April 16, 1968 C. J. VASLET 3,378,039

ATTACHMENT FOR NEEDLE LOOM

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FIG.1

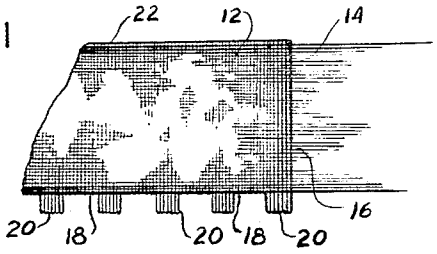


FIG.2

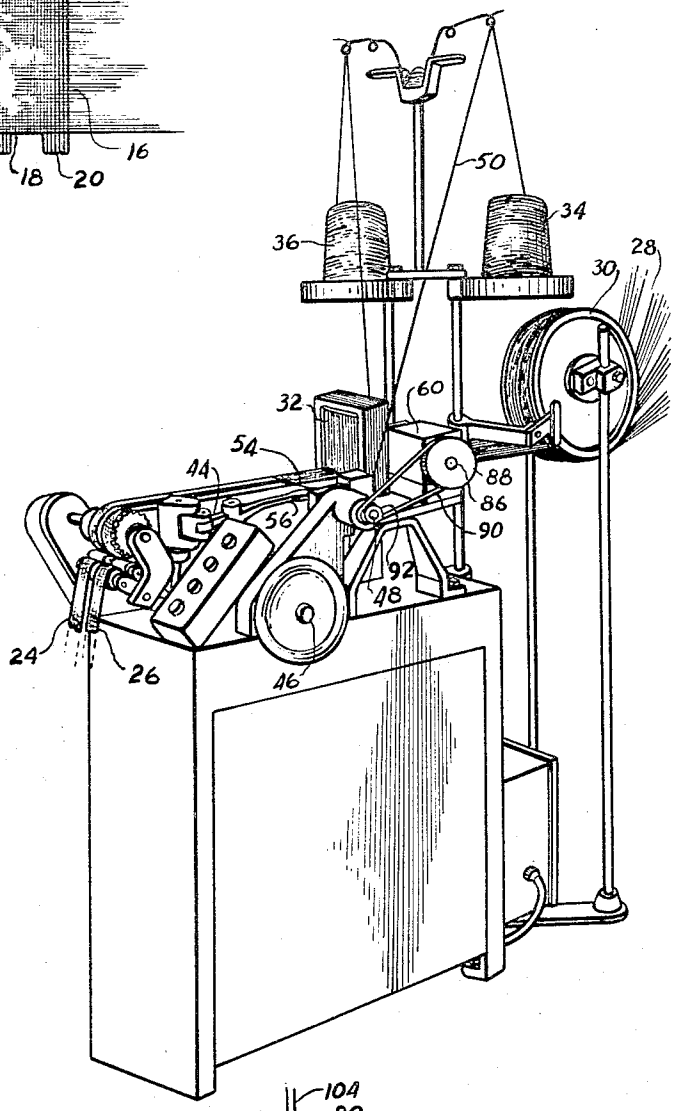


FIG.3

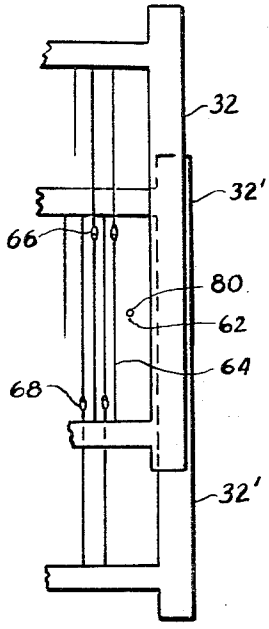
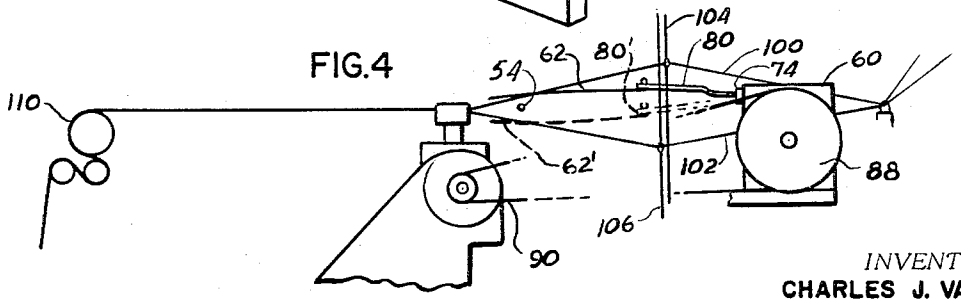


FIG.4



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FIG.5

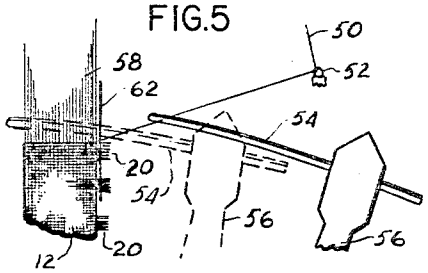


FIG.6

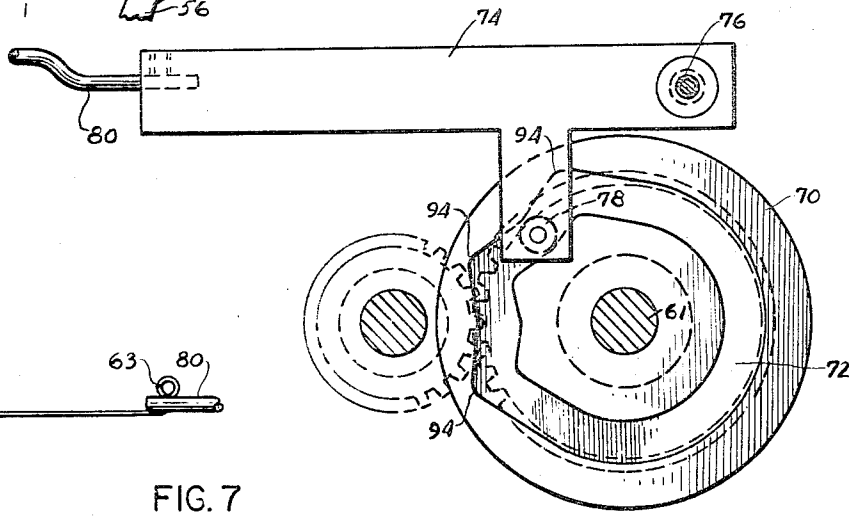


FIG.6A

FIG. 7

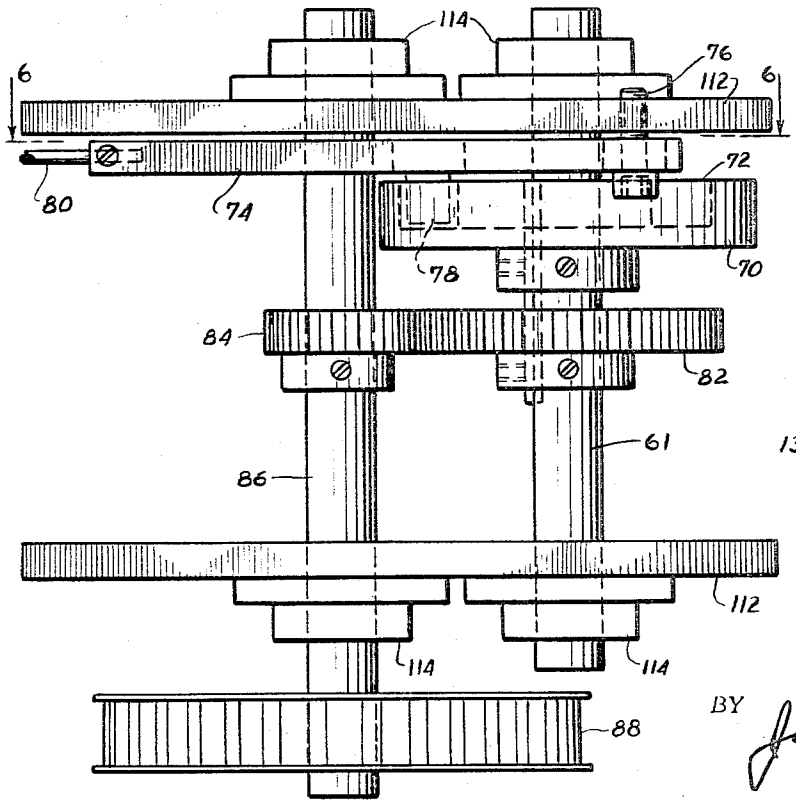


FIG.8

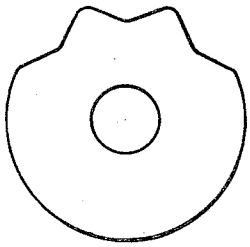
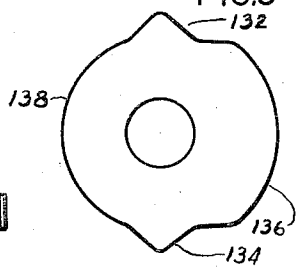


FIG.9



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FIG.10

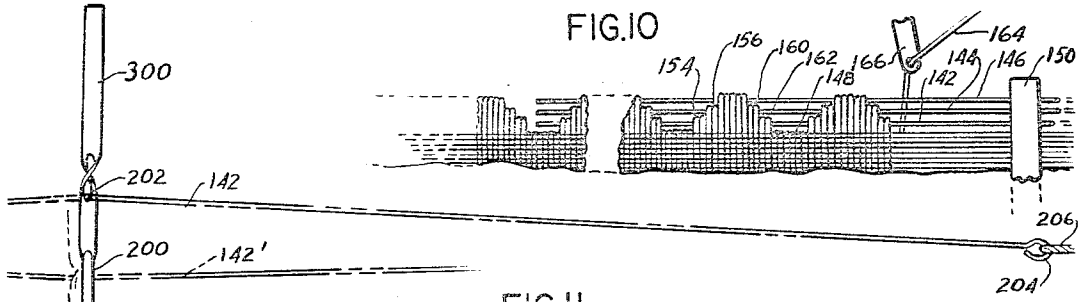


FIG.11

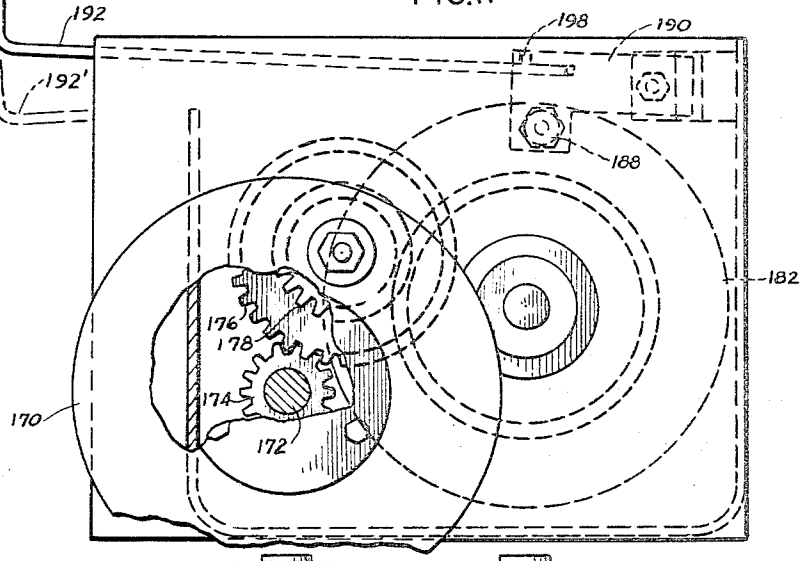
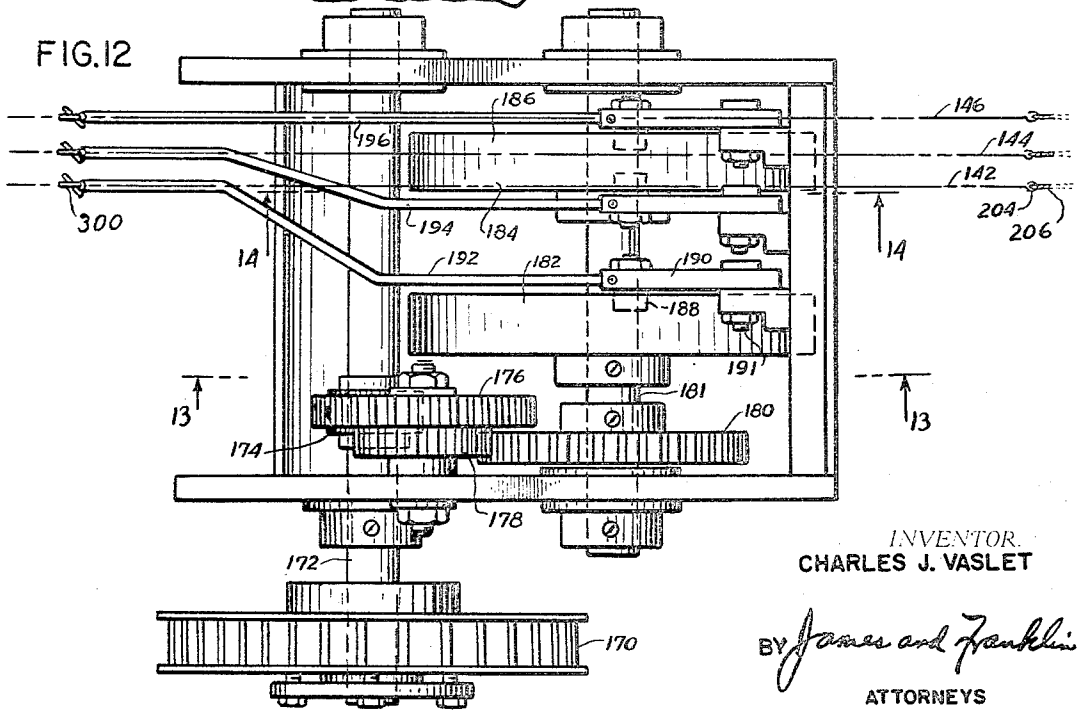


FIG.12



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FIG.13

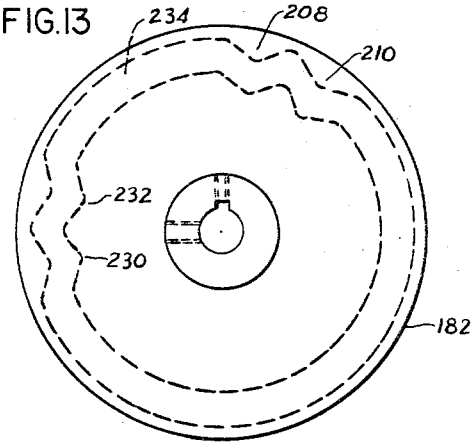


FIG.14

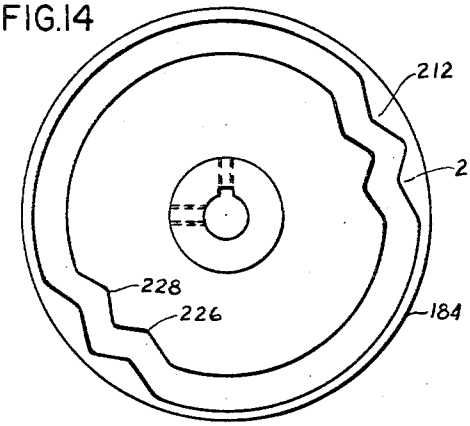


FIG.15

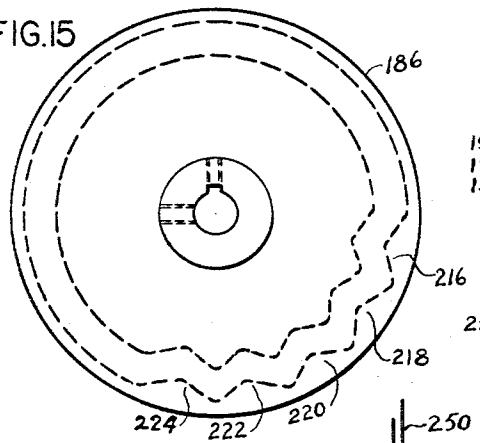


FIG.16

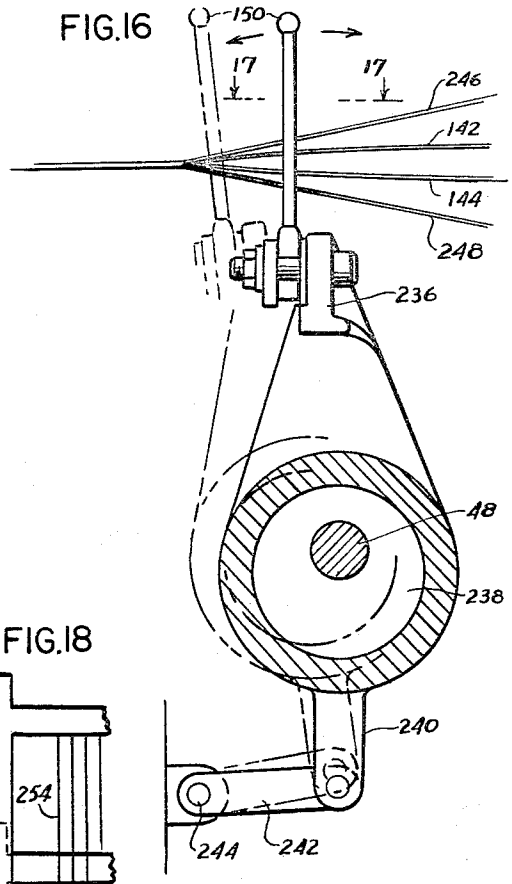


FIG.18

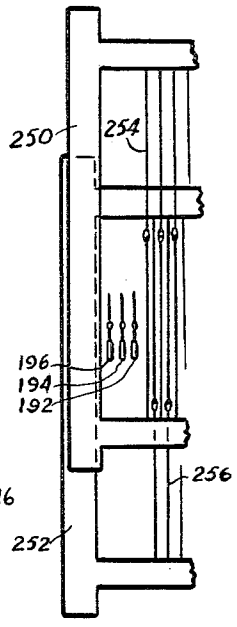


FIG.17

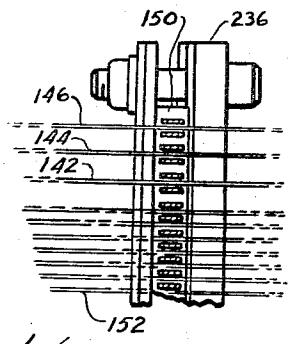
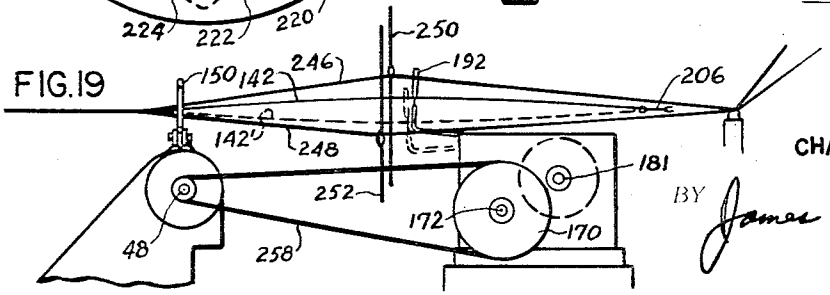


FIG.19



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United States Patent Office

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ATTACHMENT FOR NEEDLE LOOM

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Continuation-in-part of application Ser. No. 577,276, Sept. 6, 1966. This application May 10, 1967, Ser. No. 641,417

15 Claims. (Cl. 139—118)

ABSTRACT OF THE DISCLOSURE

A needle loom weaves tape, and has a latch needle and a filler needle instead of a shuttle. The present improvement is an attachment to produce ornamental loops along one edge of the tape in a repeat pattern which is independent of the harnesses. An edge wire is moved by a cam and cam follower arm to produce the loops. A plurality of collateral edge wires may be disposed at different distances from the tape edge, to produce loops of different lengths, each wire being operated by its own cam. Thus, as an example, three wires may be used to produce in sequence some short loops, some medium loops, some long loops, some medium loops and some short loops, for a scalloped edge.

The present application is a continuation-in-part of my application Ser. No. 577,276, filed Sept. 6, 1966, now abandoned, and having the same title.

Background of the invention

One type of loom for making tape or narrow fabric is a so-called "needle loom" which has the usual harnesses for the warp thread, but has a relatively long insertion needle instead of a shuttle for the weft thread, the thread being caught at the far edge of the tape by a latch needle, much as in a knitting machine. This edge may be considered to be a knitted edge, whereas the other edge at which the insertion needle is operated is a woven edge.

It is sometimes desired to ornament the edge of the tape typically with intermittent groups of loops of weft thread, called "picot loops." Heretofore such loops have been provided by means of an edge wire which passes through the harnesses and is disposed adjacent one edge of the fabric at the path of travel of the insertion needle. This edge wire is reciprocated up and down or vertically across the path of travel of the insertion needle, thereby providing a picot loop for each movement of the edge wire.

Heretofore the edge wire was moved by connection to one of the harnesses. This limits the repeat pattern to the number of picks (weft insertions) in which the harness motion repeats. If the harness is thus used for the weave and also for the edge wire, the design or pattern for the picot loops is limited by the weave pattern.

The general object of the present invention is to overcome the foregoing difficulties. A more specific object is to provide an attachment for the needle loom which operates an edge wire independently of the harnesses. Moreover, a considerable gear reduction may be provided between the reed shaft and the attachment shaft, thus providing a larger repeat pattern.

A further object is to provide an attachment which operates a plurality of edge wires each at different spacing from the edge of the tape to produce loops of different length, there being a cam for each edge wire, for operation independently of the harnesses and of one another.

Summary of the invention

The attachment has a relatively slow speed attachment shaft driven by reduction gearing from the loom shaft. An edge wire is disposed near but spaced from the edge of the narrow fabric or tape adjacent the path of the insertion or filler needle. There is a means driven by the attachment shaft to move the edge wire laterally across the path of travel of the filler needle, this means preferably being a cam and cam follower. In more advanced form there are a plurality of edge wires disposed at different spacing distances from the edge of the tape in order to produce loops of different lengths. These wires pass between different dents of the reed in order to maintain the desired different spacing distances. The attachment shaft has a plurality of cams, one for each edge wire. One cam is operative to form loops, while the other cams are inoperative. In this way different ornamental edges may be produced. For example, scallops may be formed by using, in sequence, some short, medium, long, medium and short loops.

To accomplish the foregoing general objects and other more specific objects which will hereinafter appear, my invention resides in the needle loom and the attachment elements and their relation one to another, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

FIG. 1 shows a fragment of tape or narrow fabric provided with picot loops along one edge;

FIG. 2 is a perspective view showing a needle loom provided with the attachment of the present invention;

FIG. 3 is a fragmentary front elevation of the harnesses, showing the location of the edge wire relative to the harnesses;

FIG. 4 is a schematic vertical elevation explanatory of the invention;

FIG. 5 is a fragmentary plan view at the oscillatable insertion needle;

FIG. 6 is a vertical section taken approximately on the line 6—6 of FIG. 7 and showing the mechanism in the attachment;

FIG. 6A is explanatory of a detail;

FIG. 7 is a plan view of the mechanism in the attachment;

FIG. 8 represents a modified cam which produces the same action as that shown in FIG. 6;

FIG. 9 shows a cam producing two groups of three loops each in one revolution of the cam;

FIG. 10 illustrates the use of three wires to produce a scalloped edge;

FIG. 11 is an elevation showing an attachment with increased gear reduction and suitable to produce the tape of FIG. 10;

FIG. 12 is a plan view of the attachment shown in FIG. 11 provided with three cams to operate three edge wires;

FIG. 13 shows a cam for producing the short loops, and is taken approximately on the line 13—13 of FIG. 12;

FIG. 14 shows a cam for producing the medium loops, and is taken on the line 14—14 of FIG. 12;

FIG. 15 shows a cam for producing the long loops;

FIG. 16 is a fragmentary elevation showing the reed-oscillating mechanism;

FIG. 17 is a fragmentary section taken approximately on the line 17—17 of FIG. 16;

FIG. 18 is a fragmentary elevation showing three edge wire assemblies passing through a clear space in the harnesses; and

FIG. 19 is a schematic elevation explanatory of the mechanism.

Referring to FIG. 1 of the drawing, the narrow fabric or tape **12** is being woven in a needle loom. It comprises warp threads **14** and a weft or filler thread **16**. The edge **18** is a woven edge, and is ornamented by groups of loops of weft thread, sometimes called picot loops, indicated at **20**. The opposite edge **22** of the tape is produced with the aid of a latch needle and is sometimes referred to as a knitted edge.

Referring now to FIG. 2, the particular machine here illustrated is a needle loom of the type made by Crompton and Knowles Corporation of Worcester, Mass. The particular machine is a double machine, it being symmetrical from side to side and producing two narrow fabrics or tapes which are delivered at **24** and **26**. The usual upright bins resting on the floor for receiving the tapes have been omitted.

The two sets of warp threads indicated at **28** come from a rack of spools, not shown, and they are arranged in parallel formation by a drum **30**. They then pass through harnesses indicated at **32**. For simplicity the harnesses **32** are shown aligned or in mid position but it will be understood that except at the illustrated instant of crossover, alternate harnesses are raised while the intermediate harnesses are lowered, in order to put the warp threads in shed formation, ready to receive the insertion needle and weft thread.

The spool of weft or filler thread for the nearer tape is shown at **34**, and that for the further tape is shown at **36**. The weft thread **50** is led to an insertion needle or filler needle **54** which is oscillated in a horizontal path of travel by an oscillatable arm **56** driven by linkage shown at **44**. One main shaft of the loom is located at **45**, and the so-called "reed shaft" is indicated at **48**. The latter turns in one-to-one ratio with the operation of the insertion needle **54**.

Referring to FIG. 5, the weft thread **50** is guided by a fixed eye **52** to the insertion needle **54** which is carried by an oscillatable arm or needle carrier **56**. The needle **54** moves through the shed of warp threads **58**, as is illustrated by the change from the solid line position to the broken line position. This carries the weft thread to the left side of the tape **12**, whereupon it is hooked up by a latch needle, not shown, and the insertion needle **54** is retracted. The harnesses then change the shed, and the insertion needle makes another traverse with the weft thread. The wefts then are double threads. The advantage of this type of loom is its elimination of a shuttle and bobbin, and its very high speed operation, which may be at say 2200 insertions per minute.

Reverting to FIG. 2, it will also be understood that there is an arm **56** or carrier with an insertion needle **54** on each side of the machine, for weaving the two tapes **24** and **26**. The harnesses **32** are wide enough to provide heddles for both sets of warp threads.

The picot loops **20** (FIG. 1) are formed by means of an attachment generally designated **60** (FIG. 2) and having a relatively slow speed attachment shaft indicated at **61** in FIGS. 6 and 7. There is reduction gearing between the reed shaft **48** (FIG. 2) and the attachment shaft. An edge wire **62** (FIGS. 3, 4 and 5) is disposed collaterally of the edge of the tape adjacent the path of the insertion needle **54**, and the said wire is reciprocated vertically across the path of travel of the insertion needle. As viewed in FIG. 4 the edge wire **62** moves up and down between a position just above the needle path, here shown in solid lines, and a position **62'** just below the needle path which is shown in broken lines. This is done while the insertion needle is retracted and it will be seen that this will form a loop of weft thread at the edge of the tape.

FIG. 3 shows how the edge wire **62** preferably passes through the harnesses **32** and **32'** between an endmost heddle **64** and its harness **32**. The adjacent harness **32'**

is shown in lowered position, while harness **32** is in raised position, so that the warp threads passing through the eyes **66** and **68** of the heddles will be put in shed formation, whereas the edge wire **62** remains close to mid position, although it does move up and down enough to clear the insertion needle and to form a loop resulting from oscillation of the insertion needle. Only two harnesses are shown in FIG. 3, but there may be four or more, and the edge wire passes through all of them.

The mechanism of the attachment may be described in greater detail with reference to FIGS. 6 and 7 of the drawing. The housing carries the attachment shaft **61**, which in turn carries a pattern cam **70**. In this case the cam surface is a groove **72** and is formed in one face of the cam. There is a cam follower arm **74**, pivoted at **76**, and carrying a cam roller **78** received in the cam groove **72**. Arm **74** carries an edge wire holder **80** only one end of which is shown in FIGS. 6 and 7, it being understood that this is a stiff rod (say one-eighth inch diameter) which extends to the left as viewed in the drawing, and extends to but not through the harness frames as shown at **80, 62** in FIG. 3. The edge wire itself may be a piece of resilient steel piano wire 0.028 in size. This wire passes through the harness frames. Its working end is plain or pointed, and its opposite end is passed through an eye and extended from the end of the edge wire holder **80**.

One way in which this may be done is shown in FIG. 6A, in which the end of the rod or wire holder **80** has a thin vertical hole through which the wire **62** is passed downward to its rear end, at which a loop **63** is preliminarily bent and twisted. The wire **62** then is bent forward as shown, so that it becomes an extension of the rod **80**. This wire **62** may have a length of say six inches, and its free end extends through the picot loops for an appreciable distance, say an inch or two, as is indicated in FIG. 5. Its up and down motion is therefore limited by the loops themselves, but it is resilient and readily bendable, and therefore the driving mechanism may tend to move it an appreciable distance, say three-quarters of an inch above and below center line, but the actual motion at the insertion needle is small, being limited by the loops, but it is enough to easily clear the insertion needle as it passes above or below the edge wire.

The rod **80** may be considered an extension of the edge wire **62**, or an extension of the arm **74**, but a more general description would be that the edge wire and rod and arm all form an edge wire assembly which passes through the harnesses and which is actuated by the cam.

Attachment shaft **61** (FIGS. 6 and 7) is driven by reduction gearing, and in the present case carries a gear **82** meshing with a pinion **84** on an intermediate shaft **86**. The outer end of shaft **86** carries a timing pulley **88**.

Referring now to FIG. 2, timing pulley **88** is driven by a timing belt **90**, and a driving pulley **92**, which is carried on the reed shaft **48** previously mentioned. The timing pulley drive is positive, and in the present case provides a four-to-one reduction. Also in the present case the gear reduction at **84, 82** is a four-to-one reduction, given a total speed reduction of sixteen-to-one, that is, the pattern cam **70** of the attachment turns once for each sixteen picks or oscillations of the insertion needle.

Reverting to FIG. 6, the particular pattern cam here shown has three rises and falls, indicated at **94**, which occupy three-eighths of the cam, and which provide six loops out of the sixteen picks.

FIG. 4 is a schematic view showing how the warp threads are put into shed formation at **100** and **102**, by the raised and lowered heddles **104** and **106**. These heddles are for the basic or ground weave. There are additional heddles and harnesses (not shown) for producing a pattern or pile surface on the fabric. FIG. 4 also shows how attachment **60** carries cam follower arm **74** and wire holder **80** and edge wire **62**. It further shows how the

edge wire 62 moves between its raised solid line position 62, and its lowered broken line position 62', above and below the path of the insertion needle 54. The feed of the finished tape is indicated at 110. The holder 80 preferably stops short of the harness frames, rather than passing through as suggested in FIG. 4.

In FIG. 7 only the sidewalls of the attachment housing are indicated at 112, and they carry fixed bearings 114 for the shafts 61 and 86. The bearings are preferably antifriction bearings, because the needle loom operates at very high speed. It will also be understood that there is another attachment like the attachment 60 at the other side of the loom, when the loom is weaving two strands as here illustrated, and if both tapes are to be provided with pivot loops. It will also be understood that a greater gear reduction may be provided, in which case the repeat pattern of the picot loops may repeat at a number greater than sixteen.

The cam groove 72 shown in FIG. 6 is mostly of reduced radius, with raised parts 94, and it will be understood that the first rise produces one loop, the succeeding drop produces a second loop, the next rise produces a third loop, and so on. With three rises and drops as shown in FIG. 6 there will be six loops in sixteen picks. Another way to describe it is to say that there is a double weft in each shed, and that there are three double loops. A rise and a drop produces a double loop.

The same result may be obtained using a cam of large diameter and with three cam drops instead of three rises, as shown schematically in FIG. 8. Here again there will be six loops or three double loops in sixteen picks, and the only difference in operation is that in FIG. 6 the edge wire, when inoperative for ten picks, is in its lowered position beneath the path of the insertion needle 54, as shown in broken lines at 62' in FIG. 4, whereas with the cam of FIG. 8 the edge wire 62, when idle for ten picks, would be in the raised position shown in solid lines at 62 in FIG. 4, above the path of the insertion needle 54.

It will be understood that any desired even number of loops may be provided, say two, four or eight, instead of six as here illustrated. It will also be understood that several groups of loops may be provided in one rotation of the cam, there then being a sequence of say two loops, six picks without loops, another two loops, and six picks without loops, making up sixteen picks in all.

When working with two groups of loops each group may have an odd number, because the total still is an even number. Thus, referring to FIG. 9, the cam 130 would produce two groups of three loops each, there being two rises and one drop at 132 for three loops, and two drops and one rise at 134 for another three loops. The edge wire then would be idle in its raised position for five picks at 136 where the cam is of large radius, and it would be idle in its down position for another five picks at 138 where the cam is of small radius.

The method of forming a different ornamental edge, for example a scalloped edge, may be described with reference to FIG. 10. In this case it is the left tape that is being worked on, that is, the tape 24 in FIG. 2. Three edge wires 142, 144 and 146 are disposed at progressively increased spacing from the outer edge 148 of the tape, this spacing being determined and maintained by the reed 150. FIG. 17 also shows how the edge wires 142, 144 and 146 pass between different dents of the reed 150 to establish the spacing of the edge wires, and thus the lengths of the loops produced thereby. The warp threads passing through the reed 150 are suggested in broken lines at 152, and their spacing ordinarily is much closer than the spacing between the edge wires.

Reverting to FIG. 10, it will be seen that in the present case there are two short loops 154 followed by two medium loops 156, followed by five long loops 158, followed by two medium loops 160, followed by two short loops 162. Each loop corresponds to two filler threads or picks, that is, they are really double loops using two threads, and in the present case there are then six picks indicated at 148 without loops, making up thirty-two picks in all for each repeat pattern. The weft or filler thread is shown at 164, it passing through the eye of filler needle 166, which, as before, is carried by a filler arm or carrier (not shown) which moves in and out of the shed, as previously described in connection with FIG. 5. At its inside position the filler needle engages a latch needle, not shown.

FIG. 10 also shows how the forward or free ends of the edge wires extend through the already formed loops, and indeed, as is common with edge wires they may extend in this fashion for many inches. The edge wire 146 passes through only the long loops 158. The edge wire 144 passes through both the medium and long loops, and the edge wire 142 passes through all of the loops.

Referring now to FIGS. 11 and 12, the timing pulley 170 corresponds to the pulley 88 in FIG. 7, it being driven by a timing belt from the reed shaft shown at 48 in FIGS. 2, 16, and 19. Pulley 170 drives a shaft 172 carrying a pinion 174 meshing with a gear 176, secured to a pinion 178, which meshes with a gear 180 on the main attachment shaft or cam shaft 181. In the particular case shown the timing pulleys provide a reduction of four to one, and the gearing provides a reduction of eight to one, making a total reduction of thirty-two to one.

The cam shaft 181 carries three cams 182, 184 and 186. Cam 182 engages a cam roller 188 on a carrier 190 pivoted at 191. This carries a cam follower rod 192. The cams 184 and 186 similarly operate cam follower rods 194 and 196. The rods may be appropriately bent sideward to bring them into close spacing, as suggested at the left of FIG. 12.

Separate cam discs can be used for each cam groove, but in the present case, the cam grooves 184 and 186 are formed on opposite faces of a single cam disc. The relation between cam 182, cam roller 188, and its carrier 190 is also shown in FIG. 11. This shows how carrier 190 has a hole or socket to receive one end of the cam follower rod 192, secured in place by a set screw 198. Each of the rods is bent upwardly, as shown at 200, and has an opening or eye 202 through which the edge wire, in this case the edge wire 142, passes. The upward bent part may be flattened and twisted for the hole 202. The cam moves the cam follower rod 192 up and down, between the solid line position 192 and the broken line position 192', thereby moving the edge wire between the position 142 and the position 142'.

The edge wires may extend rearwardly as shown, but for a longer distance, and at their rear ends may be formed into an eye or hook indicated at 204, these eyes being tied in any convenient manner to a stationary part of the loom, as indicated at 206. In FIG. 12 separate ties are shown, but in practice all three wires may be tied together.

Referring now to FIG. 13, the cam 182 has cam drops at 208 and 210 to produce the first two short double thread loops. Referring next to FIG. 14, the cam 184 has drops at 212 and 214 to produce two medium length double thread loops immediately following the two short loops. It may be noted in FIGS. 13, 14 and 15 that the cams have keyways which are disposed upward, for aligned position, and that the drops 212 and 214 in FIG. 14 follow the drops 208 and 210 in FIG. 13. In FIG. 15 the cam 186 has five drops 216, 218, 220, 222 and 224, which produce five long double thread loops immediately following the two medium loops. Reverting next to FIG. 14, the cam drops 226 and 228 produce two medium double thread loops immediately following the five long loops. Reverting now to FIG. 13, the cam drops 230 and 232 produce two short double thread loops immediately following the two medium loops. At 234 the cam 182 is of uniform radius, and at this time all of the edge wires are in raised position out of the path of the filler needle,

and are therefore inoperative. This provides the space between loops shown at **148** in FIG. 10.

In the loom here shown, the reed **150** (FIG. 16) is carried by a reed holder **236**, which is oscillated by an eccentric **238** on the reed shaft **48**. The reed holder is extended downward at **240** and is connected to a drag link **242** which is pivoted on the machine frame at **244**. The reed is thus given an oscillatory motion, it being moved to the right when the filler needle is moved into the shed, and it being moved to the left when the filler needle is retracted, the reed then serving to press the last filler threads into the fell.

The harnesses then reverse the shed. In FIG. 16, the shed of warp threads is suggested at **246**, **248**, and the edge wires are suggested at **142** and **144**. FIG. 17 shows how the edge wires pass through spaces between dents of the reed, to maintain a desired spacing from the edge of the tape, the warp threads being suggested at **152**.

FIG. 18 corresponds to FIG. 3, previously described, and shows raised and lowered harnesses **250** and **252**, with raised and lowered heddles **254** and **256** to produce the shed. They further show the clear space outside the endmost heddle where the three edge wires are located, these being moved by the three cam follower rods **192**, **194** and **196**.

Referring now to FIG. 19, reed shaft **48** oscillates reed **150**, and also through timing belt **258** drives timing pulley **170**, which through gear reduction previously described, drives the slow speed cam shaft **181**. The raised and lowered harnesses are indicated at **250** and **252**, producing a shed of warp threads suggested at **246**, **248**. This is for the ground weave. In practice there are two or more additional harnesses to make possible variations in the appearance of the body of the tape. A cam follower rod is shown at **192** in raised position, it raising the edge wire **142**. In its down position it would move the edge wire to the dotted line position **142'**. It will be understood that the edge wires may be several feet in length, the left or forward ends passing through the reed **150** and through a considerable length of the already formed loops, while the rear ends of the edge wires are simply tied together and to any convenient part of the loom as indicated at **206**, to hold them against moving forward with the tape.

The upward extension **300** (FIG. 11) of the flattened cam follower rod **192** is used for all three rods. This avoids mutual interference which might otherwise occur because the rods are so close to one another.

In FIG. 19 the cam follower rods are shown turned upward behind the harnesses. Alternatively the cam follower rods may pass through the harnesses. This depends on the length of the cam follower rods and the location of the mounting of the attachment on the loom and other such factors. Either arrangement is usable.

To form the same scalloped edge on both tapes when using a double loom, as shown in FIG. 2, one might use two complete attachments, but it is simpler to provide three additional rods, generally like the left ends of the rods **192**, **194** and **196** shown in FIG. 12, these being bent sideward with a drop and rise, and being welded to respective ones of the three arms shown in FIG. 12. Thus, each arm acts as a double arm without requiring duplication of the cams and cam rollers. In such case the attachment housing shown in FIGS. 11 and 12 may underlie the warp threads for both tapes, thus providing ample room for the attachment housing. The drop and rise referred to is simply a downward bend to avoid interference between one double rod and another double rod where they cross one another.

In the particular example shown in FIGS. 13, 14 and 15, the angle occupied by a cam drop from top to bottom is 11 degrees 15 minutes. In FIG. 13 the first cam drop starts at zero degrees, considering the keyway to be zero, and reckoning in clockwise direction. The clear space or uniform radius distance at **234** going in counterclockwise direction is 67 degrees 30 minutes.

In FIG. 14 the first cam drop starts at 45 degrees going in clockwise direction. The clear space between the two sets of cam drops occupies 112 degrees 30 minutes. In FIG. 15 the first cam drop starts at 90 degrees, going in clockwise direction. These values are given by way of example, and not in limitation of the invention.

In addition to proper orientation of the cams relative to one another on the keyed shaft, they also must be in proper relation as well as in synchronism to the rest of the machine, so that a change of wire position takes place while the filler needle is retracted. It is for that reason that the drive of the attachment must be a positive one, as by use of a timing belt and timing pulleys, shown at **90** in FIG. 2, and at **258** in FIG. 19.

As will be readily understood by those familiar with this art, the single edge wire for producing picot loops described in connection with FIGS. 1 through 7, may be constructed and used in the same fashion as described for the three wires, that is, its left end passes through the reed and through many of the previously formed loops, as was shown in FIG. 5, but in FIGS. 4 and 5 the reed and the mechanism to oscillate the same were omitted in order to simplify the drawing. Also the edge wire after passing through an eye or opening in the cam follower rod, may and preferably does extend rearward to be tied to a convenient part of the loom, as shown in FIG. 19, instead of terminating at the cam follower rod as suggested in FIG. 6A. The wire then may be several feet long.

It is believed that the construction and method of use of my improved attachment for a needle loom, as well as as the advantages thereof, will be apparent from the foregoing detailed description. The attachment makes it possible to provide an ornamental edge, typically picot loops, without using any of the harnesses for that purpose. This makes for greater flexibility as between the loop pattern and the weave pattern. Moreover, the number of picks available before repeating the picot loop pattern may be greatly increased, by using an appropriate amount of gear reduction between the reed shaft and the attachment shaft carrying the pattern cam of the attachment.

By using a plurality of edge wires disposed at different distances from the edge of the tape, the ornamental loops may be of different lengths, thereby producing a more elaborate ornamentation, for example, a scalloped edge.

It will be apparent that while I have shown and described the invention in a preferred form, changes may be made without departing from the scope of the invention, as sought to be defined in the following claims.

I claim:

1. An attachment for a narrow fabric needle loom having harnesses for warp threads, an insertion needle for a weft thread, and means including a loom shaft to drive the insertion needle and the harnesses, said attachment serving to produce an ornamental edge in a desired repeat pattern along one edge of the narrow fabric, and comprising a relatively slow speed attachment shaft, reduction gearing between said loom shaft and said attachment shaft, an edge wire disposed near but spaced from the edge of the fabric adjacent the path of the insertion needle, and means driven by said attachment shaft to reciprocate said edge wire vertically across the path of travel of said insertion needle.

2. An attachment for a needle loom as defined in claim **1**, in which the edge wire assembly passes through the harnesses near one edge of the harnesses in a space between each endmost heddle and its harness.

3. A attachment for a needle loom as defined in claim **1**, in which the edge wire, considered from front to rear, passes through already made edge loops, and next passes through the reed of the loom in order to maintain the desired spacing of the edge wire from the edge of the tape, and next passes through the eye of a cam follower arm, and at its rear end is tied to a part of the loom to hold the wire against forward movement.

4. An attachment for a needle loom as defined in claim

1, in which the attachment comprises a cam defining the ornamental edge pattern and driven by the attachment shaft, a cam follower arm carrying a cam roller engaging said cam, and means operatively connecting said edge wire to said cam follower arm for actuation thereby.

5. An attachment for a needle loom as defined in claim 4, in which the arm and edge wire assembly passes through the harnesses near one edge of the harnesses in a space between each endmost heddle and its harness.

6. An attachment for a needle loom as defined in claim 4, in which the reduction gearing between the loom shaft and the attachment shaft comprises a timing belt and pulleys providing a four-to-one reduction, and a pinion and gear in the attachment driven by said timing belt and providing an additional four-to-one reduction, whereby the ornamental edge pattern repeats after sixteen picks.

7. An attachment for a needle loom as defined in claim 4, in which the edge wire, considered from front to rear, passes through already made edge loops, and next passes through the reed of the loom in order to maintain the desired spacing of the edge wire from the edge of the tape, and next passes through the eye of a cam follower arm, and at its rear end is tied to a part of the loom to hold the wire against forward movement.

8. An attachment for a needle loom as defined in claim 7, in which there are a plurality of edge wires disposed at different spacing distances from the edge of the tape in order to produce loops of different lengths, said wires passing between different dents of the reed of the loom in order to maintain the desired different spacing distances, and in which there is a cam and cam follower arm for each wire, one of said cams being operative to cause the formation of loops while the other cam or cams are inoperative to cause the formation of loops, the forward end of an edge wire which is spaced further from the tape passing through the longer loops, and the forward end of an edge wire nearer the edge of the tape passing through both longer and shorter loops.

9. An attachment for a needle loom as defined in claim 4, in which there are a plurality of edge wires disposed at different spacing distances from the edge of the tape in order to produce loops of different lengths, said wires passing between different dents of the reed of the loom in order to maintain the desired different spacing distances, and in which there is a cam and cam follower arm for each wire, one of said cams being operative to cause the formation of loops while the other cam or cams are inoperative to cause the formation of loops, the forward end of an edge wire which is spaced further from the tape passing through the longer loops, and the forward end of an edge wire nearer the edge of the tape passing through both longer and shorter loops.

10. An attachment for a needle loom as defined in claim 9, in which there are three edge wires for respectively producing short, medium and long loops, and in which the cams are so shaped and so related as to produce in sequence some short loops, some medium loops, some long loops, some medium loops, and some short loops, whereby the tape is ornamented with a scalloped edge.

11. An attachment for a needle loom as defined in claim 10, in which thte reduction gearing between the loom shaft and the attachment shaft comprises a timing belt and pulleys providing a first speed reduction, and gearing in the attachment driven by said timing belt and providing an additional speed reduction, the total reduction being thirty-two-to-one, whereby the ornamental edge pattern repeats after thirty-two picks.

12. An attachment for a needle loom as defined in claim 9, in which the reduction gearing between the loom shaft and the attachment shaft comprises a timing belt and pulleys prividing a first speed reduction, and gearing in the attachment driven by said timing belt and providing an additional speed reduction, the total reduction being thirty-two-to-one, whereby the ornamental edge pattern repeats after thirty-two picks.

13. An attachment for a needle loom as defined in claim 4, in which there are a plurality of edge wires disposed at different spacing distances from the edge of the tape in order to produce loops of different lengths, and in which there is a cam and cam follower arm for each wire, one of said cams being operative to cause the formation of loops while the other cam or cams are inoperative to cause the formation of loops.

14. An attachment for a needle loom as defined in claim 13, in which there are three edge wires for respectively producing short, medium and long loops, and in which the cams are so shaped and so related as to produce in loops of different length in a sequence which gives a desired edge pattern.

15. An attachment for a narrow fabric needle loom having harnesses for warp threads, an insertion needle for a weft thread, and means including a loom shaft to drive the insertion needle and the harnesses, said attachment serving to produce an ornamental edge in a desired repeat pattern along one edge of the narrow fabric, and comprising a relatively slow speed attachment shaft, reduction gearing between said loom shaft and said attachment shaft, a generally horizontal wire disposed near and generally parallel to the edge of the fabric adjacent the path of the insertion needle, an arm carrying said wire and disposed rearward of said wire, and cam and cam follower means driven by said attachment shaft to reciprocate said wire in a direction generally perpendicular to the length of the wire.

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