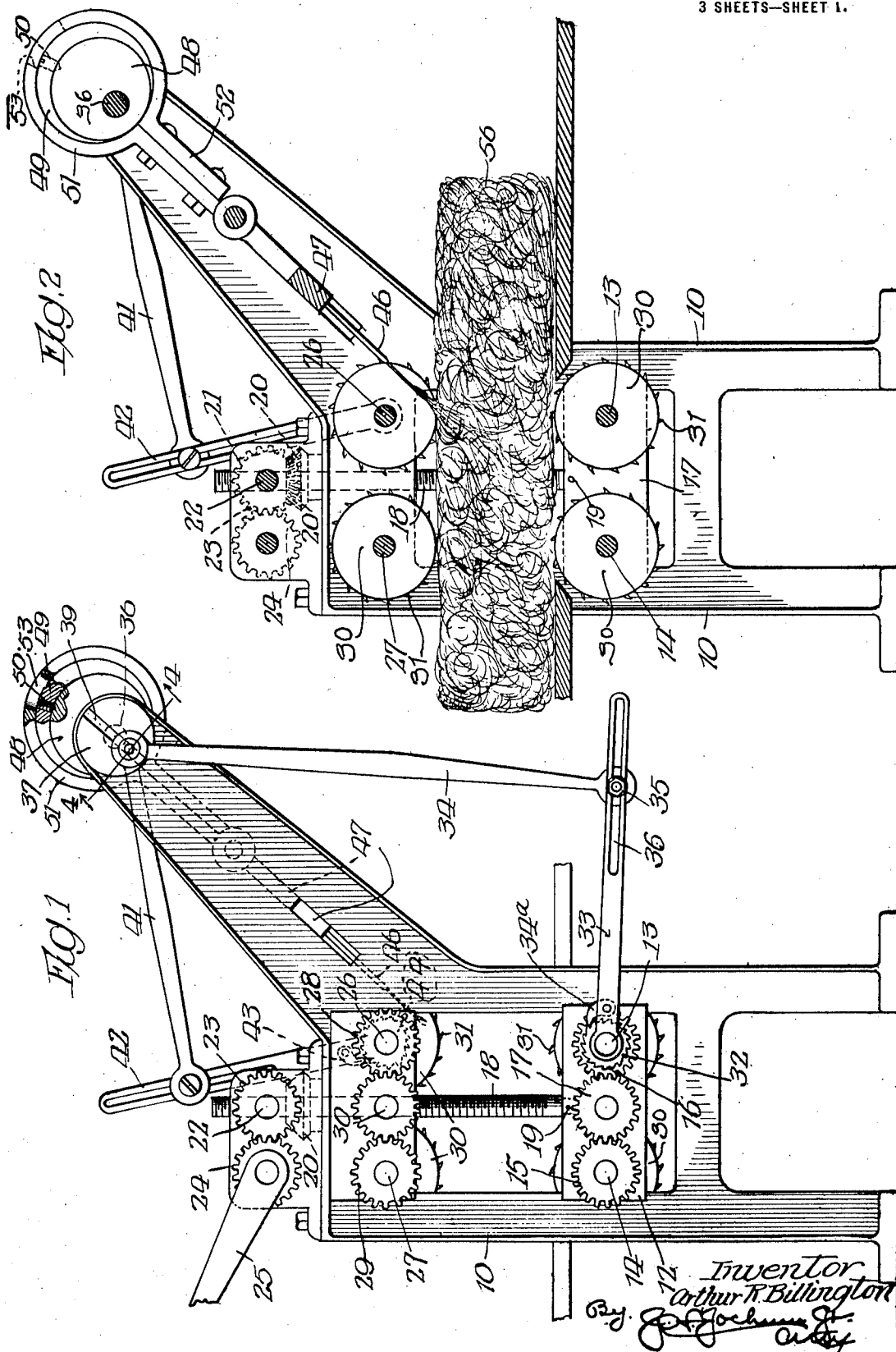


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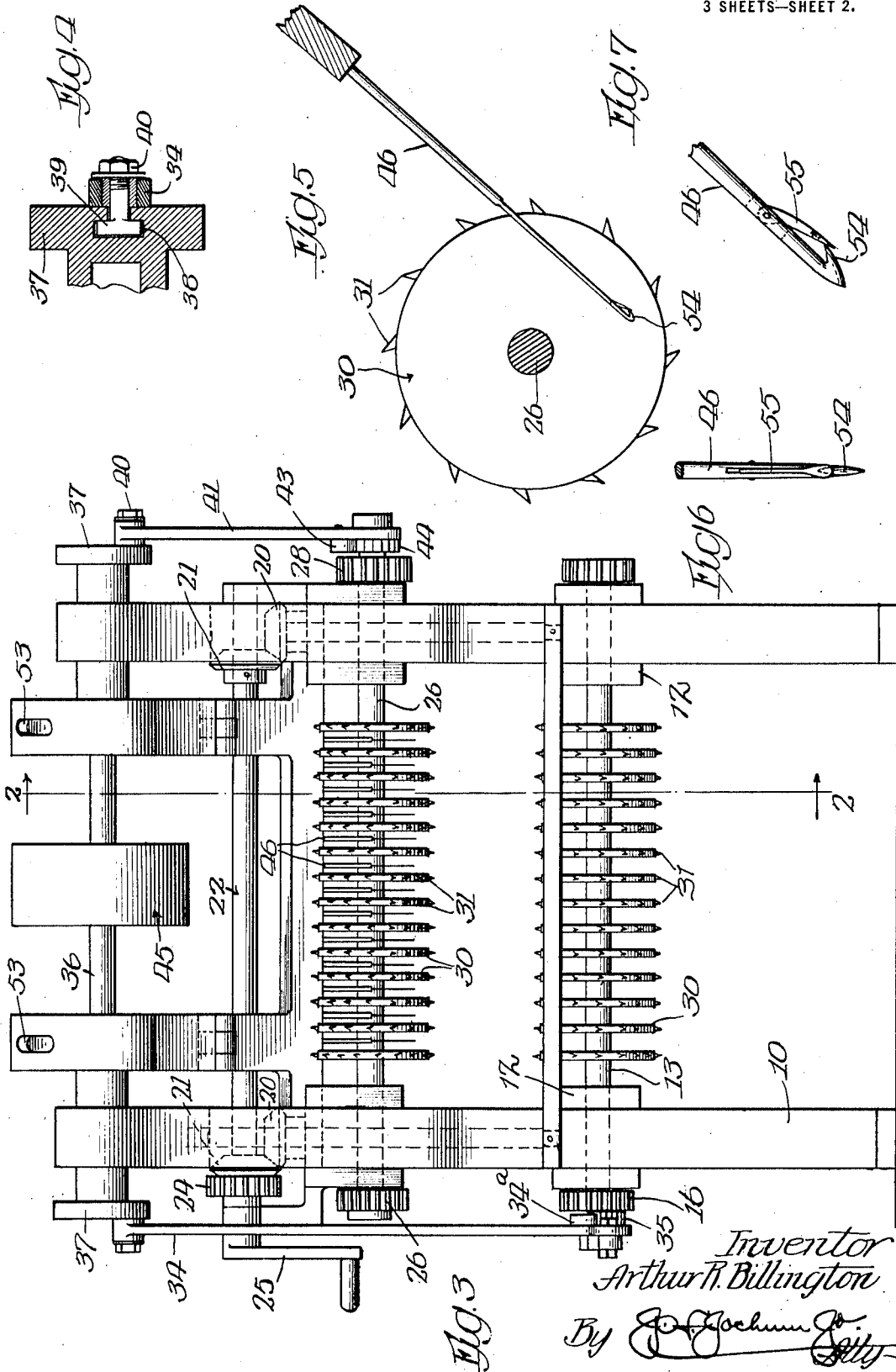
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3 SHEETS—SHEET 1.



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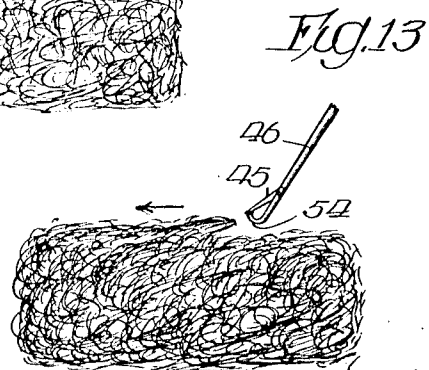
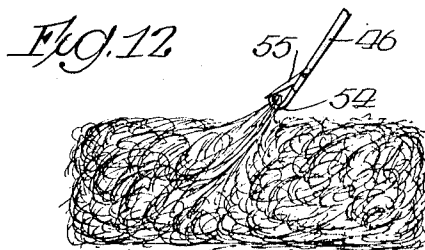
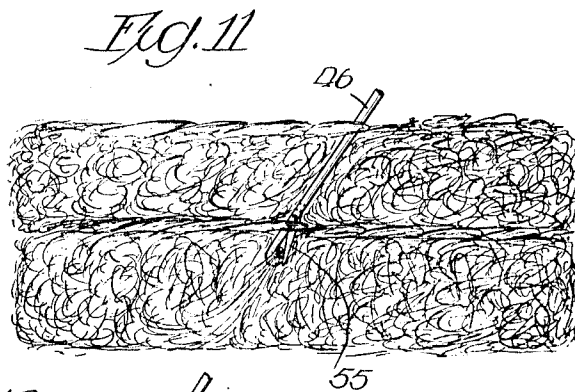
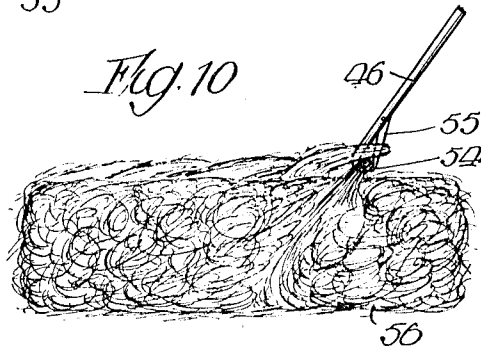
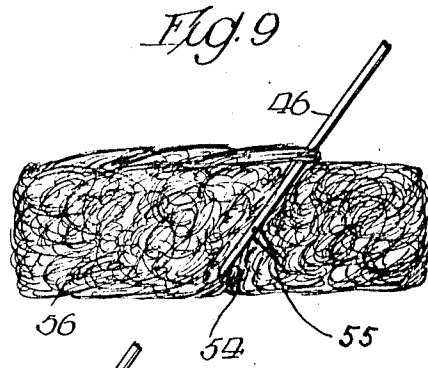
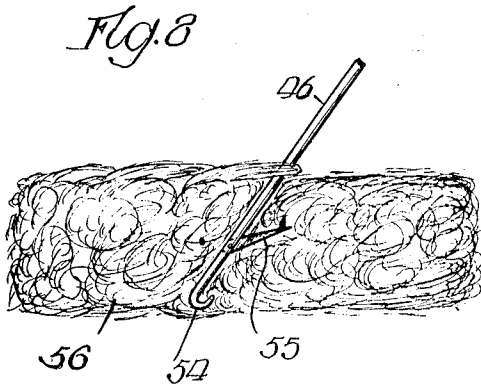


Inventor
Arthur R. Billington
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ARTHUR R. BILLINGTON, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO EMIL FRANKEL.

METHOD FOR INTERLACING CURLED HORSEHAIR.

1,314,565.

Specification of Letters Patent.

Patented Sept. 2, 1919.

Application filed April 9, 1917. Serial No. 160,691.

To all whom it may concern:

Be it known that I, ARTHUR R. BILLINGTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods for Interlacing Curled Horsehair, of which the following is a specification.

This invention relates to improvements in machines for interlacing curled horsehair and has for one of its objects to provide an improved machine of this character by means of which sheets of fabric of any desired thickness may be rapidly and quickly manufactured.

A further object is to provide improved means for feeding the material across the path of a reciprocating needle, and improved means whereby the feed of the material may be varied, and the relative stroke of the needle may be also adjusted.

A further object is to provide an improved machine of this character, by means of which superposed pads or bats of material may be interlaced.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts, hereinafter more fully described and claimed and shown in the accompanying drawings illustrating the invention, and in which:

Figure 1 is a side elevation of an improved machine of this character, constructed in accordance with the principles of this invention.

Fig. 2 is a vertical sectional view taken on line 2—2, Fig. 3.

Fig. 3 is an elevation taken from the right hand end of Fig. 1.

Fig. 4 is an enlarged detail sectional view taken on line 4—4, Fig. 1.

Fig. 5 is a diagrammatic view of one of the feeding rolls and the needle showing the relative positions of the two.

Fig. 6 is a front elevation of a portion of the needle.

Fig. 7 is a side view of Fig. 6.

Figs. 8 to 11 are views showing the different steps in the operation of the needle in interlacing the material.

Figs. 12 and 13 are views showing the

different steps in the operation of tufting the fabric.

Referring more particularly to the drawings, the numeral 10 designates generally a supporting structure, which may be of any desired size and configuration and is provided with an upright portion projecting therefrom, and preferably in an inclined position with respect to the main frame.

Mounted to move upon the structure and on opposite sides thereof, are bearing members 12 in which are journaled spaced shafts 13, 14, which extend across the structure and connected respectively with the ends of each of the shafts are gears 15, 16, and an intermediate gear 17 is also mounted upon the bearing members to mesh with the gears 15, 16 to cause them to rotate in the same direction.

The bearing members are supported for vertical adjustment preferably by means of screws 18, one arranged adjacent each end of the machine and which screws are connected as at 19 with the bearing members so that the gears will be held against rotation.

Arranged in any suitable position upon the structure and surrounding each of the screws 18, but held against bodily adjustment are bevel gears 20, each of which meshes with a bevel gear 21 carried by a shaft 22, which extend transversely of the structure. Connected with the shaft 22 on one side of the machine is a gear 23, with which a gear 24 meshes, and to which gear 24 is connected a crank handle 25, and by means of which crank handle, the gear 24 may be rotated which in turn rotates the gear 23 and with it the shaft 22 and the bevel gears 21, the latter in turn rotating the gears 20, so as to feed the screws 18 therethrough, to adjust the bearing members 12 upon the structure.

Mounted respectively above the shafts 13, 14 are similar shafts 26, 27, having secured respectively to the ends thereof, gears 28, 29 which mesh with an intermediate gear 30, to cause the shafts 26, 27 to rotate in the same direction.

Each of the shafts 13, 14, 26, 27, constitute feeding shafts for feeding the bat of material through the machine, and secured to these shafts are rollers, preferably in the form of spaced disks 30, having teeth 31

which project beyond the peripheries thereof, preferably at angles of forty five degrees with respect thereto, and the teeth are adapted to project in a general direction
5 toward the front of the machine, so that when the bat of material is fed between these cooperating rollers, the teeth will engage the material to advance it, and owing
10 to the angle of inclination and the direction of their travel, the teeth will readily disengage the material without pulling any of the material from the bat.

By adjusting the bearings 12, carrying the lower set of rollers with respect to the upper
15 set of rollers, it will be manifest, that the thickness of the bat may be varied.

The lower set of rollers are adapted to be rotated from one of the rollers, and to that end there is provided a ratchet wheel
20 32 connected with one of the rollers. A pivotally mounted arm 33 is provided with a pawl 34 adapted to cooperate with the ratchet and the arm 33. To this arm is connected a link 34 preferably by means of
25 a pin and slot connection 35, 36 and this pin and slot connection is adapted to secure the end of the link against adjustment with respect to the arm, while at the same time when the pin is loosened, the link and arm
30 may be relatively adjusted and then fastened.

The other end of the link 34 is connected with a shaft 36, which is journaled in suitable bearings in the inclined extension 11.
35 The connection between the end of the link 34 and the shaft 36 preferably comprises a disk 37, having a shouldered slot 38, opening through the outer face of the disk. A headed pin 39 moves in the slot 38 and is
40 secured by means of a fastening nut 40, so that when it is desired to vary the movement of the arm 33, this may be accomplished by loosening the nut 40 and adjusting the end of the link 34 with respect to
45 the disk 37 and then fastening the parts in their adjusted position, or if desired, the stroke of the arm 33 may be varied by means of the pin and slot connection 35, 36 between the arm and link.

A similar connection comprising a link 41
50 is provided on the opposite side of the machine for operating the upper set of rolls and to that end, a link 41 is connected with an arm 42 carrying a pawl 43 and which
55 pawl 43 cooperates with a ratchet disk 44 connected for rotation with the shaft 26. Motion may be imparted to the shaft 36 in any desired or suitable manner, but preferably by means of a pulley 45 secured thereto
60 and which pulley receives its motion from any suitable source of power.

The parts are so constructed that the two sets of rollers will operate in unison.

As the material is fed through the machine, it moves across the path of a series

of reciprocating needles 46, which latter are connected with a cross head 47 adapted to be reciprocated, and the needles are preferably so arranged that they will reciprocate in a path disposed at an angle with respect to
70 the direction of feeding of the material, so that when the needle withdraws a portion of material partially from the bat, and the bat is advanced with respect to the needle, the strain upon the needle will be longitudinally of the needle and directly in the center
75 thereof and the needle will not be subjected to lateral strain.

This cross head is adapted to move in suitable guides, and is connected with the shaft 36 preferably by means of two eccentrics 48, which are fixed to the shaft for rotation therewith. Another eccentric 49 surrounds the eccentric 48 and is adapted to be secured against relative adjustment with respect to the eccentric 48, preferably by means of fastening screws 50, which pass through the eccentric 49 and engage the eccentric 48. An eccentric strap 51 surrounds the eccentric 49 and is connected as
90 at 52 with the reciprocating head 47 so that when the shaft 36 is rotated, the eccentrics 48, 49 will rotate in the eccentric strap 51 to reciprocate the needles. Obviously the eccentric strap 51 may be provided with
95 openings 53 in alignment with the screws 50 to permit access to the screws.

When it is desired to adjust or vary the degree of reciprocation of the needles, all that is necessary is to loosen the screws 50
100 to permit relative adjustment of the eccentric 49 with respect to the eccentric 48, after which the screws may be fastened.

The needle 46 is provided with an upwardly opening hook shaped portion 54,
105 and a pivoted shield 55 is provided to extend over the hook so that when the needle passes through or into the material 56, the shield will first open as shown in Fig. 8. When the needle starts to be withdrawn from the
110 material, the shield will close as in Fig. 9, so that after the loop is formed and the needle 46 is withdrawn through the loop, the shield 55 will form a guide for directing the hook end of the needle through the loop to
115 protect the loop of the material.

When it is desired to interlace two bats of material, one of the bats, is superposed upon the other, the lower bat if desired may be first interlaced, and then the operation of
120 interlacing will be the same as with a single bat, with the exception that the needle will penetrate the upper bat and pass into the lower bat or pad and interlace the two together as shown in Fig. 11.
125

When it is desired to tuft and not interlace, the position of the needle is reversed with respect to the cross head, so that the hook shaped portion will be directed upwardly. In this position when the needle
130

passes into the material, the shield 55 will open and as the needle is withdrawn, withdrawing a portion of the material partially from the bat, the shield will close and before
 5 the needle is again inserted into the bat, the bat will be given an intermittent step of advancement in the direction shown by the arrow in Fig. 13 with respect to the needle, so that as the needle is again lowered, the
 10 material will pass off of the hook to permit the hook to enter the material.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may
 15 be made in the details of construction and in the combination and arrangement of the several parts, without departing from the spirit of this invention.

It is also to be understood that while this improved machine has been described in
 20 connection with the use of horsehair therewith, it is also adapted for efficient operation with any other kind of hair, as well as any fibrous material.

25 What is claimed as new is:

1. The method of interlacing fibrous material, which consists in feeding a plurality of superposed bats of material across the path of a reciprocatory needle, then reciprocating the needle to cause the same to penetrate the uppermost bat and impale the
 30 next adjacent lower bat, and withdraw a

portion of the lower bat into the uppermost bat, and to partially withdraw a portion of the uppermost bat to form a loop, 35 then advancing the bat and needle one relatively to the other, then withdrawing a portion of the uppermost bat partially from the supply and through the formed loop.

2. The method of interweaving fibrous 40 material, which consists in feeding a plurality of superposed bats of material across the path of a reciprocating needle, then reciprocating the needle to cause the same to penetrate the uppermost bat and impale the 45 next adjacent lower bat in an inclined position with respect to the plane of feeding movement of the material, and withdraw a portion of the lower bat into the uppermost bat, and to partially withdraw a portion 50 of the uppermost bat to form a loop, then advancing the bat and needle one relatively to the other, then withdrawing a portion of the uppermost bat partially from the supply and through the formed loop. 55

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 5th day of April, A. D. 1917.

ARTHUR R. BILLINGTON.

Witnesses:

R. W. GLASNER,
 IRMA M. BARING.