Dec. 8, 1925. 1,564,506

G. B. AMBLER

NEEDLE LOOM

Filed Aug. 5, 1924 2 Sheets-Sheet 1

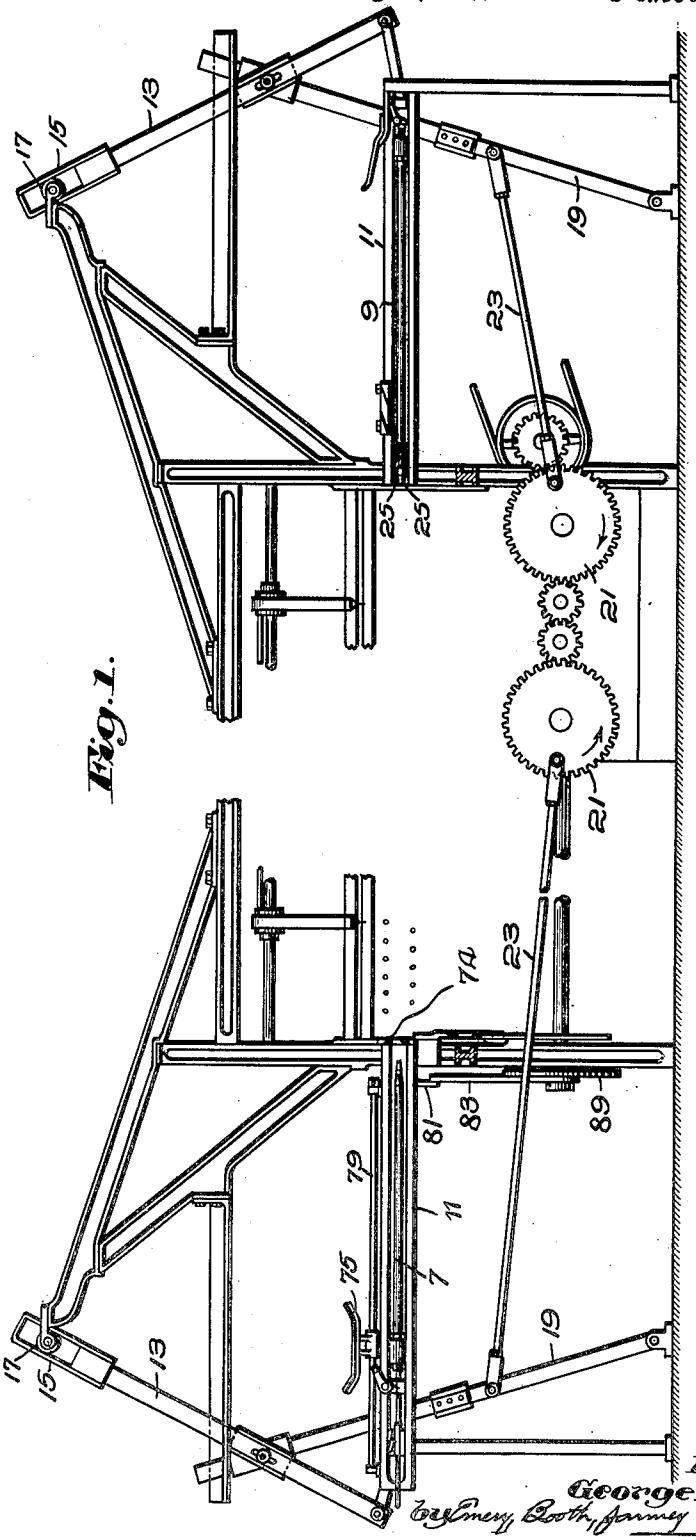


Fig. 1.

Inventor:
George B. Ambler,
by Emery, Booth, Varney & Varney Attys.

10639

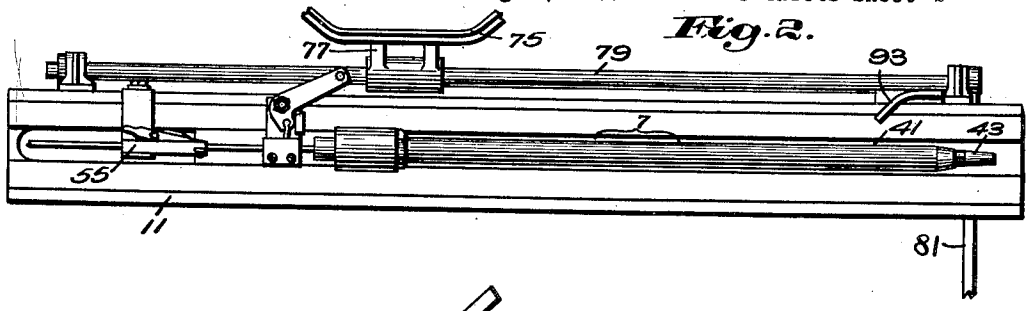
Dec. 8, 1925. 1,564,506

G. B. AMBLER

NEEDLE LOOM

Filed Aug. 5, 1924 2 Sheets-Sheet 2

Fig. 2.



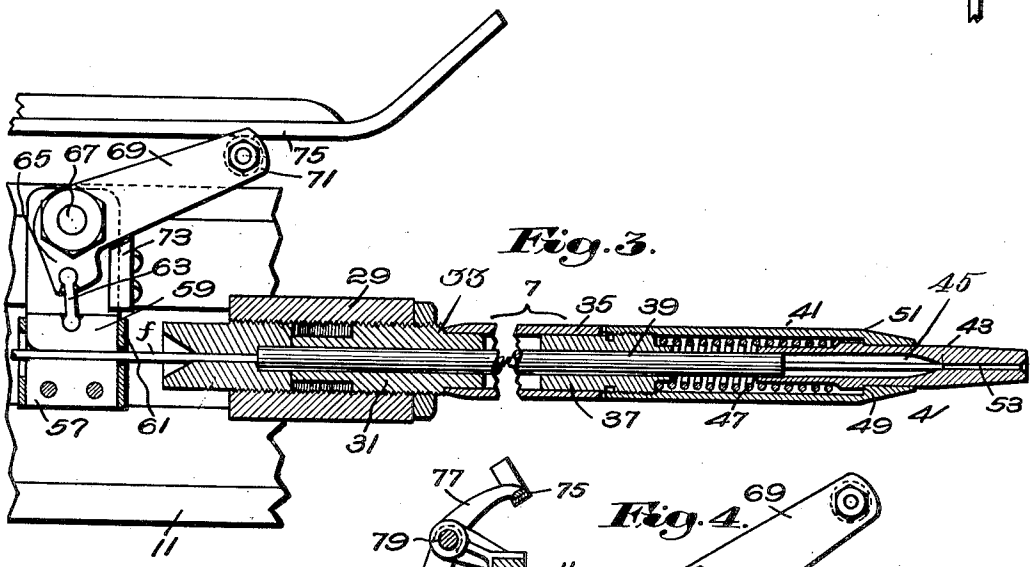


Fig. 3.

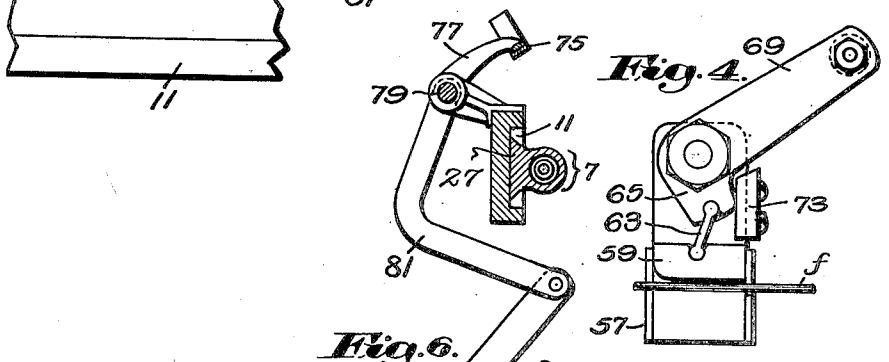


Fig. 4.

Fig. 6.

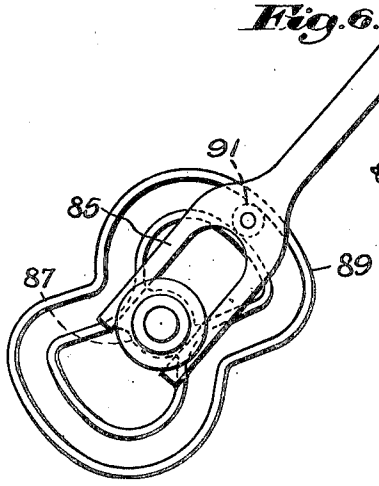
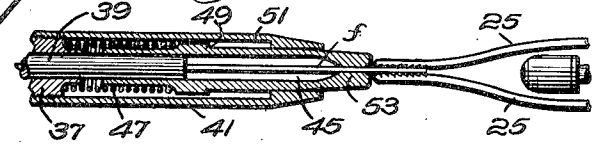


Fig. 5.



Inventor:
George B. Ambler,
by Emery, Booth, Janney & Varney
Attys

Patented Dec. 8, 1925. 1,564,506

UNITED STATES PATENT OFFICE

GEORGE B. AMBLER, OF LEOMINSTER, MASSACHUSETTS, ASSIGNOR TO F. A. WHITNEY CARRIAGE COMPANY, OF LEOMINSTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

NEEDLE LOOM.

Application filed August 5, 1924. Serial No. 730,156.

To all whom it may concern:

Be it known that I, GEORGE B. AMBLER, a citizen of the United States, and a resident of Leominster, county of Worcester, State of Massachusetts, have invented an Improvement in Needle Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to looms of the type commonly known as a needle loom and which embody an element adapted to be reciprocated through the shed and to carry with it in one phase of its reciprocating movement the end of the filling, a length of which is thus carried into the shed and deposited there by the reciprocating element or needle. The needle may be either a retracting needle which enters the shed idly and, seizing the filling, draws it into the shed on its outward movement or a protracting needle which carries the end of the filling forward into the shed on its inward movement, deposits it and leaves it there while it retreats idly, or the loom may be of the double needle type wherein a protracting needle carries the filling part way through the shed and delivers it to a retracting needle which completes the inlaying of the pick of filling.

The present invention has for its object the provision of suitable mechanism for handling the filling and while certain features are applicable to looms of the retracting needle type the invention finds a particular application to a loom which utilizes a protracting needle and I have herein shown by way of example a double needle loom embodying features of construction exemplifying my invention. The construction of the illustrative embodiment of my invention herein disclosed will be readily understood by reference to the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a front elevation of a needle loom, the view being simplified by the omission of many parts not necessary to an understanding of the invention;

Fig. 2 is an elevation on a larger scale of the protracting needle shown in the position which it occupies at the end of its outward stroke;

Fig. 3 is a broken longitudinal section through the same on a larger scale and illustrating the parts after the inward stroke has begun;

Fig. 4 is a fragmentary sectional view corresponding to a portion of Fig. 3 showing the parts of filling clamping means in the position which they occupy in Fig. 2;

Fig. 5 is a fragmentary sectional view illustrating the inner ends of the protracting and retracting needles as the filling is being transferred from the former to the latter; and

Fig. 6 is a skeletonized cross section illustrating a controlling mechanism for the filling gripping device.

Referring to Fig. 1, have there shown in front elevation certain portions of a double needle loom embodying a protracting needle 7 and a retracting needle 9 which are generally elongated rigid elements supported on their outer ends on slides adapted to travel in guideways 11 at either side of the loom and to be reciprocated along these guideways so that they extend into the shed. Any suitable means may be utilized for reciprocating the needles but I have herein shown each as driven by a depending rocker link 13 having a yoke 15 slidably and pivotally connecting the same to a roller 17 supported on an elevated bracket on the frame of the loom. This connection permits endwise shifting of the link 13 and permits the lower end thereof which is connected to the needle to move in a substantially straight line adjacent the guideway 11. The link 13 is oscillated by upstanding rocking lever 19 pivoted adjacent the floor and having its upper end connected to the link 13 at a point above the guideway 11, the lever 19 being oscillated by a crank disc 21 to which it is connected by a connecting rod 23. The oscillating mechanism for each of these is substantially the same except for the length of the connecting rod 23.

This construction is an advantage in permitting a long reciprocating movement while maintaining the position of the needles at a desirably low elevation. It will be understood that the range of movement of the needles is dependent upon the length of the oscillating link which drives them. In the arrangement shown the link 13 may be made considerably longer than the distance between the floor and the guideway 11 and thus the position in which the needles operate may be maintained in desirably low

elevation and yet the needles driven from the shaft at the base of the loom through a wide range. A correspondingly wide fabric may thus be woven.

No shedding mechanism is illustrated. This may be of any suitable type. The beat-up mechanism may also be of any suitable construction, for example, of that shown in my application Serial No. 730,155, filed August 5, 1924.

The retracting needle 9 may be provided at its inner end with jaws 25 as illustrated in Fig. 5 governed in any suitable or desired manner so that as the needle approaches the inner limit of its movement these jaws will open to receive the end of the filling *f* which has been carried forward into the shed by the protracting needle 7. These jaws then close on the filling which is released by the protracting needle and retreat closed to substantially the outer limit of their movement when they are again opened to release the pick of filling and to permit it to be beaten up into the fabric.

Important features of my invention are herein embodied in the protracting needle 7, the construction of which may be clearly understood from Figs. 2 and 3. The needle as a whole is mounted at its outer end on a base 27 (see Fig. 6) slidably in the guideway 11 and in the preferred form shown in Fig. 3 this base also carries a hub-like member 29 in which is screwed a sleeve 31 having a shoulder 33 over which fits one end of a light tube 35 forming the main exterior body of the needle, the opposite end of the tube carrying another sleeve 37. Supported by the sleeve 31 and 37 is a small central tube 39 having a bore adapted snugly but loosely to receive the filling strand *f*, thus maintaining the latter extended in the line of the needle without opportunity for lateral deflection or kinking and guarding the same against being caught by exterior objects. The end of tube 39, as shown in Fig. 3, preferably projects beyond the end of sleeve 37 and into a hollow tubular cap 41 mounted on the end of the sleeve. In the end of cap 41 is received a tip portion 43 having a chamber 45 at its inner end embracing the end of tube 39 with which it is adapted resiliently to telescope when pushed toward the left in Fig. 3 against the action of helical spring 47 interposed between the end of sleeve 37 and the shoulder 49 on the tip 43, which shoulder also cooperates with an annular flange 51 on the cap 41 to limit movement of the tip 43 in the opposite direction. The outer end of the tip 43 has a bore 53 which snugly yet loosely receives the end of the filling and the chamber 45 preferably has walls incurved toward this bore so that if the end of the filling should fall between the right hand end of tube 39 and the left hand end of this bore it may be pushed forward, being held substantially rigid in the tube 39 and will easily find its way into the bore 53.

The filling leads to the needle 7 and is fed to the same through a suitable stationary catch 55 fixedly mounted on the outer end of the guideway 11 which catch is adapted to permit the filling to be drawn therethrough toward the right but holds it against retrograde movement to the left. In the embodiment of the invention herein shown to permit the filling to be drawn into the shed it is clamped to the needle at desired times by a mechanism arranged outwardly of the inner end of the needle formed by the yieldable tip 43. I have herein shown a fixed jaw 57 carried on the slide 27 at the outer end of the main needle body over which the filling passes. Opposing this jaw 57 is a movable jaw 59 which may be moved up and down in the guiding casing 61 away from and toward the fixed jaw 57. This movement is herein effected by a mechism permitting the clamping jaws to maintain themselves in closed position when once moved thereto and I have herein shown a toggle mechanism embodying as one arm thereof a strut 63 having its ends pivotally received in recesses, respectively in the upper surface of movable jaw 59 and an arm 65 of a lever pivoted at 67 to an upright carried by the main slide 27, this arm 65 extending toward the movable jaw 59. The lever in the embodiment of the invention shown is a bell crank having an arm 69 which carries a cam roll 71 by means of which the lever may be rocked to straighten or break the toggle formed by the arm 65 of the lever and the strut 63. If the bell crank is rocked counterclockwise to the position shown in Fig. 3 until the arm 65 is stopped by the transversely extending bar 73, the toggle will be broken and the jaw 57 raised releasing the clamping action of the same and permitting the filling *f* to draw freely between the two jaws. Now, if the lever is rocked clockwise the parts will move to the position shown in Fig. 2 with the toggle at or just beyond dead center and the jaw 59 lowered to clamp the filling against the jaw 57. The upper surface of the transverse bar 73 forms a stop for the arm 69 and prevents the toggle from being thrown sufficiently far beyond dead center to release the clamping pressure.

The operation of the protracting needle is as follows. The parts being in the position shown in Fig. 2 with the filling *f* threaded through the needle and extending through the right hand end thereof, the clamp at the right hand end of the needle is opened. As the needle starts to advance, the arm 69 is depressed clamping the filling and the needle in its forward movement draws the length of the filling through the

holder 55. As it approaches the end of its movement the tip of the needle is presented to the jaws 25 of the retracting needle. In the form of my invention herein shown the ends of the needles are designed normally to meet before the completion of the inward stroke of the needles so that in the normal operation of the loom the jaws 25 press back the yieldable tip 43 of the protracting needle as shown in Fig. 5 and in doing so pass over the end of the filling *f* which slides through the bore 43 on this tip and over which the tip yields telescopically. The jaws 25 then operate to close on the filling as illustrated in Fig. 5, and at the same time the clamping means, which has maintained itself closed with the toggle thrown just over dead center in the position of Fig. 3, is tripped by a swinging of the arm 69 to the position of Fig. 3. The retracting needle then withdraws to the right carrying with it the filling which is no longer clamped to the protracting needle and which is drawn by the retracting needle through the guide 55 and through the main body of the protracting needle 7. The protracting needle retreats sliding over the filling *f*. As it reaches its outer position the filling is severed just to the right of the nose of the needle by the cutter 74 (Fig. 1). The cycle is then repeated.

I will next describe the mechanism herein shown for rocking the lever 69. Referring to Fig. 2, the lever, as the needle moves from the position illustrated toward the right, is depressed by a driven element 75 having an extended surface over which the follower roll 71 may travel and which is lowered at the proper times positively to depress the lever arm 69 and move the mechanism to the position of Fig. 3. For this purpose the element 75 is supported on arms 77 (see Fig. 6) from a rock shaft 79 extending parallel with the guideway 11, which rock shaft may be controlled by a crank arm 81 attached thereto at the inner end thereof where it may be conveniently operated by a pitman 83 guided to move rectilinearly by a forked portion embracing a roll 87 and oscillated at proper intervals by the action of cam 89 cooperating with the cam follower 91 carried by the pitman. In Fig. 6 the member 75 is shown raised in the position of Fig 2. Now, as the cam 89 rotates, the rock shaft 79 will be turned clockwise and the element 75 swung downwardly and in so doing it will act to press downwardly the cam follower 71 on lever 69 as the needle travels inwardly closing the jaw on the filling.

As the needle completes its inward movement the cam follower 71 rides over an upwardly and inwardly sloping fixed cam surface 93 mounted on the inner end of guideway 11 and is thrown upwardly to the position of Fig. 4. This releases the filling which may be seized by the jaws 25 of the retracting needle, as shown in Fig. 5. The lever 69 remains in the position of Fig. 4 during the entire outward movement of the needle as the element 75 is raised out of the way by the action of the cam 89, the said element not operating to close again the gripping jaws until the needle has commenced its inward movement on the next cycle.

The construction herein shown as an example of my invention has many advantages, some of which I shall herein refer to without pretending to be exhaustive.

The protracting needle maintains the filling in line therewith facilitating its insertion in the shed and preventing the possibility of sidewise deflection and kinking. The filling being thus maintained extended in a substantially straight line, it may be clamped to the needle at a point remote from the inner thereof and conveniently at the extreme outer end as herein illustrated, this simplifying the installation and operation of the clamping mechanism and leaving the extreme end of the filling free for operation of the jaws 25 of the retracting needle or other cooperating mechanism on the opposite side of the loom thereon. The mechanism shown in the drawings is compact and rugged. It has few parts and no long or slender element which might bend or break. The provision of the strut 63 received in recesses in the jaw 59 and arm 65 eliminates small pivots which might shear as obviously the bell crank lever and its pivot 67 may be made amply large.

In the preferred form of the invention the tip 43 is adapted normally to yield and to retreat over the filling on each pick. The end of the filling may be severed closely adjacent to the tip of the protracting needle at its outer extreme of movement. During the outward movement of the needle the filling must be free as it is held by the retracting needle or other mechanism. Consequently the clamping jaws of the protracting needle will close only after inward movement of this needle has begun since preferably there is no dwell of the needle which is incessantly reciprocated. There is thus a slight travel of the needle to the right relative to the filling *f* and the severed end of the filling may be withdrawn inwardly of the extreme end of the tip 43. This, however, is an advantage since there is no projecting end of filling which might droop or be bent and so be out of position for delivery to the mechanism to which it is to be transferred. On the contrary, the end of the filling is supported in the line of pick by the bore 53 of the tip which is displaced to the left in the manner indicated by Fig. 5 exposing the end of this filling

for transfer to the jaws 25 or like mechanism. The resiliently yieldable tip 43 also takes care of any possible backlash in the movement of the needles and may, if desired, be utilized for this purpose alone if the filling is so severed that a sufficient portion thereof projects beyond the tip, maintaining itself substantially in a straight line because of its shortness and relatively rigid nature.

The construction shown, wherein the tip is designed normally to yield, also permits desirable tolerance in the timing of the action of the cam 93 which releases the clamping jaw. If the clamping pressure is released the filling *f*, of course, ceases to travel to the left with the needle but as the end of the needle is pushed to the right, it may in any event be displaced beyond the end of the filling strand. At the same time the end of the filling as it is exposed beyond the end of the retreating tip enters between the jaws 25 which are to receive the same and which are the actual elements displacing the yieldable tip and there is no opportunity for failure of the transfer of the filling from one mechanism to another.

I have described in detail the particular embodiment of my invention chosen for purposes of illustration in order that the construction and method of operation of that particular device might clearly be understood and not because these details are essential. Obviously the construction might be widely varied without departing from the principles of the invention.

What I claim as new and desire to secure by Letters Patent I shall express in the following claims:

1. In a needle loom a protracting needle having means to hold the filling extended in line with the body thereof and including a nose at its inner end through which the filling freely passes said nose being yieldably mounted to move from the filling and means remote from the inner end of the needle for gripping the filling.

2. In a needle loom a protracting needle having a hollow body and a telescopically yieldable tubular tip, the filling being adapted to pass through body and tip and means at the outer end of the body for gripping the filling.

3. In a needle loom a protracting needle through which the filling passes, means to grip the filling at a point remote from the inner end of the needle when the latter has begun its inward stroke, the needle having a tip resiliently yieldable to expose the end of the filling to be taken by co-operating filling-handling mechanism at the opposite side of the loom.

4. In a needle loom a protracting needle having a tubular tip through which the filling freely passes, said tip being resiliently yieldable to expose the end of the filling to be taken by co-operating filling-handling mechanism at the opposite side of the loom.

5. In a needle loom means for presenting the end of the filling to a retracting needle comprising a tubular sleeve through which the filling freely passes yieldable telescopically of the filling under impact of the retracting needle to expose the end portion of the filling for action of the latter thereon.

6. In a needle loom means for clamping the filling remote from the end thereof, means receiving the end portion of the filling beyond the clamping means and constructed to maintain the same against substantial lateral deflection, said means being yieldable telescopically of the filling under impact of a retracting needle.

7. A double needle loom comprising a protracting needle and a retracting needle, the former having a tip through which the filling freely extends and yieldably mounted to give rearwardly to the pressure of the retracting needle to expose the filling and means organized rearwardly of said tip for clamping the filling.

8. A double needle loom comprising a protracting needle and a retracting needle, the former having a resiliently telescoping tip having a bore snugly receiving the filling and means organized rearwardly of said tip for clamping the filling whereby said tip may yield under impact of the retracting needle to expose the end of the filling to be taken by the latter while the end of the filling is supported during protracting movement substantially in the line of pick.

9. A loom as defined in claim 8 wherein the needle supports against substantial lateral deflection the portion of the filling between said tip and said clamping means.

10. A protracting needle having a tubular body receiving the filling, means adjacent the outer end thereof for gripping the filling, a tip having a chamber receiving the inner end of the tube, said chamber having walls incurving to a longitudinal terminal bore closely receiving the filling and a spring for maintaining said tip yieldably projected from the tube.

11. In a needle loom a reciprocating protracting needle having a body adapted to support the filling extending longitudinally thereof, a gripping jaw at the outer end of the needle, a strut operating on the jaw, an arm to move the strut and means operating on the arm at the beginning and end of the inward stroke of the needle respectively to close and open the jaw.

12. In a needle loom a reciprocating protracting needle having a body adapted to support the filling extending longitudinally thereof, a gripping jaw at the outer end of the needle, mechanism for working the jaw

having a self-maintaining position wherein it holds the jaw closed, means acting thereon after the needle has completed its outward stroke to close the jaw and a cam into cooperation with which said mechanism moves as it completes its forward stroke for releasing said mechanism from its self-maintaining position.

13. In a needle loom in combination with a protracting needle, means for clamping the filling thereto having a self-maintaining closed position, a shiftable element for operating said means, means operating thereon at the inner position of the needle to release the clamping means, a device operating on the element for closing the clamping means and driving means for said device to move it from the path of said element in the outward movement of the needle and move it into cooperation therewith after outward movement of the needle has ceased.

14. In a needle loom in combination with the needle, means for clamping the filling thereto comprising a jaw over which the filling leads, a cooperating movable jaw, and operating lever having an arm extending toward said latter jaw and a strut interposed between said jaw and said arm and having its ends pivotally received in recesses therein.

15. In a needle loom in combination with the needle, means for clamping the filling thereto comprising a jaw over which the filling leads, a cooperating movable jaw, a toggle mechanism for moving said second jaw including an operating element, a driven device acting on said element to straighten the toggle and a cam into cooperation with which said element rides during movement of the needle for breaking the toggle.

16. In a needle loom means for intermittently clamping the filling remote from its end, a yieldably mounted guide having a bore in which the end of the filling lies, a retracting needle having jaws to engage said guide on either side of the bore and adapted to displace the guide rearwardly along the filling whereby the end of the latter passes between the jaws and means governing said jaws.

17. In a needle loom a protracting needle having means remote from its inner end for intermittently clamping the filling and a yieldably mounted tip having a bore in which the end of the filling lies, mechanism to receive the filling having jaws to engage said tip on either side of the bore and adapted to displace the tip rearwardly along the filling whereby the end of the latter passes between the jaws and means governing the jaws.

18. In a needle loom a protracting needle having a body adapted to sustain a length of filling extended therealong against substantial deflection, having adjacent its outer end means for intermittently clamping the filling and at its inner end a yieldably mounted tip having a bore in which the end of the filling lies, mechanism to receive the filling having jaws to engage said tip on either side of the bore and adapted to displace the tip rearwardly along the filling whereby the end of the latter passes between the jaws and means governing the jaws.

19. In a needle loom a reciprocating protracting needle through which the filling is trained and which sustains the same against substantial lateral deflection, means for severing the filling at the inner end of the needle as the latter completes its outward stroke, clamping means for the filling carried by the needle remote from the inner end thereof governed to close on the filling after the needle commences its inward movement and to release the same as the inward movement ends, said needle having a yieldably mounted tip having a bore through which the end of the filling passes, and means to receive the filling adapted to make contact with said tip as the needle completes its inward stroke to displace the tip rearwardly along the filling to expose the end of the filling to be grasped by said receiving means.

In testimony whereof, I have signed my name to this specification.

GEORGE B. AMBLER.