June 17, 1969 G. N. LYGO 3,450,167

LOOMS FOR WEAVING CUT-PILE FABRICS

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Fig. 2.

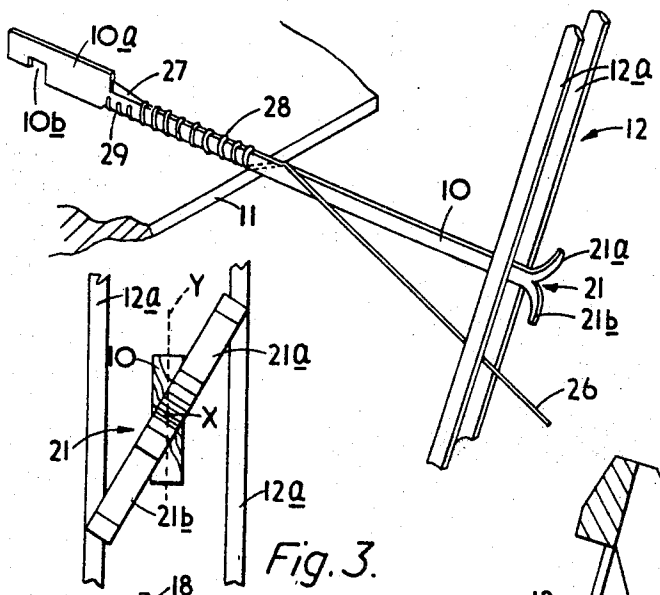

Fig. 3.

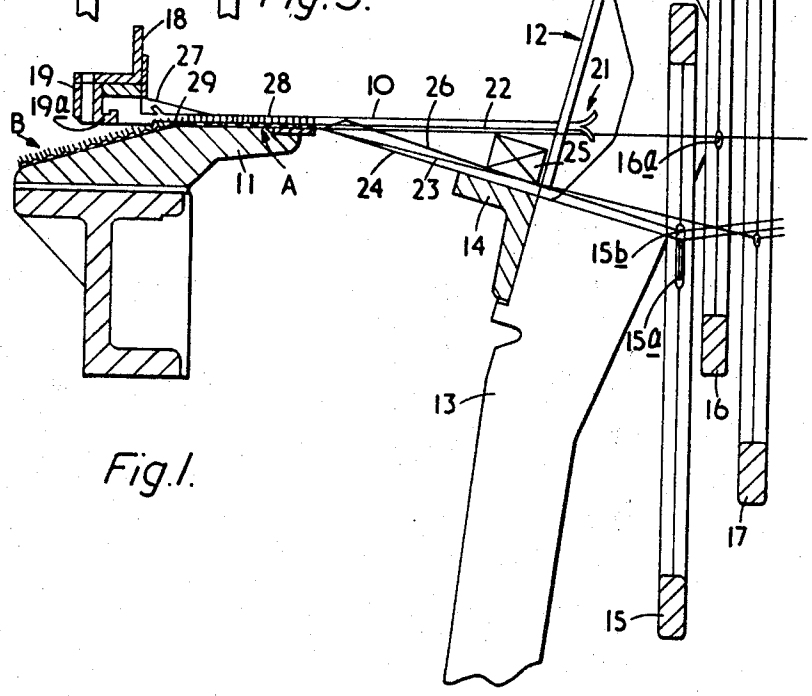

Fig. 1.

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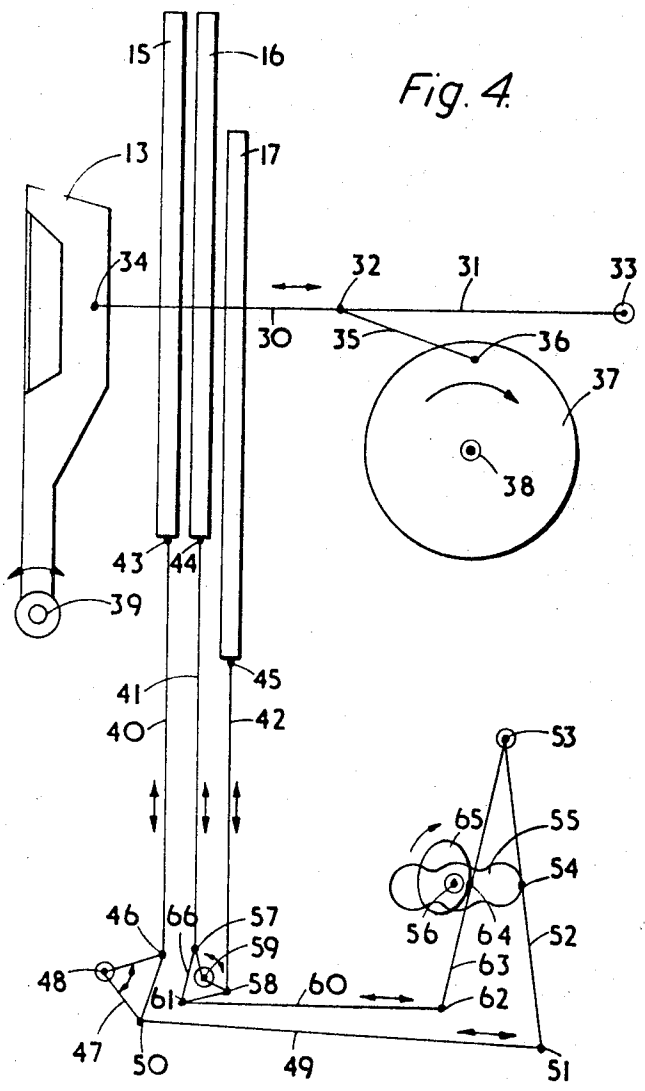
Fig. 4



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LOOMS FOR WEAVING CUT-PILE FABRICS

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U.S. Cl. 139—47 1 Claim

ABSTRACT OF THE DISCLOSURE

A loom for weaving cut-pile fabrics in which deflecting surfaces are formed on stationary pile wires to cause pile yarns to form loops by passing to opposite sides of the pile wires as the yarns are raised and lowered.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to looms (hereinafter referred to as being of the kind specified) for weaving cut-pile fabrics wherein the pile is formed by bringing the pile yarns to a weaving station of the looms as pile-forming warps which are raised and caused to be looped over bars or rods, known as "pile wires," which extend warpwise from the weaving station into the already woven fabric and wherein the loops formed about the pile wires are cut open to produce the cut pile and liberate the woven fabric from the pile wires.

This invention is particularly concerned with the looping means whereby the pile-forming warps are caused to be looped around the pile wires, and has for its object the provision of a new or improved looping means.

Description of the prior art

In known looms of the kind specified the fabric is woven by raising and lowering a number of parallel threads, known as "binding warps," relatively to one another by means of reciprocating carrier frames, known as "healds," and passing a thread forming the weft across the warps in timed relation with the raising and lowering thereof so as to produce a woven backing or "base fabric." The pile is formed by similarly raising and lowering pile-forming warps with these other movements and the loops of pile are formed by oscillating the pile wires weftwise so that the pile-forming warps, as they are raised by heald working in co-ordination with other healds for the binding warps, are caused to pass to a selected side of the associated pile wires and, as they are lowered by said heald, are caused to pass, to the other side of such pile wires. In such known looms the free ends of the pile wires have been received between adjacent teeth of a comb or "reed" which is also caused to oscillate weftwise. After the formation of each loop the base fabric and the loops are pushed by a beater known as a "sley" along the pile wires against the already woven fabric to retain the pile yarn more securely in the base fabric, this operation being known as "beating-up." As the woven fabric is pushed further along the pile wires the loops of yarn are advanced over cutting means to cut the loops open so as to produce tufts of pile and release the woven fabric from the pile wires.

It is usual to maintain a substantial number of uncut loops on the pile wires in the region of cutting means, these being generally situated at the ends of the pile wires at which the latter are supported. This ensures that the pile yarn is not pulled out of the base fabric since it is securely retained therein by the cumulative pressure resulting from several cycles of beating-up which follow the formation of each loop before it is cut. However, the fact that a substantial number of loops are retained on each pile wire at any given time causes significant resistance to movement of the pile wire, such movement being necessary to effect formation of the loops.

SUMMARY OF THE INVENTION

According to the present invention we provide a loom of the kind specified wherein the pile wires are formed or provided at their leading ends with looping means comprising respective deflecting surfaces to deflect the pile-forming warp to one side of the pile wire as the pile-forming warp is raised, and to the other side thereof as the pile-forming warp is lowered.

Thus, in a loom in accordance with the present invention no movement is required to be performed by the pile wires and hence a substantial simplification of the mechanism of the loom is achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 shows a part cross-section through the loom,

FIGURE 2 shows a perspective view of one pile wire and adjacent parts of the loom,

FIGURE 3 shows an endwise view of the pile wire from the forward or free end thereof on an enlarged scale, and

FIGURE 4 shows diagrammatically linkages forming driving means of the loom.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The loom illustrated includes a plurality of pile wires **10** formed as flat strips spaced parallel across the width of the loom. The pile wires **10** are formed with end portions **10***a* of locally increased vertical dimensions which are received in slots between adjacent plates or teeth of a comb-like mounting member **20** supported on a cross member **18** which is arranged above a breast-plate **11** and secured rigidly to the frame (not shown) of the loom. The pile wires **10** are secured in position by means of a clamping member **19** bolted to the cross member **18** and formed with a projecting formation **19***a* which interfits with a recess **10***b* in the end portion **10***a* of each pile wire **10**. Adjacent to the cross member **18**, each pile wire carries secured thereto a knife blade **27** at its upper side.

The pile wires each extend forwardly from the cross member and between adjacent dents **12***a* of a reed **12** mounted in a sley **13** which is reciprocated warpwise to beat-up woven fabric indicated at A to the breast-plate **11** after a pick of weft has been inserted by conventional means, such as a shuttle **25** or needle, between pairs of binding warps **22** and **23** as the latter are reciprocated in a vertical plane by respective healds **16** and **17**, the warps being guided in respective eyes (such as **16***a* and **17***a*). A third heald **15** carries a third set of warps **24**, known as stuffers, which are woven into the fabric. This heald **15** also carries the pile warps **26** so that these are reciprocated between positions respectively above and below the pile wires **10**. The stuffers **24** however, do not pass above the level of the pile wires and are carried in the heald **15** by eyes (such as **15***a*) disposed below the eyes (such as **15***b*) through which the pile warps pass. The eyes for the stuffers **24** are elongated, as shown, so that the latter move in a predetermined time relationship to the pile warps **26** and through a smaller aperture.

To guide the pile warps **26** to one side of the respective pile wires **10** each time the heald **15** is raised and to the other side each time it is lowered so that the pile warps are looped over the pile wires, looping means **21** comprising deflecting surfaces are provided at the free ends

of the latter. Such deflecting surfaces may be formed by twisting the free end portions of the pile wires **10** relatively to the main flat portion of the latter about a longitudinal reference axis X and through an angle in the range 3° to 30°. Preferably, as shown, this free end portion is also bifurcated into a pair of divergent fins **21***a*, **21***b*, so as to be of "fishtail" shape, such fins extending respectively above and below the upper and lower edges of the main portion of the pile wire, and being inclined to a reference plane Y which is parallel to the plane of up and down movement of the pile warps **26** and is coincident with a medial plane parallel to the wider faces of the pile wire. It can clearly be seen from FIGURE 3 that one fin **21***a* extends upwardly from the reference axis X to one side of the reference plane Y whilst the other fin **21***b* extends downwardly and to the other side of said plane Y. Such broadening of the vertical dimensions of the deflecting surfaces with respect to those of the pile wires ensures that the pile warps are moved laterally as they pass the deflecting surfaces without being excessively strained or unduly subjecting the pile wires themselves to strain at their free ends, the required horizontal movement of the pile warps taking place over a substantially increased range of vertical movement than would otherwise be the case. The width of the bifurcated portion and the angle at which the latter is twisted relatively to the main flat portion of the pile wire are chosen to be such that the overall width of the bifurcated end portion measured horizontally is equal to the weftwise pitch of the reed **12** as best seen in FIGURE 3.

Thus, in action, the pile warps **26** may be deflected by the fins **21***a* and *b* so as to pass to the right of their associated pile wires **10** (as viewed looking towards the breast-plate as in FIGURE 3) as the heald **15** is raised, and to the left as the latter is lowered, so as to form loops **28**. Of course it would be equally possible for the pile warps to be wound around the pile wires in the opposite sense where desired. Subsequent beating-up of the fabric A to the breast-plate **11** pushes the loops **28** along the pile wires **10** up to the already woven fabric. Take-up roll mechanism pulls the fabric through the loom and caused the looped pile to come up to the blades **27** adjacent to the cross member **18** and so be cut to form individual tufts **29** of cut pile, and liberate the woven fabric as seen at B.

Instead of forming the deflecting surfaces integrally on the pile wires, it would be possible to provide these surfaces on an attached part. Thus for example the deflecting surfaces could be afforded by opposite sides of a spade like member having a socket which is adapted to receive the free end of the pile wire, which latter need not be formed of a flat strip but could comprise round or oval section rod. However, it is particularly simple and convenient to employ a flat strip for the pile wires and to form the looping means by bifurcating the end portion and then bending the fins thus formed into the required disposition.

The means for imparting the requistite motions to the sley **13** and healds **15**, **16** and **17** is conventional and is illustrated diagrammatically in FIGURE 4.

The sley **15** is pivoted at **39** to a suitable fixed part of the loom and is rocked backwards and forwards by a pair of rods **30** and **31** which are pivoted together at **32** to form a toggle-like linkage, rod **30** being pivoted at **34** to the sley **13** and rod **31** being pivoted at **33** to a suitable fixed part of the loom. A connecting rod **35** is pivotally connected to the rods **30** and **31** at their junction **32** and imparts reciprocating movement to the rods by virtue of its pivotal connection **36** to a wheel **37** which rotates about an axle **38**.

The heald **15** which raises and lowers the pile warps, and the two healds **16** and **17** which raise and lower the binding warps, are each reciprocated vertically by respective rods **40**, **41** and **42** which are pivotally attached thereto at **43**, **44** and **45** respectively.

The rod **40** is pivoted at **46** to a bellcrank lever shown at **47**, the latter being oscillated about a fixed pivot **48** by means of a rod **49** pivotally attached thereto at **50**. The rod **49** is reciprocated by a lever **52** to which it is pivotally attached at **51**. The lever **52** is oscillated angularly about a fixed pivot **53** by a cam follower **54** driven from a double lobed cam **55** which is rotated on shaft **56**.

The rods **41** and **42** are pivotally connected at **57** and **58** respectively to two arms of a three armed lever **66** which is oscillated about a fixed pivot **59** by a rod **60** pivotally attached thereto at **61**. The three armed lever **66** is so arranged that when the heald **16** is raised the other heald **17** is lowered and vice versa. The rod **60** is reciprocated by a lever **63** to which it is pivotally connected at **62**, and the lever **63** is oscillated about the fixed pivot **53** by a cam follower **64** driven by a single lobed cam also rotating on shaft **56**. In this way the heald **15** is raised and lowered every time the heald **16** is raised or lowered.

The relationships between the movements of the three healds and the shuttle are normally such that every pile yarn is raised and lowered every time a pick of weft is inserted. However, it is possible to arrange for some pile yarns to stay in the raised position for several picks of weft, and other pile yarns to stay in the raised position for several other picks of weft, all the pile yarns staying in the lowered position for only one pick. In this way longer loops would be formed and hence longer tufts.

What I claim then is:

1. Apparatus for use with a loom having a breast-plate and a reed with a plurality of spaced generally parallel dents and adapted to weave cut-pile fabrics, means for forming a base fabric, a plurality of pile-forming warp yarns on said loom with each yarn disposed between a pair of said dents, means for moving each of said pile-forming warp yarns in a generally vertical plane to locations above and below said base fabric, said apparatus comprising a plurality of independent pile wires fixed at one end above said breast-plate and extending outwardly thereof generally in the plane of movement of said pile-forming warp yarns, the other end of each of said pile wires extending between a pair of said dents, said other end being bifurcated to form upper and lower fins, said upper fin being inclined to one side of the plane of movement of said pile-forming yarns and said lower fin being inclined to the opposite side thereof, said upper and lower fins terminating in a location generally equal to the weftwise pitch of the reed, and said fins providing the sole guiding means for said pile-forming warp yarns, whereby when each of said pile-forming warp yarns is raised it engages said upper fin and is directed to one side of the pile wire, and when said pile-forming warp yarn is lowered it engages the lower fin and is directed to the opposite side of the pile wire so that a pile-forming loop is formed about said pile wire.

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