittently-acting work-feeding means whose strokes are timed with those of the plaiter, means for causing intermittent cycles of operation of said plaiter of a predetermined number of strokes, and means for varying the recurrence of said cycles in respect to the operation of the feed without varying the number of strokes in each cycle.

8. In a plaiting-machine, a plaiter, mechanism for causing intermittent cycles of operation of said plaiter, a device adapted to periodically stop said mechanism, means for throwing said device out of action, and provisions for variably timing said means.

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

DANIEL L. CHANDLER.

Witnesses:
HORACE C. HOVEY,
THEODOR WUESTEMANN.