April 6, 1954 H. J. SMILEY 2,674,270

PILE WIRE FOR LOOMS

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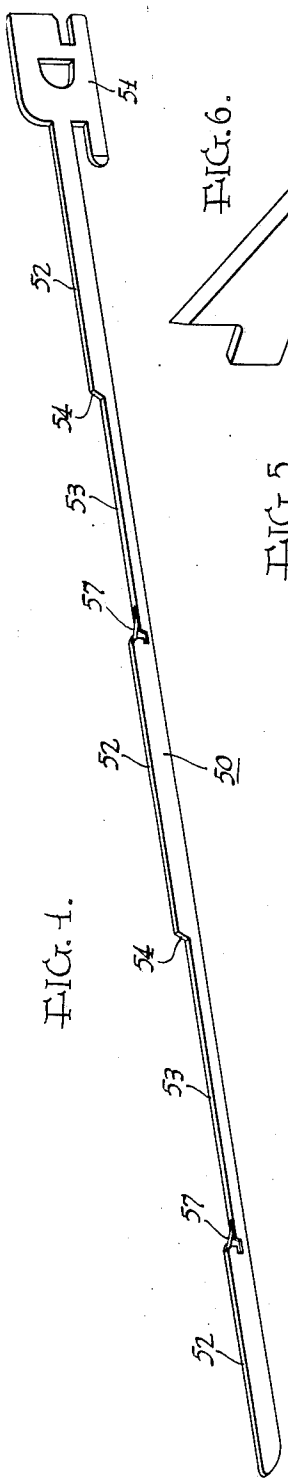


FIG. 1.

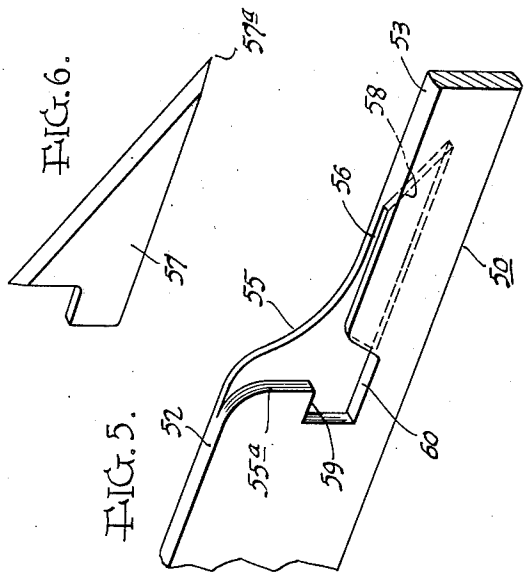


FIG. 5.

FIG. 6.

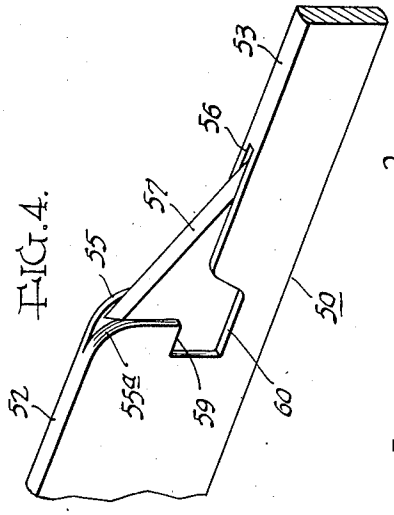


FIG. 4.

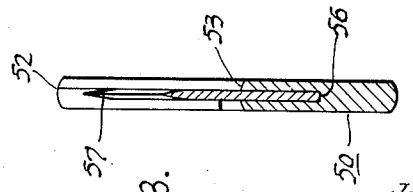


FIG. 3.

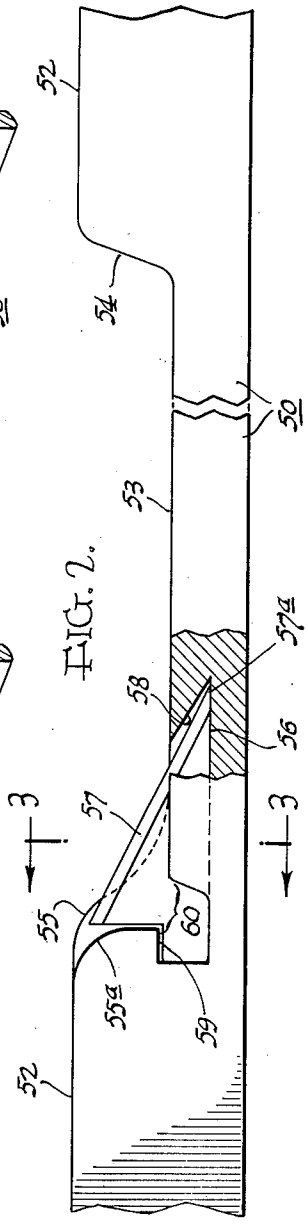


FIG. 2.

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PILE WIRE FOR LOOMS

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FIG. 7.

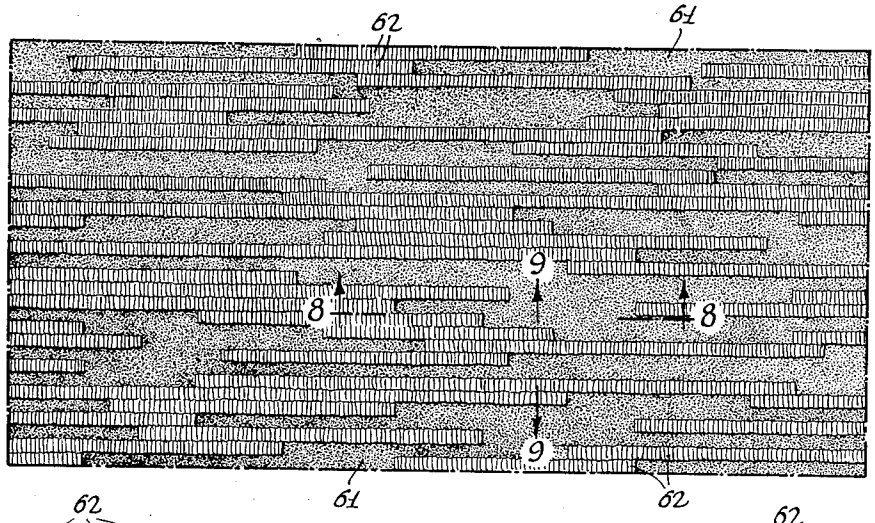


FIG. 8.

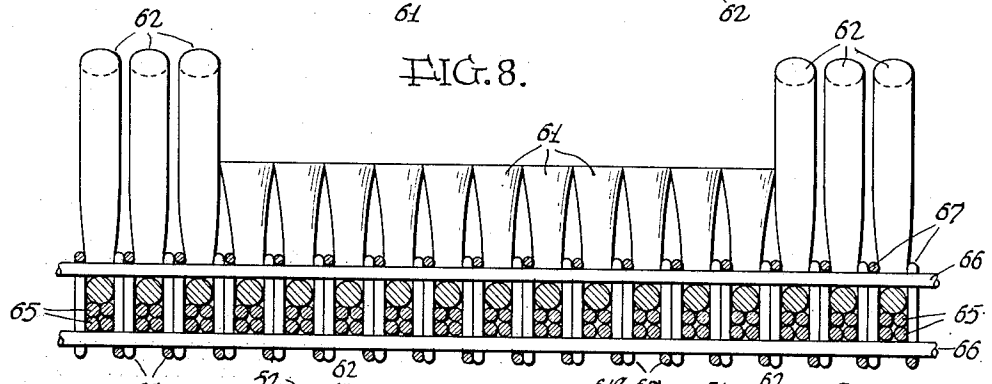


FIG. 10.

FIG. 9.

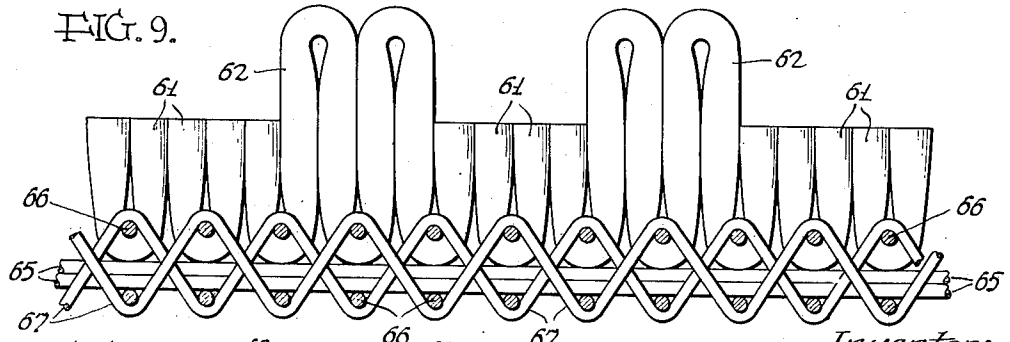
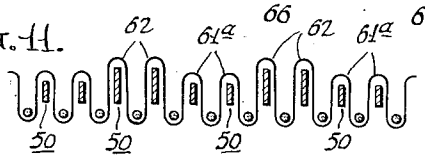


FIG. 11.



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PILE WIRE FOR LOOMS

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FIG. 12.

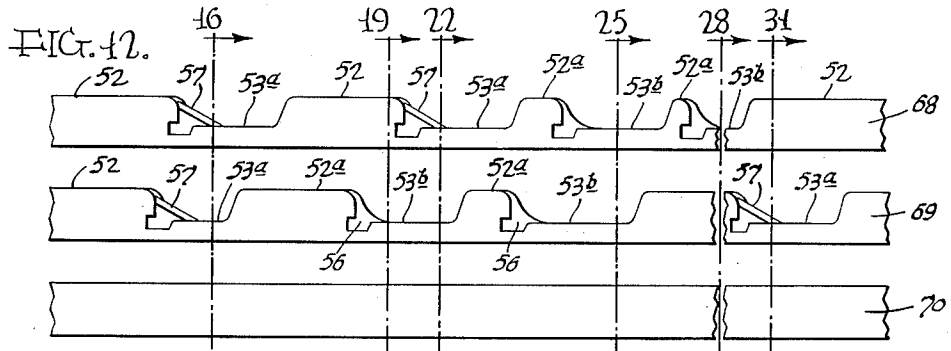


FIG. 13.

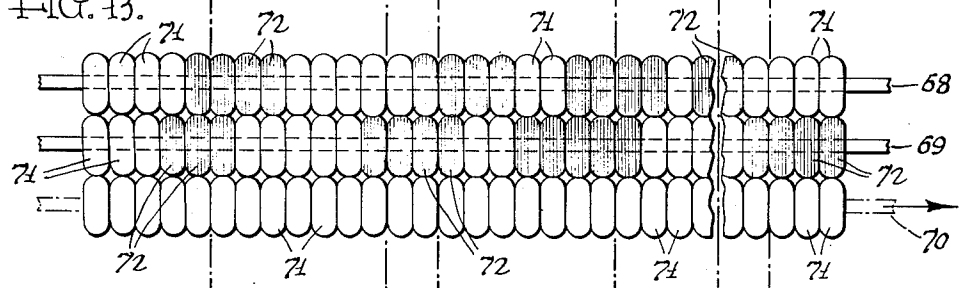


FIG. 14.

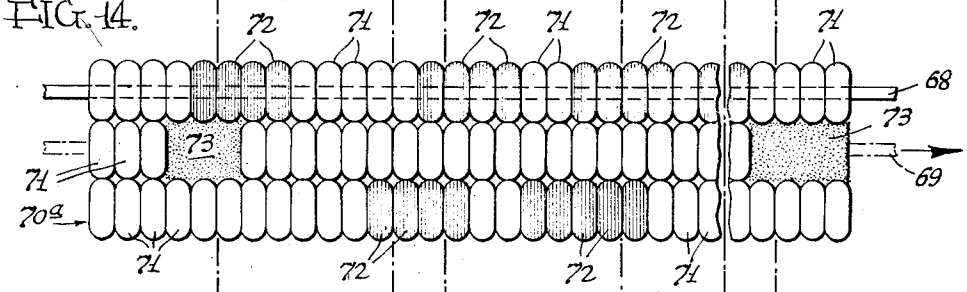
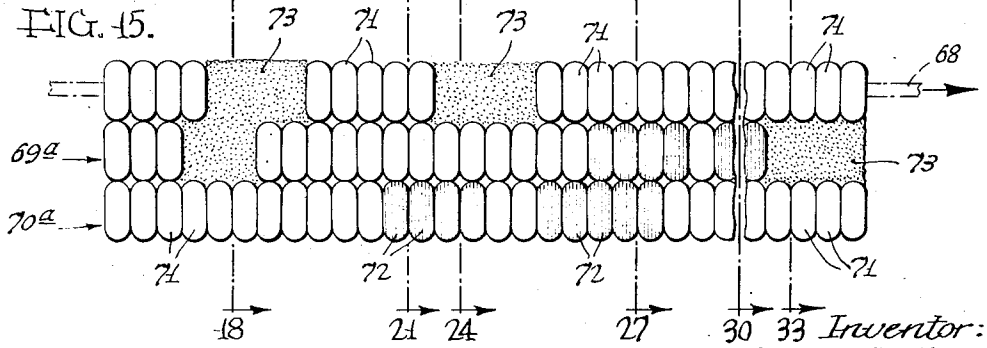


FIG. 15.



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PILE WIRE FOR LOOMS

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FIG. 16.

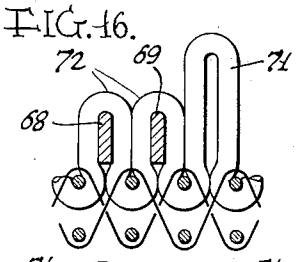


FIG. 17.

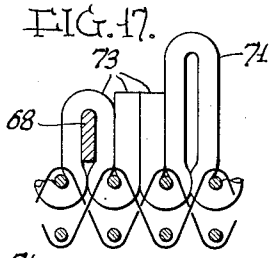


FIG. 18

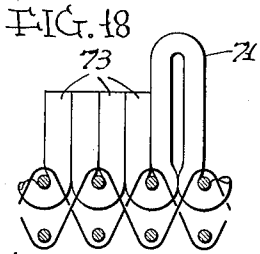


FIG. 19.

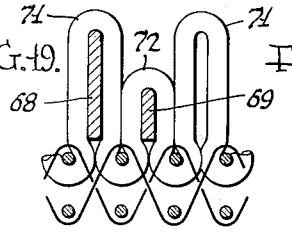


FIG. 20.

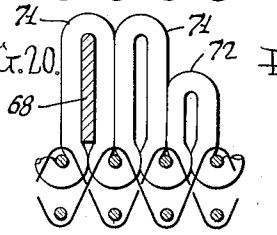


FIG. 21.

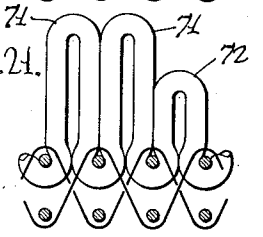


FIG. 22.

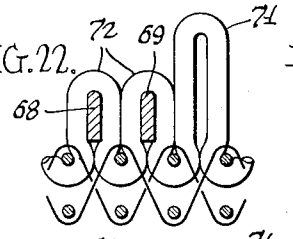


FIG. 23.

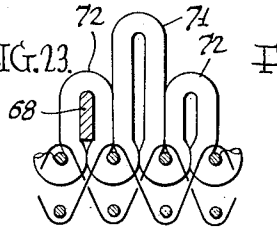


FIG. 24.

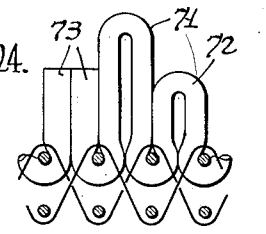


FIG. 25.

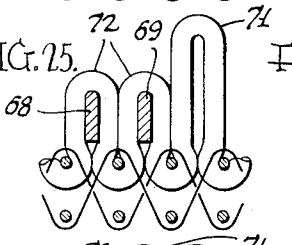


FIG. 26.

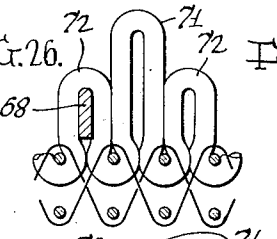


FIG. 27.

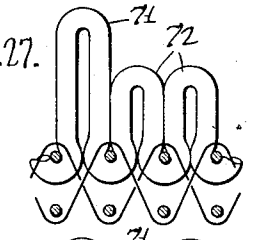


FIG. 28.

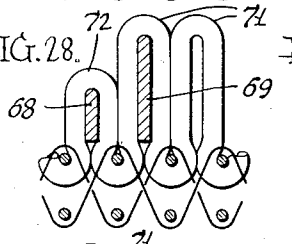


FIG. 29.

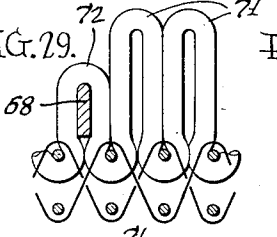


FIG. 30.

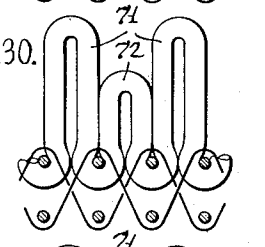


FIG. 31.

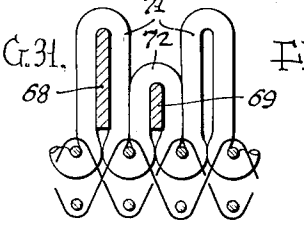


FIG. 32.

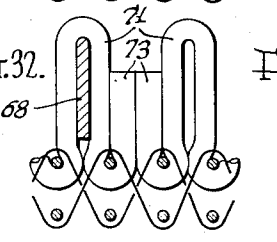
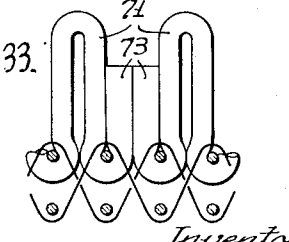


FIG. 33.



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Patented Apr. 6, 1954

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UNITED STATES PATENT OFFICE

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PILE WIRE FOR LOOMS

Harry J. Smiley, Glasgow, Va., assignor to James Lees & Sons Company, Bridgeport, Pa., a corporation of Pennsylvania

Application June 1, 1951, Serial No. 229,405

7 Claims. (Cl. 139—44)

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This invention relates to pile wires and fabrics, and more particularly to an improved pile wire and fabric formed therefrom in which the fabric is characterized by areas of relatively high loops intermingled with low tufts in the same weftwise row.

I have found that strikingly novel effects can be achieved in pile fabrics such as carpets, by employing a serrated pile wire having high and low portions over which high and low pile loops are woven and in addition having a blade or knife at one or more points along the wire in the shed so that when the wire is withdrawn, some of the loops in the transverse row are cut. If the knife is located along the wire at the rise or leading edge of one of the high portions of the wire, the low loops formed over the preceding low portion will all be cut to form low tufts, whereas the loops woven over the higher portions of the wire remain as uncut pile to form loops higher than the tufts.

With the above novel pile wire in mind, it will be apparent that a wide range of effects may be achieved in a fabric that may be woven on a Velvet loom or a Wilton loom customarily equipped with a Jacquard motion. The wire disclosed in the present invention may have one high and one low portion on each wire or any number. The low portions may be of different heights if desired, and they may be transversely arranged in any desired spacing on the individual wire. Likewise, the knives may be inserted or omitted on the same wire or in accordance with a predetermined pattern on a group of wires.

Due to the loop drawing characteristic of pile wires having a serrated top edge, it is possible to provide an extremely wide range of variations in the appearance of the fabric using only a single set of wires. It is contemplated that a set of wires may include individual wires in which the serrations are staggered weftwise of the loom and in which the cutting knives may be selectively inserted or removed in accordance with the effect desired. Furthermore, the relative height of the high and low portions may be varied on each wire and from wire to wire. A uniform round wire can be employed in conjunction with a number of the serrated wires and the serrations may be located at any desired weftwise location on the wires.

It will thus be apparent that an extremely wide range of effects may be achieved incorporating loops of varying height together with tufts of varying height, which are at least shorter than the highest loops.

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A primary object of the invention therefore, is to provide a pile wire for a wire loom having high and low portions and a knife positioned at the leading edge of at least one of the high portions so that loops formed over the low part of the wire in advance of the knife are cut as the wire is withdrawn from the fabric.

A further object of the invention is to provide a pile wire having one or more pile cutting knives located within the shed and positioned on the wire in such a way that the knife may be readily inserted and removed.

A further object of the invention is to provide a pile wire having high and low portions along its length and a socket for retaining a pile cutting knife at the leading edge of at least one of the high portions, the contour of the wire at the socket being such that the wire may be used interchangeably with or without a knife.

A further object of the invention is to provide an improved pile fabric having an area in which at least some transverse rows of pile are formed from cut tufts and relatively higher uncut loops.

Further objects will be apparent from the specification and drawings in which:

Fig. 1 is a perspective showing a single pile wire constructed in accordance with the invention and in which all of the knives are inserted in their sockets;

Fig. 2 is an enlarged detail partly sectioned, of one of the knife sockets of the wire of Fig. 1, showing the manner in which the knife is inserted and retained in the socket;

Fig. 3 is a transverse section as seen at 3—3 of Fig. 2;

Fig. 4 is a perspective of one of the pile wire knife sockets;

Fig. 5 is a perspective of the socket with the knife removed;

Fig. 6 is a perspective of the knife;

Fig. 7 is a diagrammatic face view of a fabric woven with a set of wires constructed in accordance with the invention;

Fig. 8 is an enlarged sectional detail as seen at 8—8 of Fig. 7;

Fig. 9 is an enlarged sectional detail as seen at 9—9 of Fig. 7;

Fig. 10 is a diagrammatic view looking warpwise of the fabric, showing the pile loops woven over one of my improved pile wires and before the wire is withdrawn;

Fig. 11 is a schematic view looking weftwise of the fabric, showing a series of my improved wires with a warp yarn woven over the wires before withdrawal thereof;

Fig. 12 illustrates, by way of example, some of the variations that may be achieved by using my improved pile wire;

Fig. 13 is a schematic face view showing three transverse rows of pile loops woven over the wires of Fig. 12 and with one wire drawn;

Fig. 14 is a view corresponding to Fig. 13 with the second pile wire drawn;

Fig. 15 is a view corresponding to Fig. 14 with all three wires drawn, showing high loops, low loops, and low tufts;

Figs. 16–18 are sectional details of Figs. 13–15 respectively, taken on the line **16—18**;

Figs. 19–21 are sectional details of Figs. 13–15 taken on line **19—21**;

Figs. 22–24 are sectional details of Figs. 13–15 taken on line **22—24**;

Figs. 25–27 are sectional details of Figs. 13–15 taken on line **25—27**;

Figs. 28–30 are sectional details of Figs. 13–15 taken on line **28—30**; and

Figs. 31–33 are sectional details of Figs. 13–15 taken on line **31—33**.

The present invention comprises essentially the provision of a set of pile wires in which at least one wire and preferably a plurality of wires, are provided with low portions and relatively higher portions, together with a knife socket at the leading edge of at least one of the higher portions. The height of the knives when installed in the socket is desirably not sufficient to cut high loops woven over the high portions of the wire but is sufficient to cut only the loops woven over the immediately preceding low wire portions. The effect that may be obtained by introducing the knife into the shed instead of positioning it at the end of the wire beyond the shed as formerly, provides novel effects because in this way low tufts dispersed at random with higher loops can readily be produced. While it has been possible in the past to provide a fabric having low loops and high tufts by running a separate cutter along the top of the fabric, such mechanism could not cut low loops and leave the high loops in the same transverse row uncut.

Referring now more particularly to the drawings, the pile wire **50** is provided with a conventional head **51** and one or more high portions **52, 52** which are inserted in the shed of a pile fabric in accordance with the usual operation of a pile wire loom. The low portions **53, 53** between the high portions **52** have in the preferred form, a steep edge **54** which is in effect the trailing edge of the high portions **52**, and a sloping edge **55** which forms the leading edge of the high portions **52**. A groove or socket **56** is provided directly in advance of each sloping edge **55** to accommodate a knife **57**. The forward terminus of the socket **56** is undercut at **58** (shown in Fig. 2) and the rearward terminus of the socket is likewise undercut at **59** to provide secure retention for the knives **57**. The knife may be inserted in the socket by first locating the tip **57***a* of the knife in the forward terminus of the socket and then bending the body of the blade sideways so that it may be snapped in place through the notch **60** in one of the socket walls. It will be understood that the shape of the notch and sloping edge **55** is such that if the knife is omitted (as shown in Fig. 5) loops woven on the low portions **53** will be raised by the sloping edge **55** so that the high portions **52** may pass through the raised loops without cutting them. The edge **55** is initially higher than the knife but it drops sharply below the cutting edge thereof in order to provide minimum loop drawing for any loops woven over the wire above the knife. The slope must not be so steep however, that when the knife is removed there will be any difficulty in pulling the wires. It is also to be noted that the opposite edge **55***a* of the socket is substantially undercut and rounded so that it will not snag the pile loops when the wire is withdrawn without the knife. It will also be understood that other satisfactory means for selectively securing the knives **57** at the sloping edges **55** can be provided without departing from the spirit of the present invention.

Referring now to Figs. 7–11, a pile fabric woven from a set of wires **50** in which the warpwise position of the knives and the high and low portions are varied to provide a symmetrical fabric pattern that will not be stretched, will be described. The fabric of Fig. 7 is characterized by random portions of low tufts **61** and higher loops **62** in the same transverse rows. While the showing of Fig. 7 illustrates fabric in which each row has at least some tufts, it will be understood that some non-cutting wires may be interspersed as desired, with the cutting wires.

A fabric to which the present invention is admirably suited comprises a plurality of stuffer warps **65, 65** and weft shots **66, 66** which are bound together to form the conventional groundwork by binder warps **67, 67**. Pile loops **62** remain uncut since they are woven over the high portions **52, 52** of the wires above the knives. The tufts **61, 61** formed from loops **61***a*, **61***a* woven over the low portions **53** of the wire are cut by knives **57, 57** when the wires are withdrawn, to provide the fabric shown in Figs. 8 and 9. By selecting the relative position of the pile wires and by locating the high and low portions at different positions along different wires, the varied pattern effect such as shown in Fig. 7, may be achieved. In this form it will be noted that there is substantially no drawing or robbing of the loops when the wires are pulled because all of the low loops are cut so that the fabric is an exact duplication of the high and low portions on the set of wires. However, further variations may be achieved either by omitting some of the knives on the wires and/or by using one or more uniform wires in the set. Such an arrangement is shown by way of example in Fig. 12 in which the knives **57, 57** have been removed from the sockets in front of high portions **52***a*, **52***a* on wires **68** and **69**. In this example, I have also illustrated a uniform round wire **70** in conjunction with the serrated wires **68** and **69**.

When the pile is woven over the wires shown in Fig. 12, the unshaded high loops **71, 71** and the shaded low loops **72, 72** are provided as shown in Fig. 13 in accordance with the configuration of the wires of Fig. 12. When the uniform round wire **70** is withdrawn, there is no change in the loops **71** formed over this wire since they are neither cut nor raised. However, when wire **69** is withdrawn as shown in Fig. 14, the high loops **71** remain unchanged but the low loops which were woven over the low portions **53***a*, **53***a* in front of knives **57, 57** are cut to form tufts **73, 73**, but the low loops woven over portions **53***b*, **53***b* are not cut and are consequently raised to become high loops **71** because the knives have been omitted from sockets **56***a*, **56***a* in wire **69**. In so raising the low loops on portions **53***b*, **53***b*, the aligned high loops **71** in row **70***a* are lowered to form the shaded low loops **72** in this row (as shown in Fig. 14).

When wire 68 is withdrawn, the high loops 71 formed over the high portions 52 of this wire, remain unchanged. The low loops in front of knives 57 are cut to form tufts 73, 73 and the low loops on portions 53b, 53b of wire 68 are raised to become high loops 71. Similarly in so doing, the corresponding high loops in the same pile yarn in row 69a are lowered from high loops to low loops (as shown in Fig. 15).

In Figs. 13–33 the numeral 71 is used to designate a high loop, the numeral 72 is used to designate a low loop, and during the course of wire pulling low loops 72 are changed to high loops 71 and vice versa. The succeeding wire can be arranged to lower some of the high loops formed when wire 68 is withdrawn in exactly the same manner that has been described above, to provide the desired pattern effect.

It will thus be apparent that it is possible to provide any desired combination in a single transverse row of high loops, low loops and tufts that may be desired to complete a predetermined pattern. Not only may the height of the loops be varied in the same row but it is possible to provide some rows in which the loops are all the same height, the loops are all cut into tufts of uniform or non-uniform height, as well as any intermediate combination thereof. It will be apparent that if the set of wires is so arranged that the raising of a low loop to a high loop occurs in a pile yarn which has been cut to form a tuft in the preceding row, only one of the two tufts formed will be lowered in an amount sufficient to make up the difference between the high and low loop.

Figs. 16–18 show clearly the forming of a high loop and low tufts in the same pile yarn, as described above. Figs. 19–21 show how high and low loops are formed from the same pile yarn. Figs. 22–24 illustrate a high loop and a low loop and tufts in the same yarn, whereas Figs. 25–30 show the effect of loop drawing in the same yarn to provide successively two low loops and a high loop, and a low loop between two high loops. Figs. 31–33 show how tufts of equal height are formed between two high loops.

It will thus be evident that the use of a pile wire having a knife positioned in the shed so that tufts and loops in the same transverse row are formed, is capable of producing a wide range of novel effects, particularly when such a wire is provided with high and low portions along its length and when such wires are used in sets having the high and low portions staggered warpwise in the set.

Having thus described my invention,

I claim:

1. For wire looms, a pile wire having a plurality of high loop forming portions disposed at spaced intervals longitudinally along one edge of the wire in the portion of the length thereof over which the pile warps of a fabric are raised, a low loop forming portion intermediate adjacent high portions, and a loop cutting knife blade detachably mounted on said pile wire at the junction between the leading edge of a selected high loop forming portion and the adjacent low loop forming portion.

2. For wire looms, a pile wire having a plurality of high loop forming portions disposed at spaced intervals longitudinally along one edge of the wire in the portion thereof intermediate its ends over which the pile warps of a fabric are being raised during weaving of the fabric, a low loop forming portion intermediate adjacent high portions, and wall portions of the wire at the junction between the leading edge of each high portion and adjacent low portion defining a knife socket.

3. For wire looms, a pile wire having a plurality of high loop forming portions disposed at spaced intervals longitudinally along one edge of the wire in the portion thereof intermediate its ends over which the pile warps of a fabric are raised during weaving of the fabric, a low loop forming portion intermediate adjacent high portions, and wall portions of the wire at the junction between the leading edge of each high portion and adjacent low portion defining a knife socket, at least one of said wall portions of the wire at each high loop forming portion declining gradually therefrom to the adjacent low portion and being operable upon withdrawal of the wire to raise the loops on the low portion to high loops on the high portion.

4. For wire looms, a pile wire having a plurality of high loop forming portions disposed at spaced intervals longitudinally along one edge of the wire in the portion thereof intermediate its ends over which the pile warps of a fabric are raised during weaving of the fabric, a low loop forming portion intermediate adjacent high portions, and wall portions of the wire at the junction between the leading edge of each high portion and adjacent low portion defining a knife socket, one of said wall portions of the wire at each high loop forming portion declining gradually therefrom to the adjacent low portion and being operable upon withdrawal of the wire to raise the loops on the low portion to high loops on the high portion, and the other of said wall portions being cut-away to provide a lateral opening in the wire for insertion of a knife blade into the socket formed by said wall portions.

5. For wire looms, a pile wire having a plurality of high loop forming portions disposed at spaced intervals longitudinally along one edge of the wire in the portion thereof intermediate its ends over which the pile warps of a fabric are raised during weaving of the fabric, a low loop forming portion intermediate adjacent high portions, wall portions of the wire at the junction between the leading edge of each high portion and adjacent low portion defining a knife socket, at least one of said wall portions of the wire at each high loop forming portion declining gradually therefrom to the adjacent low portion and being operable upon withdrawal of the wire to raise the loops on the low portion to high loops on the high portion, and a knife blade detachably mounted in a selected socket defined by said wall portions.

6. For wire looms, a pile wire having a plurality of high loop forming portions disposed at spaced intervals longitudinally along one edge of the wire in the portion thereof intermediate its ends over which the pile warps of a fabric are raised during weaving of the fabric, a low loop forming portion intermediate adjacent high portions, wall portions of the wire at the junction between the leading edge of each high portion and adjacent low portion defining a knife socket, one of said wall portions of the wire at each high loop forming portion declining gradually therefrom to the adjacent low portion and being operable upon withdrawal of the wire in the absence of a knife in the socket defined thereby to raise the loops on the low portion to high loops on the high portion, and the other of said wall portions being cut-away to provide a lateral opening in the wire for in-

sertion of a knife blade into the socket formed by said wall portions, and a knife blade detachably mounted in a selected socket defined by said wall portions.

7. For wire looms, a pile wire having a high loop-forming portion along one edge of the wire in the portion of the length thereof over which the pile warps of a fabric are raised, a low loop-forming portion along said edge in leading relation to said high loop-forming portion, and a loop-cutting knife blade detachably mounted on said pile wire at the junction between the leading edge of the high loop-forming portion and the adjacent low loop-forming portion.

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