

E. O. DAVIS.
MACHINE FOR UNITING KNIT FABRICS.
APPLICATION FILED APR. 22, 1909.

1,050,432.

Patented Jan. 14, 1913.

3 SHEETS—SHEET 1.

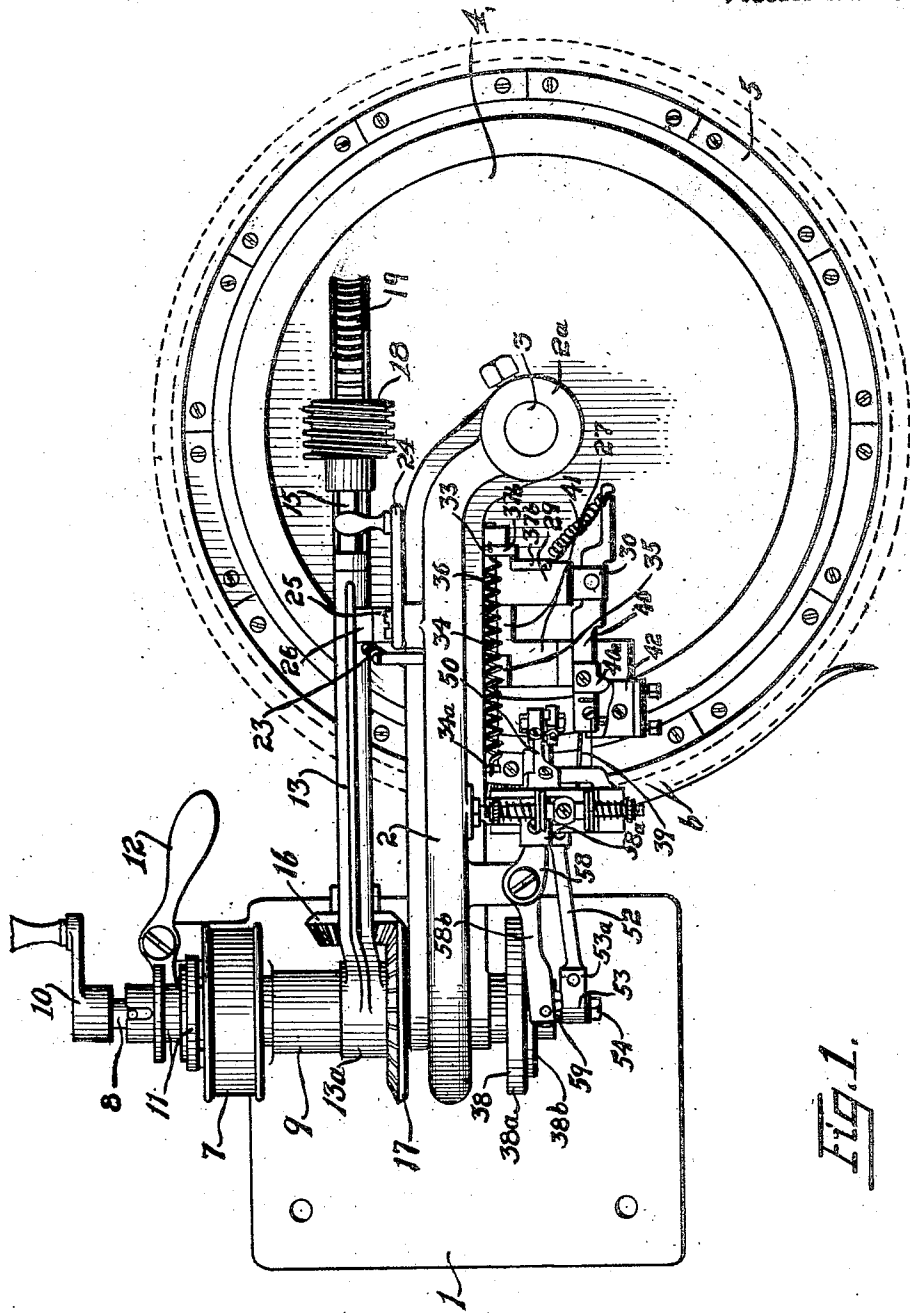


Fig. 1.

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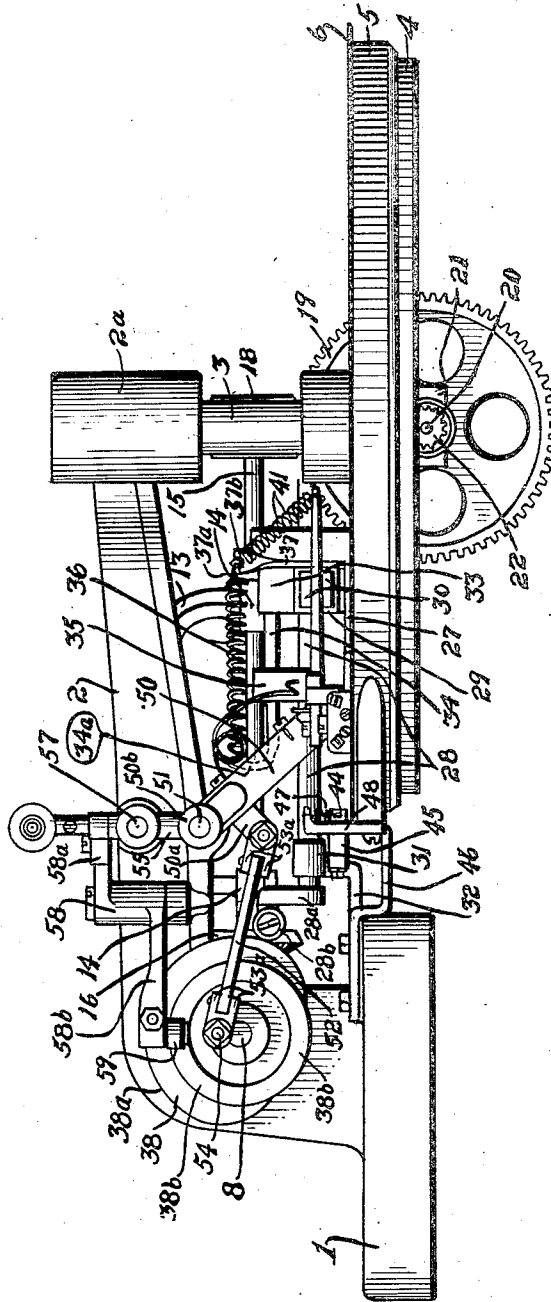


Fig. 2.

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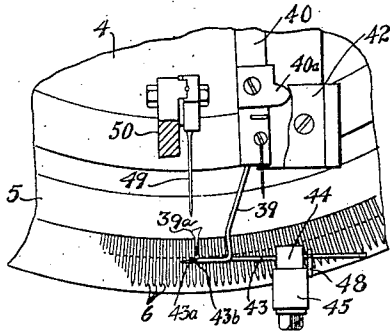


Fig. 3

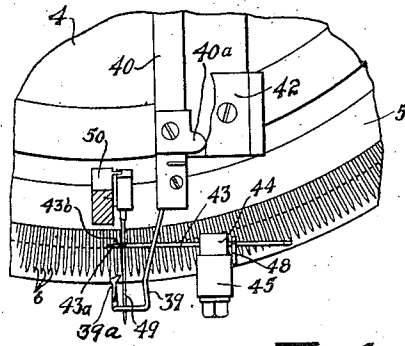


Fig. 4

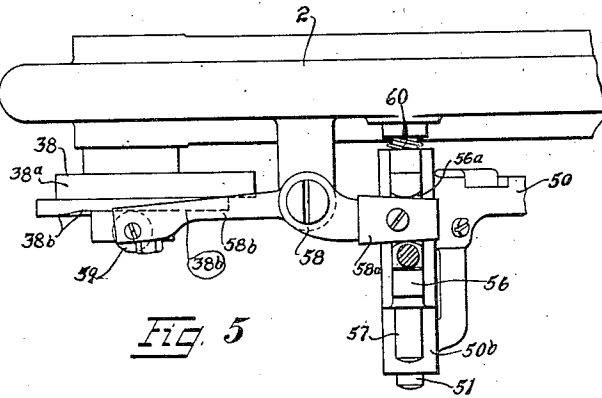


Fig. 5

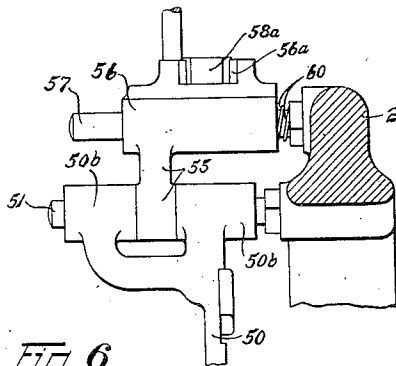


Fig. 6

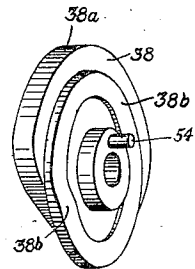
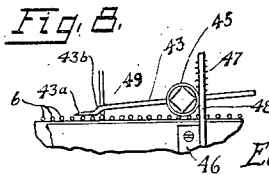


Fig. 7

Fig. 8



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UNITED STATES PATENT OFFICE.

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MACHINE FOR UNITING KNIT FABRICS.

1,050,432.

Specification of Letters Patent.

Patented Jan. 14, 1913.

Application filed April 22, 1909. Serial No. 491,511.

To all whom it may concern:

Be it known that I, EDWIN O. DAVIS, citizen of the United States, residing at Paducah, in the county of McCracken and State of Kentucky, have invented certain new and useful Improvements in Machines for Uniting Knit Fabrics, of which the following is a specification.

My invention relates to improvements in machines for uniting knit fabrics, the machine being adapted to unite or connect the meeting edges of two pieces or portions of knit fabric by joining the loops of the adjacent edges thereof by means of an elastic seam or chain of stitches.

The present embodiment of the invention is particularly designed for closing the usual opening in the toe portion of a knitted stocking and is designed to form an elastic chain of stitches for joining the adjacent loops of the two portions of fabric, said elastic chain or seam being formed transversely in the toe portion of the stocking and being adapted to cooperate with the loops of the stocking fabric to provide transverse elasticity to this portion of the stocking.

The machines of this class now in use are usually provided with an intermittently revolving ring of impaling-pins and reciprocating loopers and needles adapted to be reciprocated while the impaling needles are in a stationary position. These short intermittent movements of the ring of impaling-pins interfere with the speed of the operator in placing the loops of the fabric to be joined upon the impaling-pins and often results in nervousness on the part of the operator.

The present invention relates more particularly to mechanism for imparting a continuously and uniformly revolving movement or motion to the ring of impaling-pins, and means for imparting a combined reciprocatory and lateral movement to the curved thread needle as the latter is passed through the loops of the fabric and above the impaling-pins whereby said thread needle is carried laterally to correspond with the movement of the adjacent impaling-pins.

With the above mentioned objects in view, the invention consists in the novel construction, arrangement, and combination of parts, hereinafter described, illustrated in the accompanying drawings showing one of the embodiments of the invention, and par-

ticularly pointed out in the appended claims.

Referring to the drawings, forming a part of this specification, Figure 1, is a top plan view of a machine constructed in accordance with my invention. Fig. 2, a side elevation of the same. Fig. 3, an enlarged plan view of a portion of the ring of impaling-pins showing the relative position of the reciprocating thread carrying looper and thread needle when the latter are in their initial or receded positions. Fig. 4, a similar view showing the relative position of the parts when in their extreme projected or extended positions. Fig. 5, an enlarged detail top plan view of the mechanism for imparting a combined reciprocatory and lateral movement to the reciprocatory thread needle. Fig. 6, a front elevation of the same. Fig. 7, an enlarged detail perspective view of the dual cam-body for imparting the combined reciprocatory and lateral movement to the thread needle. Fig. 8, a side elevation of the stitch carrying guide-arm and its mountings illustrating the relative position of the parts with respect to the ring of impaling-pins.

Similar numerals of reference designate like parts throughout all the figures of the drawings.

The improved machine comprises a stationary bed-plate 1, provided with an upwardly and outwardly projecting supporting-arm 2. The arm 2, terminates in a bearing-head 2^a, carrying a vertical-shaft 3, and a stationary-supporting disk or dial-plate 4. The stationary supporting disk or dial-plate 4, may be provided with the usual ring 5, carrying a peripheral series of outwardly-extending impaling-pins 6. The loops of the fabric to be united are placed over the impaling-pins 6, in a well known manner and the ring of impaling-pins is given a continuous and uniformly revolving movement by the mechanism to be now described.

The machine is adapted to be driven by a belting communicating with a suitable source of power and passing over a driving-pulley 7, carried upon a driving-shaft 8, said driving-shaft being mounted in a bearing-head 9, of the bed-plate 1, and passing through a suitable bearing opening in the rear portion of the supporting-arm 2. The driving-shaft 8, is provided with a crank 10, for manual operation and is adapted to be

thrown into gear with the driving pulley 7, by means of a slidably mounted clutch member 11, adapted to be operated by means of a clutch operating handle or lever 12, in a well known manner.

A vertically movable shaft carrying arm or member 13, extends outwardly at right angles to the driving-shaft 8, and is provided at its rear with a bearing-head 13^a, pivotally-mounted upon the driving-shaft 8. The arm or member 13, is provided in each end with depending bearings 14, carrying a shaft 15, said shaft receiving its motion by means of a bevel-gear 16, meshing with a bevel-gear 17, on the driving-shaft 8. The shaft carrying arm or member 13, is provided at its outer or free end with a worm gear 18, normally meshing with a gear-wheel 19. The gear-wheel 19, is carried upon one end of a shaft 20, said shaft being mounted in depending bearings 21, beneath the stationary supporting disk or dial-plate 4. The shaft 20, is provided at one end with a pinion 22, meshing with a rack (not shown) on the under side of the ring 5, carrying impaling-pins 6. When the worm gear 18, is in gear or in mesh with the gear wheel 19, it is apparent that the gearing described will impart a continuously and uniformly revolving motion to the ring 5, and impaling-pins 6. As a means for throwing the worm gear 18, out of gear or mesh with the gear wheel 19, the outer or free end of the shaft carrying arm or member 13, is adapted to be depressed against the resistance of a coil spring 23, and the worm-gear 18, is held down in its normal or engaging position by means of a crank-lever 24, pivotally secured to one side of the supporting arm 2, by means of a pivot-screw 25, and provided with a depending cam-head or nose portion normally engaging a laterally extending lug 26, of the arm or member 13. When the crank lever 24, is elevated the movement of the depending portion of the crank-lever 24, will permit of the elevation of the free end of the arm or member 13, by the action of the coil spring 23.

A reciprocating carriage is slidably mounted upon a slightly elevated bearing portion 27, of the stationary-supporting plate 4, said carriage comprising a horizontal guide arm 28, and a laterally-extending arm 29, terminating in bearing lugs 30. The guide arm 28, is slidably mounted in a bearing head 31, of a carrying bracket 32, extending from the bed-plate 1, and said guide-arm 28, is provided at its rear with an upwardly-extending guide-head 33, provided with a guide recess taking over a horizontal guide-shaft 34, carried by a supporting arm or post 35, secured upon the stationary supporting-plate 4. The carriage is adapted to be reciprocated against the resistance of a coil spring 36, one end of

which is secured to an upwardly-extending portion 34^a, of the guide-shaft 34, the other end of said coil-spring 36, being secured to one of the wings 37^a, of a post 37, carried by the reciprocating carriage. As a means for reciprocating the carriage against the resistance of the coil spring 36, one end of the guide arm 28, is provided with an upwardly-extending arm 28^a, carrying a friction roller 28^b, adapted to frictionally engage with the peripheral face 38^a, of a dual cam-body 38, said cam-body 38, being mounted upon the driving-shaft 8. A thread carrying looper 39, is carried by the reciprocating carriage and is adapted to be given the proper relative movements with respect to the thread-needle and adjacent cooperating parts hereinafter described, by being mounted in a laterally movable spring resisted carrying-bar 40, said carrying bar being pivotally mounted between the bearing lugs 30, of the laterally-extending arm 29, of the carriage and having one end provided with a coil-spring 41, secured to a wing 37^b, of a post 37, of the reciprocating carriage, said spring carrying the opposite or looper carrying end of the carrying bar against a block 42, secured on the stationary supporting disk 4, and provided with an irregular shaped face to cooperate with a friction lug 40^a, of the carrying bar 40.

A stitch-carrying guide-arm 43, is pivotally mounted above the path of travel of the ring of impaling-pins by being mounted in a bearing block 44, removably mounted in a bearing head 45, carried by a bracket 46. The free end of the guide-arm is provided with a slightly depressed pointed portion 43^a, impinging upon a plurality of impaling-pins and adapted to be carried just above and in alinement with the adjacent loops of the fabric to be united carried by said impaling-pins. The depressed pointed portion 43^a, of the guide-arm 43, is held down by the action of a coil-spring 47, secured at the rear of the guide-arm 43, and carried by a bracket 48. The depressed pointed portion 43^a, terminates at its rear in an offset portion 43^b, at the rear of which the thread needle hereinafter described passes during its reciprocatory movements through the loops of the fabric to be united and over and above each of the impaling-pins in the loop and stitch forming operation.

The purpose of the stitch carrying guide-arm 43, as the name implies, is to carry the loops of the elastic chain-stitch in proper relative position with respect to the loops of fabric to be united on the adjacent impaling pins, as well as form a guide member about which the loops of thread are carried and formed by the thread carrying looper 39, and the thread-needle to be now described.

The curved thread-needle 49, as carried by and reciprocated by the means herein-

after described, in its initial forward movement or thrust as indicated in Fig. 3, is carried close to the thread carrying looper head 39^a, and between the latter and the adjacent looper thread extending to the forward loop on the off-set or shoulder portion 43^b, of the stitch carrying guide-arm, said off-set or shoulder portion 43^b, acting in this position to hold the looper thread in a position to afford ample clearance for the passage of the thread needle. As the latter is carried forward it passes through the two loops of fabric to be united and at the rear of the off-set portion 43^b, of the stitch carrying guide-arm. When the thread-needle 49, and looper 39, are in their extreme projected or extended positions as indicated in Fig. 4, the thread carrying looper head 39^a, is in a position to engage the slack of the needle thread, of the thread needle 49, as the latter starts to retreat. The compound movement of the looper 39, is fully shown and described in my application for Letters Patent for improvements in machines for sewing looped fabric, filed May 19, 1909, Serial No. 496995, this compound movement being necessary, as above described, for the purpose of clearing the thread-needle and forming the necessary loops upon and about the off-set or shoulder portion 43^b of the stitch carrying guide-arm. As the loops are being formed upon the slightly elevated shoulder portion 43^b, each loop as drawn taut by the formation of the next succeeding loop is drawn or carried down to and follows upon the depressed portion 43^a, thus forming a chain of stitches of uniform thickness and formation throughout. As the depressed portion 43^a, included in said chain of stitches rests upon the adjacent loops of fabric united by said stitches and extends in the direction of travel as carried by the subjacent impaling-pins, said chain of stitches are carried along said depressed portion 43^a, and with the adjacent loops of fabric included in said chain of stitches whereby the latter are carried off of the pointed free end of the stitch carrying guide arm in the form of an elastic chain of stitches uniting the adjacent edges of the fabric by what may be termed a "two-thread over-locking seam," of uniform formation throughout, making the looped fabric as elastic at the seam as at any other point. The depressed tapered portion 43^a, resting immediately above the path of travel of the loops of fabric carried by the subjacent impaling-pins and extending substantially in the same horizontal plane with that intersected by the reciprocation of the curved thread-needle at the rear of the off-set portion 43^b, provides for the formation of a close chain of elastic stitches and contributes to its uniformity of formation, as above referred to, and the yielding

feature of the depressed free end or tapered portion of the stitch carrying guide arm enables the same to follow any variations in the thickness of the loops of fabric to be united as well as the position of same by reason of variations in the plane of travel followed by the subjacent impaling-pins. When the impaling pins are free from loops of fabric as between intervals of work, the depressed portion 43^a, together with the chain of stitches are adapted to impinge, directly upon the impaling-pins whereby the latter come into frictional engagement with and carry off the chain of stitches from the free end of the stitch carrying guide-arm, and an uninterrupted elastic chain of stitches is perfectly formed between the intervals of work thus resulting in perfectly formed stitches at the terminal portions of the seam.

The curved thread-needle 49, is carried by and reciprocated over and above each of the impaling-pins by means of an oscillating arm 50, carried upon a bearing-shaft or pin 51, extending from the side of the supporting-arm 2, of the machine. The oscillating arm 50, is adapted to be reciprocated by means of a pitman or connecting arm 52, said arm 52, being adapted to have lateral movement with respect to its connected ends by being pivotally secured at each end in bearing-lugs 53^a, of bearing-heads 53. One of the bearing-heads 53, is mounted upon a crank-pin 54, of the dual cam-body 38, and the other is pivotally-mounted to a short arm 50^a, of the oscillating arm 50. This connection of the oscillating arm 50, with respect to the connecting arm 52, enables the oscillating arm 50, and the thread-needle carried thereby to be carried laterally during their reciprocating movements and while the thread-needle is in the loops of the fabric to correspond with the movement of the adjacent impaling-pins beneath by the means to be now described.

The oscillating-arm 50, is provided at its upper portion with two bearing heads 50^b, between which is interposed a guide-arm 55, depending from a laterally movable guide-block or second bearing member 56, mounted on a second bearing shaft or pin 57, extending from the side of the supporting arm 2. The bearing member 56, is adapted to have lateral movement on the bearing shaft or pin 57, and is adapted to be reciprocated thereon by means of a laterally oscillating member 58, pivotally-mounted at the side of the supporting-arm 2, said laterally oscillating member 58, being provided with an arm 58^a, taking into a recess opening 56^a, of the bearing member 56, and a second arm 58^b, provided with a friction roller 59, adapted to frictionally engage the side face 38^b, of the dual cam-body 38. By reason of the elevated and depressed por-

tions of the cam or side face 38, of the cam-body the oscillating member 58, is operated whereby the bearing member 56, will be moved upon the bearing pin 57, and to and from the resistance of a coiled spring 60, surrounding the pin 57, and abutting against one side of the bearing member 56. By reason of this movement it is evident that a similar lateral movement will be imparted to the bearing heads 50^b, and oscillating arm 50, so that as the latter is reciprocated it will be moved laterally and thus carry the thread needle during its reciprocatory movements in the loops of the fabric to correspond with the movement of the impaling-pins carried by the continuously rotating ring.

From the foregoing description, taken in connection with the accompanying drawings, the operation and advantages of my invention will be readily understood.

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

1. In a machine for uniting knit fabrics, a series of impaling-pins, a yielding stitch carrying guide-arm provided with an off-set depressed tapered portion extending above a plurality of the adjacent loops of fabric to be united on said impaling-pins, and a reciprocating thread needle and looper co-operating with said off-set tapered portion of said guide-arm.

2. In a machine for uniting knit fabrics, a stationary supporting plate, a ring of impaling-pins rotatably carried thereby, a stitch carrying guide arm provided with a pointed off-set portion mounted above the path of travel of said ring of impaling-pins and extending above a plurality of said impaling-pins, and a reciprocating looper and thread needle mounted in operative relationship to said guide-arm; of mechanism for continuously and uniformly revolving said ring of impaling-pins, and means for carrying said thread needle laterally during its reciprocatory movements in the loops to correspond with the rotation of said ring of impaling-pins.

3. A machine for uniting knit fabrics, comprising a stationary supporting disk, a continuously revolving ring provided with peripheral impaling-pins, a stitch carrying guide arm provided with a depressed portion adapted to be brought into frictional engagement with a plurality of said impaling-pins, a reciprocating thread needle adapted to pass under said stitch carrying guide arm and to pass above each of said impaling-pins while the latter are being revolved, a reciprocating looper-hook in operative relationship with respect to said thread needle, and means for carrying said thread needle laterally during its reciprocatory movements in the loops to correspond

with the movement of the adjacent impaling-pins.

4. In a machine for uniting knit fabrics, the combination with a rotary ring carrying impaling-pins, and a yielding stitch carrying guide arm provided with an off-set portion above the path of said impaling-pins; of a reciprocating looper in operative relationship with respect to said off-set portion of said stitch carrying arm, a reciprocating thread needle adapted to coöperate with said stitch carrying guide arm and looper and to pass over and above each of said impaling-pins while the latter are being revolved, and means for carrying said thread needle laterally during its reciprocatory movements in the loops over and above each of said impaling-pins to correspond with the movement of the latter.

5. In a machine for uniting knit fabrics, a series of impaling pins, a stitch carrying guide arm comprising a supporting shank and a tapered offset free end affording a shoulder below the terminating portion of said shank and at the base of said tapered free end, and a reciprocating thread needle and looper coöperating with said shoulder and adapted to form a chain of stitches about said tapered free end as the successive loops are formed about and shed off from said shoulder.

6. In a machine for uniting knit fabrics, the combination with a plurality of impaling-pins, and a reciprocating thread needle and thread carrying looper; of a stitch carrying guide arm having a shoulder and a tapered free end extending from the latter a substantial distance and parallel with a plurality of said impaling-pins, said shoulder constituting the zone of stitch formation and said tapered free end the zone of retreat.

7. In a machine for uniting knit fabrics, a series of impaling pins, a stitch carrying guide arm comprising a shank portion and an offset pointed free end extending in a horizontal plane parallel with and in close proximity to a plurality of said impaling-pins and adapted to ride upon the adjacent loops of fabric to be united on said impaling pins, and a reciprocating thread needle and thread carrying looper coöperating with said tapered offset free end of said guide arm and inclosing the same in a chain of elastic stitches extending through the subjacent loops of fabric a substantial distance from the zone of initial stitch formation by said thread needle and looper.

8. In a machine for uniting knit fabrics, a series of impaling pins, a stitch carrying guide arm having a vertically movable tapered free end adapted to ride upon a plurality of said impaling pins and having a shoulder at the base of said tapered free end, and a reciprocating thread needle and looper

adapted to pass beneath and over said guide arm in close proximity to said shoulder, said shoulder portion constituting the zone of formation and said tapered free end the zone of retreat for the stitches.

9. In a machine for uniting knit fabrics, a ring of impaling pins, a reciprocating thread needle and looper, a stitch carrying guide arm having an offset pointed portion of reduced diameter extending in a horizontal plane above a plurality of said impaling pins, and an upwardly extending shoulder portion at the base of said offset pointed portion, said shoulder portion constituting the zone of formation for the stitches as formed by said reciprocating thread needle and looper and said pointed free end extending therefrom constituting the zone of retreat for the chain of stitches carried by the adjacent loops united on said impaling pins.

10. In a machine for uniting knit fabrics, a ring of impaling pins, a reciprocating thread needle and thread carrying looper, and a stitch-carrying guide arm comprising a shank portion and a tapered portion offset from said shank portion and extend-

ing in a horizontal plane parallel with and in close proximity to a plurality of said impaling-pins said tapered offset portion being adapted to ride in frictional engagement with the loops united on said impaling-pins by the chain of stitches and forming a zone of retreat for the stitches.

11. In a machine for uniting knit fabrics, a series of impaling-pins, a stitch carrying guide arm terminating in a tapered free end extending parallel with and in close proximity to a plurality of said impaling pins, and a thread needle and thread carrying looper adapted to pass beneath and over said tapered free end, respectively, and forming a chain of stitches about said tapered free end and through the subjacent loops of fabric on said impaling-pins for a substantial distance from the zone of initial stitch formation.

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

EDWIN O. DAVIS.

Witnesses:

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S. T. ARNOLD.