To all whom it may concern:

Be it known that I, Edwin O. Davis, a 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 Unitng 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 or selvage edges of two pieces or portions of knit fabrics by joining the loops of the adjacent edges thereof by means of an elastic seam or chain of stitches as in the production of hosiery, underwear, and the like.

The invention relates to improvements on machines of this class of the general character described and claimed in my application filed April 22, 1909, Serial No. 491,511, wherein mechanism is provided for imparting a continuously and uniformly revolving movement or motion to the ring of impaling-pins, together with means for imparting a combined reciprocatory and lateral movement to the curved thread needle as the latter passes through the loops of fabric and above the impaling-pins, said lateral movement of the curved thread needle corresponding to the movement of the adjacent impaling-pins.

A still further object of the invention is to provide the necessary or required elasticity in the uniting seam or chain of stitches, this being secured by means of a stitch finger or stitch carrying guide-arm mounted above and extending in the direction of the travel of the ring of impaling-pins and adapted to cooperate with the thread needle and thread carrying looper in the stitch forming operation so as to be included in a chain of uniformly formed stitches, and providing the necessary elasticity when the latter are withdrawn by the subsequent impaling-pins.

A further object of the invention is to provide means for uniformly forming the stitches about said stitch finger notwithstanding variations in the tension of the looper thread by providing the necessary slack in said looper thread at or near the point of the formation of its loops about said stitch finger, and with this end in view

I provide in addition to said stitch finger and thread needle and thread carrying looper shown in my previous application above referred to, an intercepter member or intercepter-finger, said intercepter finger engaging the loop thread of the looper head just after the latter has engaged and is holding up the loop from the thread needle and while the thread needle is being withdrawn from the intervening stitch finger, said intercepter-finger continuing to hold the loop of the looper head while the latter passes forwardly and dropping or releasing it just before the initial retracting movement of the looper head and just after the thread loop of the latter is being engaged by the thread needle.

With the above mentioned and other ends in view, the invention consists in the novel construction, arrangement, and combination of parts, hereinafter described, illustrated in one of its embodiments in the accompanying drawings, and particularly 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 this 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 parts while the reciprocatory intercepter-finger is engaging and holding the thread of the looper and the latter is in engagement with the loop from the needle in its forward position and prior to the initial forward movement of the thread needle. Fig. 4, a similar view of the intercepter-finger and looper in their retracted positions and prior to the initial movement of the looper to take up the loop from the thread needle. Fig. 5, a detail view of the improved looper member detached. Fig. 6, a similar view of the thread needle detached. Fig. 7, a detail perspective view of the stitch forming parts just prior to the initial movement of the reciprocatory intercepter-finger to engage the thread of the looper as the latter is in the act of taking up the thread from the thread needle. Fig. 8, a similar view showing the intercepter-finger moved laterally and in engagement with the looper thread while the looper is being moved toward its extreme forward position and the thread needle is being withdrawn from the off-set portion of the stitch finger. Fig. 9, a similar view showing the position of the parts just prior to the initial forward movement of the
thread needle, the intercepter-finger being adapted to move laterally and drop the looper thread just after the thread needle has entered between the looper and the adjacent looper thread and just prior before the initial movement or retreat of the looper.

Fig. 10, a detailed perspective view of the oscillating needle-arm and the operating mechanism and connections for moving said needle-arm laterally during its reciprocatory movements.

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 3, 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-pin 6, in a well known and understood manner, and the ring of the impaling pins is given a continuous and uniformly revolving movement by the mechanism hereinafter described.

The machine is adapted to be driven by a belting communication 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 at the rear portion of the supporting arm 2. The driving shaft 8, is provided with a crank 10, for unison operation and is adapted to be thrown into gear with the driving pulley 7, by means of a slidable 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 member 13, extends outwardly at right angles to the driving-shaft 8, and is provided at its rear with a bearing head 14, pivotally mounted upon the driving shaft 8. The arm or member 13, is provided at either 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 the 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 of impaling pins. As a means for throwing the worm gear 18, into and out of mesh with the gear wheel 19, a crank lever 23, is pivotally secured to one side of the supporting arm 2, by means of a pivot bolt 24, said crank lever being provided with a depending head or nose portion secured to a second pivot bolt 25, at the side of the arm or member 13. When the crank lever 23, is elevated, the movement of the depending portion 25, will elevate the free end of the arm or member 13, and the worm gear 18, on the shaft 15, and vice versa.

As a means for actuating the various parts or members comprised in the stitch forming mechanism, a master cam-wheel 26, is mounted on the driving shaft 8, said cam-wheel being provided at opposite sides about its periphery with cam faces 27, and 28, for imparting the requisite reciprocatory motion to the intercepter-finger and lateral motion to the thread needle as hereinafter described, and a cam groove or guide-way 29, for actuating the thread carrying looper as hereinafter described.

The curved thread needle 27, is carried and reciprocated over and above each of the impaling-pins by means of an oscillating needle arm 28, carried upon a bearing shaft or pin 29, extending from the side of the supporting-arm 2, of the machine.

The oscillating needle arm 28, is adapted to be reciprocated by means of a pitman or connecting arm 30, said connecting arm being provided at its ends with universal or ball and socket bearings 31, connecting one end to the arm 28, and the other to the cam wheel 26. The needle arm 28, is provided at its upper portion with two bearing heads 32, on the bearing shaft 29, and said bearing heads 32, on the bearing shaft 29, are adapted to be moved longitudinally on said shaft 29, whereby said needle arm 28, and thread needle 27, are moved laterally during both their to and fro reciprocation by means of a guide-arm 31, interposed between said bearing heads 32, and depending from a laterally movable head-block or second bearing member 33, mounted on a second bearing shaft 35, extending from the sides of said supporting arm 2.

The bearing member 32, is adapted to be reciprocated on the bearing shaft 35, by means of a laterally oscillating member 34, pivotally-mounted at the side of the supporting arm 2, by means of the vertical bearing shaft 35, extending from the bracket 36, said laterally oscillating member 34, being provided with a bifurcated arm 38, taking over a bearing block 39, of the bearing member 32.
looper 32, and a second arm 34, provided with a friction roller 36, adapted to engage the cam-face 29, of the cam-wheel 26.

By reason of the cam-face 29, of the cam-wheel 26, the oscillating member 34, is operated whereby the head block 32, will be moved upon the bearing-shaft 33, and to and from the resistance of a coil-spring surrounding the bearing shaft 33, and interposed between the inner side of the head block 32, and the side of the supporting arm 2. By reason of this movement it is evident that a similar movement will be imparted to the bearing heads 28, on the bearing shaft 29, so that as the needle arm 28, is reciprocated, it will be moved laterally in its to and fro movements and thus carry the thread needle laterally while in the loops of the fabric to correspond with the movement of the impaling-pins carried by the continuously rotating ring.

A stitch carrying guide-member or stitch-finger 37, is pivotally mounted above the path of travel of the ring of impaling-pins by being mounted in a supporting member 38, movably mounted in a bearing head 28, of a depending bracket 40, carried upon the guide-arm 31, interposed between the bearing heads 28, of the laterally movable needle arm 28. The free end of the stitch-finger is provided with a slightly depressed pointed or tapered tongue portion 37a, impinging upon a plurality of impaling-pins and adapted to be carried just above and in alignment with the adjacent loops of the fabric to be united as the latter are carried under the tongue portion of the stitch-finger by the impaling-pins. The depressed tongue portion 37a, of the stitch-finger is held down by the action of a coil-spring 41, secured upon the rear projecting portion of the stitch-finger and carried upon a laterally extending bracket-arm 40a, of the depending bracket 40. The depressed tongue portion 37a, of the stitch-finger terminates at its rear in an offset portion 37b, at the rear of which the thread needle 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 as hereinafter described.

By reason of the above construction it will be understood that the depressed tongue portion 37a, rides upon a series or plurality of the subjacent united loops and within the uniting stitches of the latter and that the needle and looper move in paths on opposite sides, respectively, of the offset or shoulder portion 37b, the initial stitches being formed over and about said shoulder whereby said shoulder forms the zone of formation and said tapered tongue portion forms the zone of retreat for the stitches.

As a means for giving the thread carrying looper the necessary undulatory movement during its reciprocation in the stitch forming operation by the looper carriage member 48, said carriage member 48, is provided with a laterally extending friction roller 55, extending into and adapted to travel within a guide-slot 57, of a supporting bracket 58, mounted upon the bearing standard 44. As a means for giving the looper the necessary lateral movements during its reciprocation by the carriage member 48, the upwardly extending bearing pin 51, at the rear end of the laterally movable looper carrying member 49, is held into frictional engagement with a cam-faced cam-block 59, by means of a spring 60, fastened at one end to the pivotal bolt 61, of the laterally movable looper carrying member 49, said spring 60, bearing against the friction bearing pin 51, for the purpose of maintaining the latter in contact with the irregular faces of the cam-block as the looper carriage member 48, is reciprocated. The position of the cam-block 59, may be adjusted by means of adjusting screws 62, in the supporting bracket 58.

As a means for providing for uniformity in the formation of the stitches about the stitch-finger 37, notwithstanding variations in the tension of the looper thread, I provide a reciprocatory interceptor-finger 63, adapted to intercept or engage and hold the looper thread 64, near the point of formation about the offset portion 37b, of the stitch-finger while the looper is in engagement.
ment with the thread loop 85, from the needle as illustrated in Fig. 7, of the drawings, said intercepter-finger being adapted to continue in engagement with the thread loop 85, as the looper is moving forward to its extreme forward position as illustrated in Fig. 8, and also continuing to hold it while the looper is in its extreme forward position and the thread needle is in its extreme rearward position as illustrated in Fig. 9. said intercepter-finger moving laterally and dropping loop thread just before the initial retracting or receding movement of the looper head and just after the needle has moved forwardly between the looper and the adjacent loop thread and is about to pass through the loop of the fabric on the subjacent impaling-pin.

As a means for giving the intercepter-finger the necessary reciprocatory movements the intercepter-finger is adjustable mounted in the end of a supporting-bar 65, carried on a depending arm 67, of an oscillatory member, said oscillating member being pivotally mounted upon a vertical bearing shaft 63, extending downwardly from the bracket 32, supporting the upwardly extending bearing shaft 35. The oscillatory member carrying the depending arm 67 is provided with a second arm 69, carrying a friction roller 70, adapted to bear against the cam face 28, of the cam-wheel whereby the necessary oscillatory movement will be imparted to the oscillatory member and the supporting bar 65, will carry the intercepter-finger into and out of engagement with the thread of the looper at proper times as above described. The friction roller 70, of the arm 69, the oscillatory member is held in frictional contact with the cam-face 28, by means of a coil-spring 71, surrounding the bearing shaft 63, said spring being secured at one end to the shoulder 68, of the bearing shaft and at the other to the oscillatory member to operate the latter in a well understood manner.

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 an embodiment of my invention, what I claim and desire to secure by Letters Patent is:

1. In a machine for uniting knit fabrics, a ring of impaling-pins, a stitch finger, a thread needle and thread carrying looper, an intercepter, means for moving said stitch finger longitudinally while the needle is in the fabric to correspond with the movement of said impaling pins and means for moving said intercepter into and out of engagement with the thread of said looper.

2. In a machine for uniting knit fabrics, the combination of a support, the needle arm and its actuating mechanism, the needle carried by said arm, the thread-carrying looper and its actuating mechanism, the impaling pins and their actuating mechanism, the movable stitch finger and its actuating mechanism, and the intercepter-finger and its actuating mechanism.

3. In a machine for uniting knit fabrics, the combination with a ring of impaling-pins, stitch forming mechanism including a needle and looper, and operating means of a stitch finger provided with an offset tapering tongue extending in the direction of travel of said impaling-pins and adapted to receive and carry a plurality of stitches from said stitch forming mechanism, an intercepter in cooperative relationship with said stitch forming mechanism and the offset portion of said stitch finger, means for moving said stitch finger longitudinally to correspond with the movement of said impaling pins while the needle is in the loops and means for actuating said intercepter.

4. In a machine for uniting knit fabrics, the combination with a ring of impaling-pins, a stitch finger provided with an offset portion, a reciprocatory needle and thread carrying looper, means for moving said stitch finger longitudinally and said needle laterally while the latter is in the loops and means for actuating said needle and looper, of a reciprocatory intercepter adapted to intercept the thread of the looper between the latter end to said stitch finger and to release the same prior to the retraction of said looper.

5. In a machine for uniting knit fabrics, a ring of impaling-pins and its actuating mechanism, a reciprocatory needle and thread carrying looper, means for actuating said needle and looper, a stitch finger provided with an offset portion adapted to cooperate with said needle and looper and to receive the loops therefrom, an intercepter adapted to cooperate with said needle, looper and stitch finger, and means for actuating said intercepter.

6. In a machine for uniting knit fabrics, a ring of impaling-pins, a stitch finger provided with an offset portion, a reciprocatory thread needle and looper passing at the rear and over said offset portion, respectively, to form the loops over said offset portion, a reciprocatory intercepter-finger adapted to move into and out of engagement with the thread of said looper as the latter takes up the loop from the needle and said needle enters the loop of said looper, respectively, and means for so actuating said intercepter-finger with respect to said needle and looper.

7. In a machine for uniting knit fabrics, the combination with a ring of impaling-pins, and a stitch carrying guide finger mounted above and extending in the direction of the travel of said ring of impaling-pins.
pins; of stitch forming mechanism comprising a reciprocatory needle and thread carrying looper, and a reciprocatory inter-}

cetter-finger engaging and holding the 5 thread of said looper while the latter is in engagement with the loop from the needle and moving out of engagement therewith when the latter is in engagement with the thread of said looper.

8. In a machine for uniting knit fabrics, a series of impaling pins, a stitch forming mechanism comprising a reciprocatory needle and thread carrying looper, and a reciprocatory inter-cefter-finger adapted to be moved laterally into engagement with the thread of said looper while the latter is being moved forwardly in engagement with the loop from the needle, and means for reciprocating said inter-cefter-finger.

9. In a machine for uniting knit fabrics, the combination with a plurality of impaling pins, a reciprocatory thread needle and looper; of a stitch carrying guide arm provided with a shoulder in close proximity to the paths of said needle and looper and terminating in a vertically movable tongue portion adapted to ride upon a plurality of loops carried by said impaling pins and a reciprocating thread needle and looper adapted to successively pass under the paths of travel of the impaling pins and provided with a shoulder terminating in a depressed tapered tongue portion adapted to ride upon a plurality of loops carried by said impaling pins, and a reciprocating thread needle and looper adapted to successively pass under said tapered tongue portion to form the stitches over and about said shoulder whereby said shoulder forms the zone of formation and said tapered tongue portion forms the zone of retreat for the stitches.

11. In a machine for uniting knit fabrics, a series of impaling pins, a reciprocating thread needle and looper, a vertically movable stitch forming guide arm having a shoulder in close proximity to the paths of said needle and looper, said shoulder terminating in a pointed free end extending above a plurality of said impaling pins and adapted to ride upon the loops of fabric to be united on said impaling pins, the needle and looper moving in paths in opposite sides, respectively, of said shoulder and said shoulder constituting the zone of stitch formation and said pointed free end the zone of retreat for the stitches as formed by said reciprocating thread needle and looper.

12. 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 pivotally mounted above the path of travel of the impaling pins and provided with a shoulder between the paths of travel of said needle and looper, said shoulder constituting the zone of stitch formation and terminating in a tapered tongue portion in frictional engagement with a plurality of said impaling pins and adapted to be carried above the adjacent loops of fabric to be united as the latter are carried under said tongue portion, said tongue portion forming the zone of retreat for the chain of stitches.

13. In a machine for uniting knit fabrics, the combination with a continuously revolving ring of impaling pins, and a laterally movable oscillating arm carrying a reciprocating curved thread needle passing above each of said impaling pins; of a driving shaft provided with a laterally movable connecting member adapted to reciprocate said thread needle, and a cam body operatively connected to said laterally movable oscillating arm whereby said thread needle is carried laterally during its reciprocatory movements in the loops to correspond with the movements of the latter as carried by said impaling pins.

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

EDWIN O. DAVIS.

Witnesses:
O. C. BILLMAN,
SAM BILLMAN.