March 10, 1970 G. T. GURNEY ET AL 3,499,472

TERRY LOOM OPERATING WITH STATIONARY WEFT SUPPLIES

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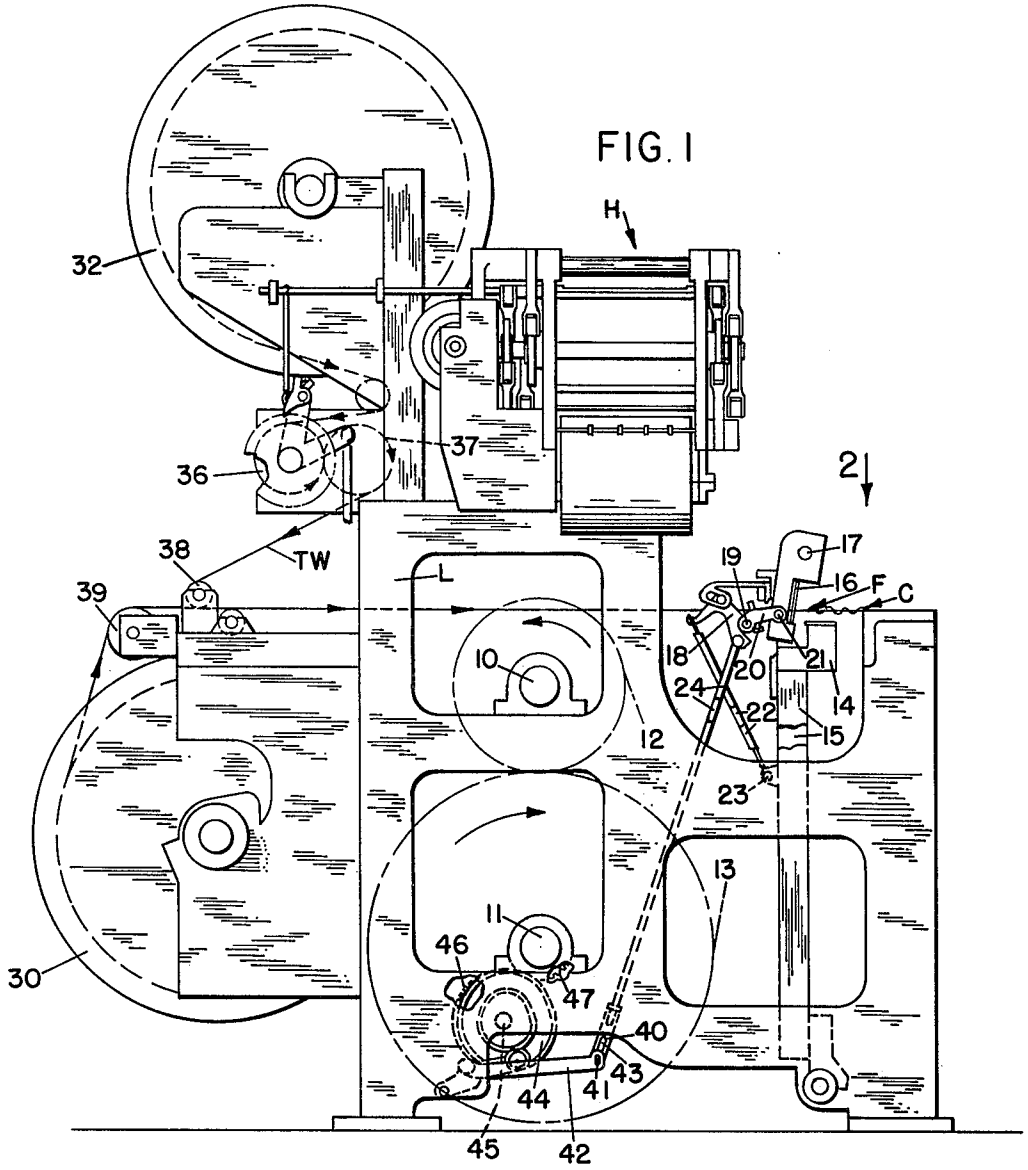
FIG. 1



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TERRY LOOM OPERATING WITH STATIONARY WEFT SUPPLIES

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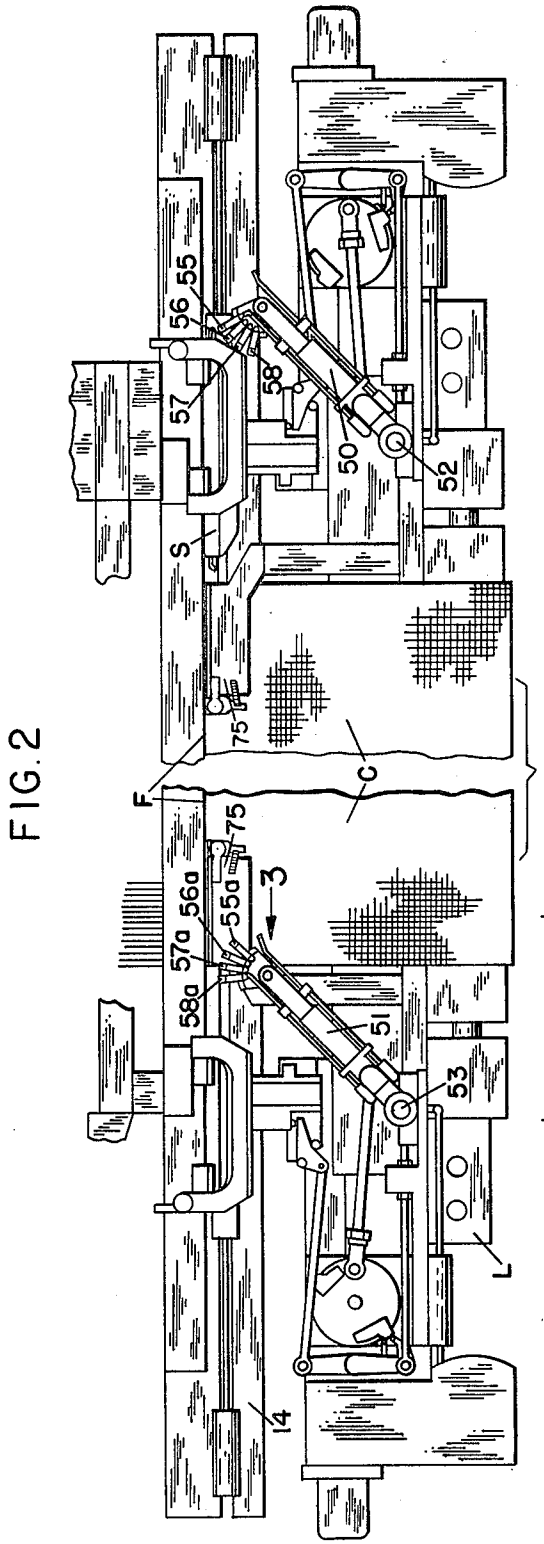

FIG. 2

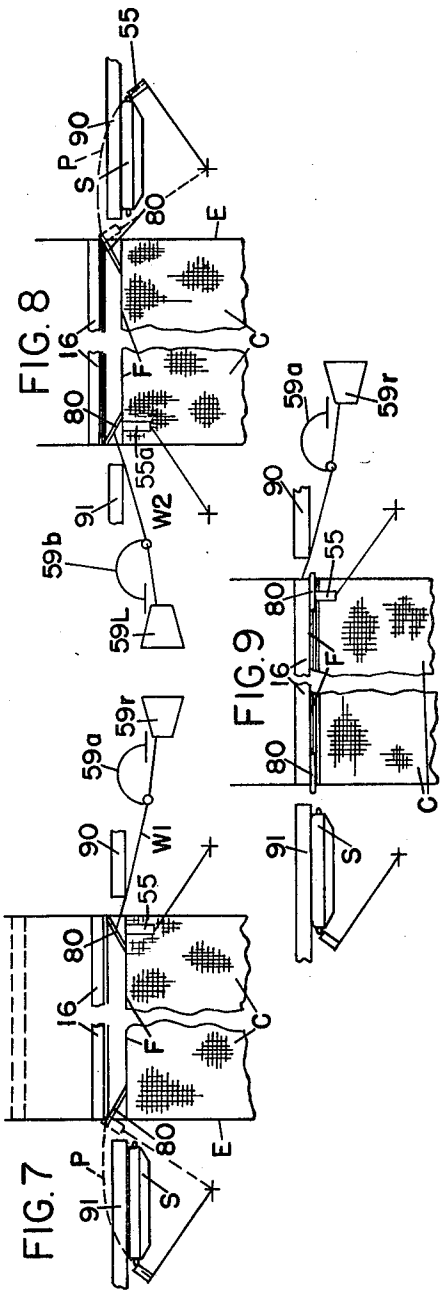

FIG. 8

FIG. 9

FIG. 7

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FIG. 3

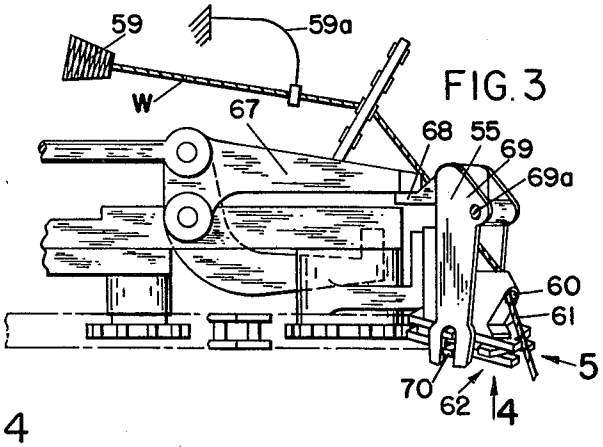


FIG. 4

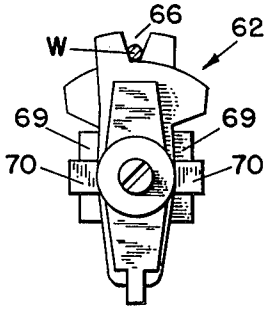


FIG. 5

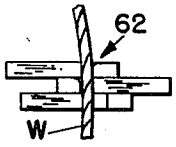


FIG. 11

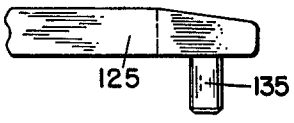


FIG. 6

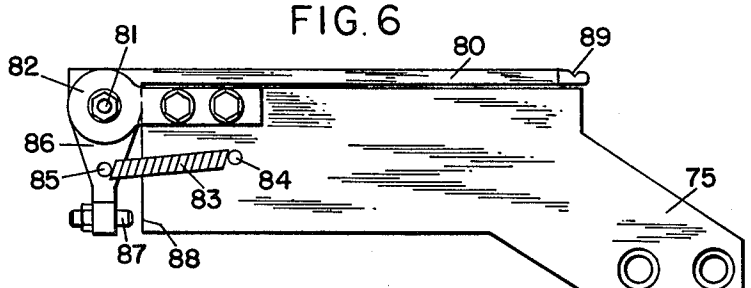
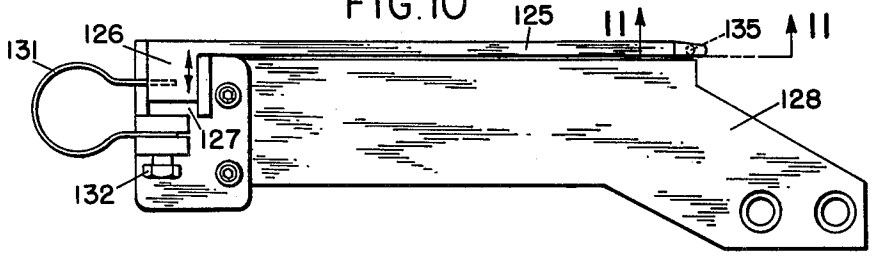


FIG. 10



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TERRY LOOM OPERATING WITH STATIONARY WEFT SUPPLIES

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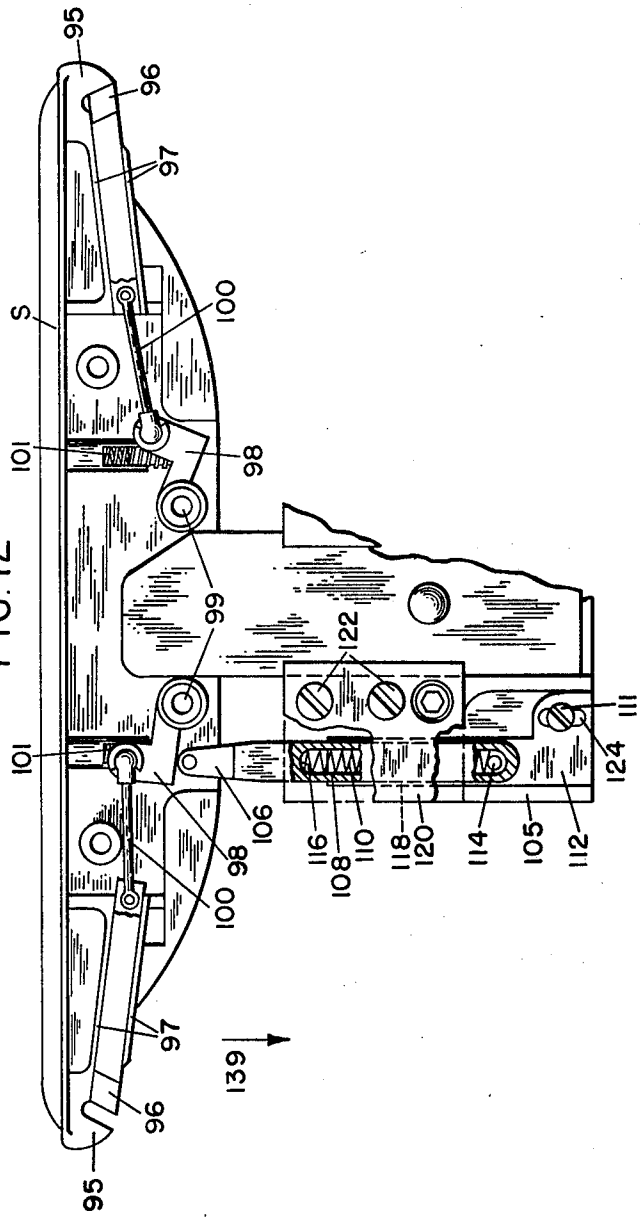
FIG. 12



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TERRY LOOM OPERATING WITH STATIONARY WEFT SUPPLIES

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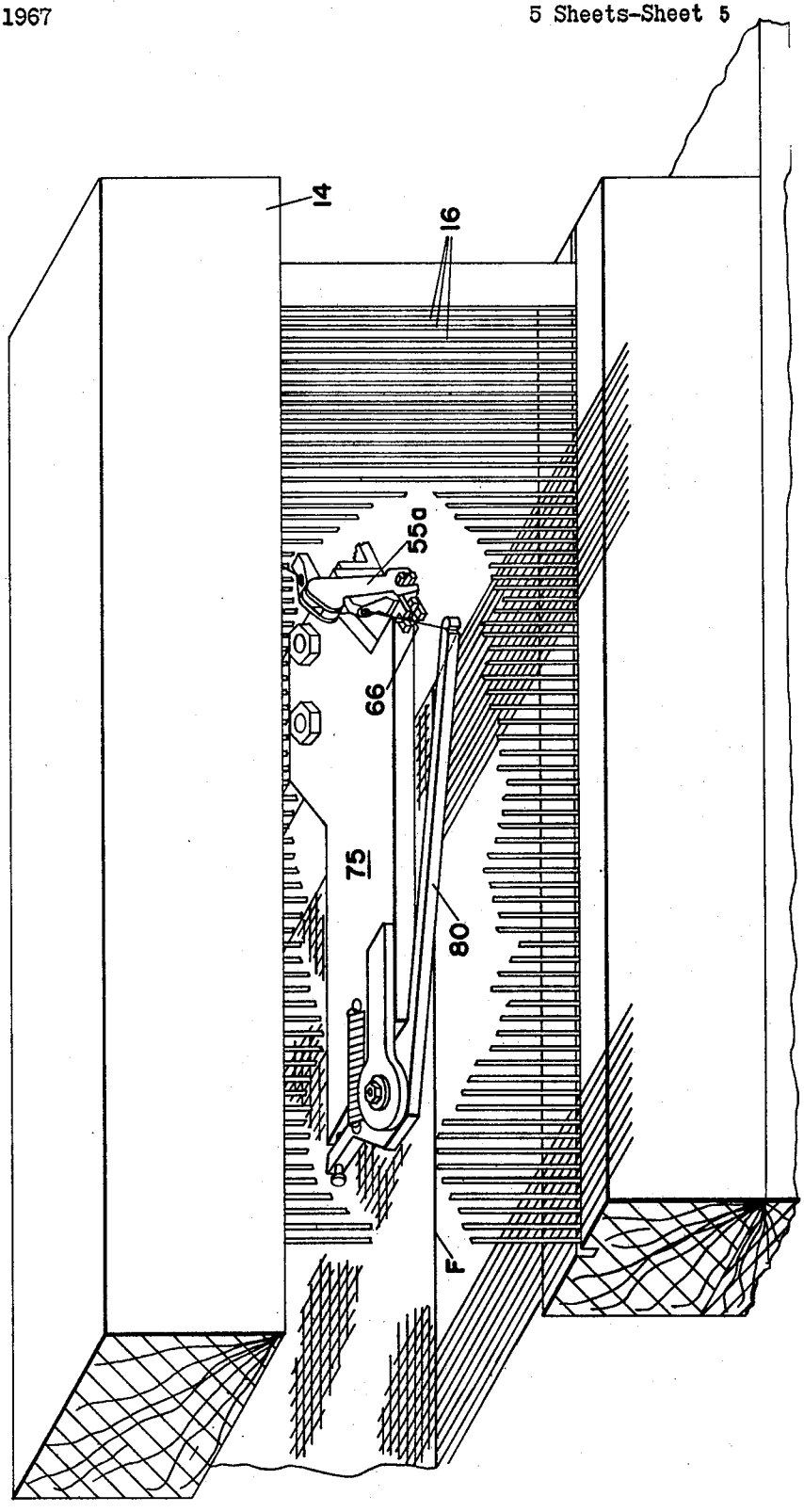

FIG. 13

United States Patent Office 3,499,472
Patented Mar. 10, 1970

3,499,472

TERRY LOOM OPERATING WITH STATIONARY WEFT SUPPLIES

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Filed Aug. 28, 1967, Ser. No. 663,604
Int. Cl. D03d 39/02, 47/12
U.S. Cl. 139—25 10 Claims

ABSTRACT OF THE DISCLOSURE

An outside filling supply loom adapted to weave terry cloth and operating with a gripper shuttle, the loom having a lay which operates in cycles of partial beat-ups followed by a full beat-up, a presenter for presenting weft from the outside supply source to the shuttle before it is picked and for retrieving the weft after the shuttle is picked. The presenter retrieves the weft at the intersection of a weft (at one of the beat-up positions) and the selvage and a pick placer positions a portion of the weft from the other beat-up position to the same intersection for retrieval by the presenter.

This invention relates to an outside filling supply loom operating with a gripper shuttle and a reed adapted to beat-up at two points in a multi-pick cycle for weaving terry cloth.

The invention is particularly adapted for a loom of the type set forth in U.S. Patent 3,376,900 to Oscar V. Payne. In this type of loom, the weft is fed from a stationary weft supply to a presenter which presents the weft to a gripper in the shuttle at a point remote from the edge of the cloth. The shuttle is then picked and draws the attached weft after it into the warp shed.

When the shuttle reaches the end of its travel through the warp shed, it is still connected to the weft which leads from its supply source down through the guide eyes of the presenter. The weft then passes between the momentarily open clamp and cutter on the bottom of the presenter, and then into the warp shed. While the shuttle moves through the shed, the presenter moves towards the edge of the cloth from its position remote therefrom. It is while the presenter is at this point that the weft which has just been inserted is clamped and cut between the clamp and the selvage. This operation of the presenter is called retrieving.

When the type of loom as set forth in Payne, supra, is adapted for weaving terry cloth, there exists a condition not found in Payne. When weaving "three pick" terry, for example, two picks are partially beaten up, and these two picks and a third pick are all beaten to the fell on the third beat-up of a three-pick terry cycle. This condition presents a problem for retrieval of the weft by the presenter. During the partial beat-up, the weft will extend from the selvage of the guide-eyes of the presenter at a different angle than that at which it extends during the full beat-up. Because of this, the presenter does not always retrieve its weft.

Another problem is the uniformity of terry pile loops. In conventional weaving wherein a weft package is carried by the shuttle, uniformity of pile-loop heights is maintained by a "crow hop" located at each selvage. The crow hop is a device which inserts a pin at the selvage so that the ends of the weft inserted during the partial beat-up will be looped around the pin and will be maintained substantialy parallel. During the full beat-up, the loops near the selvage will be the same height as those in the center of the fabric. The crow hop can be used in conventional

weaving because the weft is continuous. When an outside filling supply loom is adapted to weave terry, however, a crow hop can no longer be used.

A principal object of the present invention is the provision of mechanism which will overcome the above problem of retrieving and enable the presenter to retrieve its weft with greater consistency.

A further object of the invention is the provision of mechanism which will maintain all of the partially beaten up wefts parallel throughout their lengths to insure uniformity of terry loop height.

The objects of the invention are accomplished by arranging the weft presenters so that they will register with the wefts of picks 1 and 2 of a three pick cycle when they are in partial beat-up position. The end of the third pick of the three pick cycle is moved by a pick placer to the position of partial beat-up so that the weft will be retrieved by the presenter. It is possible to move the weft into the partial beat-up position because retrieving does not occur until after front center when the lay has moved a sufficient distance in its back stroke. The pick placer is, also, arranged so that it will move the weft no further than the partial beat-up position. This insures that the two partially inserted wefts of a three pick cycle will be parallel for terry loop uniformity.

FIGURE 1 is a side elevation of a loom having the preferred form of the invention applied thereto, the details of the harness mechanism being omitted,

FIGURE 2 is a plan view, parts omitted, looking in the direction of arrow 2, FIGURE 1,

FIGURE 3 is an enlarged partial elevation of a presenter looking in the direction of arrow 3, FIGURE 2,

FIGURE 4 is a plan view looking in the direction of arrow 4, FIGURE 3,

FIGURE 5 is an enlarged detail view of the lower part of FIGURE 3 in the direction of arrow 5,

FIGURE 6 is a plan view of a loom temple with the preferred form of pick placer applied thereto,

FIGURES 7 to 9 are diagrammatic plan views showing the relation of the reed, shuttle boxes, controllers and wefts for a terry three pick cycle of operation of the loom,

FIGURE 10 is a plan view of a modification of the pick placer.

FIGURE 11 is an enlarged view of the end of the pick placer shown in FIGURE 10;

FIGURE 12 is a plan view of a shuttle made to operate with the invention; and

FIGURE 13 is a fragmentary prospective looking generally from a point behind the reed toward the front of the loom.

Referring to FIGURES 1 and 2, the loom frame L supports top and bottom shafts 10 and 11, respectively, having driving connections through gears 12 and 13, the latter twice the size of the former. A lay 14 mounted on swords 15 has a beat-up reed structure 16 pivoted thereto at 17. At each side of the loom there is a link means 18 pivoted at 19 to a link means 20 which is in turn pivoted to the reed structure at 21. A spring 22 operatively connected to each link means 18 has its lower end attached to the swords at 23.

The reed structure is controlled through rods 24 to produce the usual three pick terry cycles. There will be a partial beat-up for each of the first two successive picks of a cycle when the lay is on front center, and there will then be a full beat-up for the third pick of the cycle to move all three picks to the fell of the cloth to produce a cross row of terry pile loops.

The loom has the usual ground warp beam 30 and the upper terry warp beam 32 and has the terry feed rolls 36 and 37 to advance the terry warp TW to the terry

whip roll 38. The ground warp whip roll 39 keeps the ground warp tight but permits it to move forwardly to the right in FIGURE 1, to the fell F of the terry fabric or cloth C, see FIGURE 2.

Referring to FIGURE 1, each rod 24 extends down and has a slotted rod head 40 at the bottom thereof. A stud 41 on a lever 42 fits into a slot 43 of the rod head and when the lever is depressed by action of a cam 44, rods 24 are lowered to depress the pivots 19 and move the reed structure 16 rearwardly as in FIGURE 1. This happens for two successive picks and then on the third pick, the cam allows rods 24 to rise under action of springs 22 to move the reed structure forwardly around pivot 17 so that it can move the reed to the fell. A shaft 45 having the cam 44 secured thereto is also fastened to a gear 46 meshing with a gear 47 on the bottom shaft 11, the gears 46 and 47 are in such ratio that the cam 44 rotates once in three picks.

For a more complete description of the terry reed control mechanism, reference may be had to a publication "Terry Motion," Section 25, issued in 1963 by Crompton & Knowles Corporation, owners of the present application, and an earlier publication of 1939 issued by Crompton & Knowles Loom Works, predecessor of the present owners.

The feeding of the terry warp may also be as set forth in the prior Crompton & Knowles publications.

In FIGURE 1 the harnessing mechanism for effecting raising and lowering of the warp threads is indicated at H. This mechanism may be made in any approved manner and a detailed description of it is not deemed necessary.

The parts of the present invention similar to corresponding parts in the aforesaid Payne patent are shown herein in FIGURES 2 to 5. The Payne patent is owned by the owners of this present application and can be referred to for a fuller description of the parts shown herein.

Referring to FIGURE 2, right and left hand levers 50 and 51 respectively, are pivoted to the loom at 52 and 53, respectively, and swing to the right as shown when the shuttle S is at the right hand side of the loom and the lay 14 is on front center. On the next beat of the loom, the levers will have swung to the opposite positions and will be to the left when the shuttle is on the other side of the loom. Each lever has pivoted to the rear end thereof a group of four weft presenters and the group of each lever is moveable to locate the presenters on at a time in operating position. In FIGURE 2 the presenters for lever 50 are indicated, from right to left, at 55, 56, 57 and 58, respectively, and for lever 51 at 55*a* 56*a*, 57*a* and 58*a*. Presenter 55 is shown in detail in FIGURE 3, the other presenters being omitted, and it is shown in one of said operating positions, such as a shuttle threading position and having a weft thread W leading from a stationary supply 59 through a light tension device 59*a*, down through the presenter and through eye 60, see FIGURE 3, and a length 61 leading to clamping and cutting means generally indicated at 62, see FIGURES 3 and 5. It is this length which is grasped by the shuttle S preparatory to its picking, as set forth in Payne, supra.

The other position is that which the selected presenter assumes to recover or retrieve its weft after cutting. After the shuttle has grasped the weft when in the first position, (right hand side) the weft remains threaded through the presenter and is drawn through it down into the warp shed. When the shuttle is boxed at the other end of the loom, lever 50 will have swung to the left so that the cutting and clamping means 62 will lie over the cloth and as the weft leads back to its cone it comes out of the shed and extends up to presenter eye 60 and will pass through the opening 66 between the cutter and clamp blades, as seen in FIGURE 4. Arm 67, FIGURE 3, presses down on finger 68 to rock part 69 of the presenter around pivot 69*a* and cause the ears 70 to close the cutter and clamp blades from the open position shown in FIGURE 4. This results in clamping the weft leading from the weft supply to the presenter and the latter thus retrieves its weft.

The matter thus far described is as usual in Payne, supra, except as noted hereinafter. The recovering or retrieving of the weft by its presenter produces a problem when two wefts are partially beaten up and the third is fully beaten up. The present invention aims to solve this problem by cooperation of the presenter and pick placer which together form a novel presenting and retrieving means. The levers 50 and 51 are operated so that they will pass directly over the partial beat-up position of the first two picks of a terry cycle at the selvage. When the lay moves backwardly after beating up all three picks during the full beat-up, the presenter will again move to the position occupied by the partially beaten up wefts and the end of the weft of the third pick will be brought by the pick placer to the partial beat-up position to be retrieved by the presenter.

The three pick operation will be described in connection with FIGURES 7 to 9.

Each side of the loom has a temple 75 which is secured in usual manner to the loom frame. The pick placers are mounted on each temple, the preferred form, shown in FIGURES 2, 6 and 7, comprising an elongated rod 80 having a journal 81 which fits into a bearing 82 fastened to each temple 75. A spring 83 having one end anchored at 84 with respect to the temple and the other end attached at 85 to an arm 86 on the journal acts to move the rod rearwardly. Rod 80 lies above the level of the cloth and below the level of the presenter 55 as shown in FIGURE 7 so that as rod 80 moves rearwardly it will intercept the weft extending from the shed to the presenter. A stop 87 adjustable relative to the rod engages a fixed abutment 88 to limit the rearward motion of rod 80. The rearward motion of rod 80 will be determined approximately by the length of the terry warp left behind the fell after a partial beat-up. The outer end of each rod 80 has a rearwardly opening notch 89 which engages the section of weft extending from the supply source between the presenter and the selvage.

In describing a three pick cycle it will be assumed that the terry warp will be fed forwardly in the usual manner and that the shuttle S has been picked from box 90 into box 91 and that the reed 16 has reached its first partial beat-up position as shown in FIGURE 7. The weft W has been drawn from source 59R, as an example, and led down through presenter 55, see FIGURE 3, and then rearwardly and downwardly into the warp shed. After passing through the warp shed, the weft is released from the shuttle and extends in the direction of shuttle flight while the lay is beating up.

Both rods 80 are urged rearwardly by their respective springs 83 as the lay moves back. The rod 80 at the right hand end of the loom locates the right hand end of the weft parallel to the fell F. The opening 66 lies directly below the guide 60 and intercepts the weft as the presenter passes over the partial beat-up position at the edge of the cloth. The arm 67 is depressed as the lay swings rearwardly and causes clamping and cutting means 62 to grip the weft in the presenter and cut it at the bottom. This much relates to the first pick of the presenter, thus retrieving or recovering the weft from cone 59R for the presenter in readiness for the next shuttle gripping. The light tension 59*a* holds the weft W1 taut so it will go into opening 66.

On the next pick, the shuttle will be moved to the right, see FIGURE 8, to draw weft W2 from package 59L through tension 59*b* and down through presenter 55*a* and then as in FIGURE 7, into the warp shed and to the shuttle in box 90. As was the case in FIGURE 7, the trailing end of the shuttle will release weft W2 in a manner to be described. The weft 2 will be retrieved by presenter 55*a* as was weft W1 by presenter 55.

In both FIGURES 7 and 8 the presenters swing in horizontal planes and in swinging each presenter prefer-

ably moved in a horizontal curve from a position spaced from the cloth where the shuttle could be threaded to a position over the intersection of the selvage and picks one and two when they are in a partially beaten up position. The presenters continue to swing until they are over the cloth to a position where they will clear the lay at front center. As the presenter swings back toward the shuttle threading position, the weft is retrieved when the clamp and cutting means **62** lies directly over the intersection of the partially beaten-up weft and the selvage.

In FIGURE 9 all three picks are shown as beaten up with the lay at front center. During the ensuing backward stroke of the lay the presenter will traverse the same paths as contemplated in FIGURE 7. Rod **80** will move rearwardly as previously described and move the portion of the weft, which extends from the shed to the presenter, to the partial beat-up position. The presenter at the right will then retrieve its weft as it did in FIGURE 7. As seen in FIGURE 13, the placer has positioned the end of the fully beaten-up weft to the partial beat-up position. The presenter, which is adjusted to pass over the intersection of the partial beat-up and the selvage, is shown just prior to being directly over the intersecting point so that the weft begins to enter the opening **66** formed by the clamping and cutting blades. It should be noted that for each retrieving operation the presenter recovering its weft passes over the point where the selvage and partially beaten-up wefts are in vertical alignment with the clamp and cutting means **62**.

In FIGURE 12 there are shown details of shuttle S already mentioned. The shuttle can be similar to the disclosure of U.S. Patent No. 3,417,792 owned by the owners of this application and in the name of one of the inventors in this application, namely, Gordon T. Gurney. Fixed jaws **95** at the ends of the shuttle cooperate with movable jaws **96** which slide in guides **97**. Levers **98** pivoted at **99** are connected by links **100** to the moveable jaws **96** and spring **101** acts to hold link **100** aligned with pivot **99**, a position in which each movable jaw **96** is held against its stationary jaw **95**. A stationary block **105** has mounted thereon a slide plunger **106** which, as the shuttle moves forwardly with the lay, engages lever **98** and moves it rearwardly, upwardly as viewed in FIGURE 12, the effect of which moves jaw **96** away from fixed jaw **95** to release the weft held between the jaws.

Plunger **106** has a lower cavity **108** which houses a compression spring **110** through which it is operatively connected to an adjustable plate **112** mounted on block **105** by screw **111**. Plate **112** has an upwardly extending pin **114** which extends into cavity **108** and engages one end of spring **110**. The other end of spring **110** engages wall **116** which forms the rearward edge of cavity **108**. Plate **112** and plunger **106** are both slidable in a slot **118** in a bracket **120** mounted on block **105** by screws **122**. Spring **110** is stronger than spring **101** so that as the lay approaches front center, and plunger **106** engages lever **98** and rocks it about pivot **99**.

The reason that a spring is used instead of a rigid connection is to prevent damage to the plunger or shuttle if the shuttle happens to be misplaced when the lay approaches front center. To adjust plunger **106** so that lever **98** will be operated sooner or later with respect to front center, there is a slot **124** in plate **112** through which screw **111** extends. By loosening screw **111** plate **112** can be moved forwardly or rearwardly through pin **114** and spring **110**.

When the partial beat-up position is changed in order to adjust the height of the terry pile, the plunger **106** is moved rearwardly or forwardly to cause the weft to be released earlier or later to match any change in the partial beat-up. Reference may be had to the aforesaid Gurney patent for a further understanding of the shuttle. It is thought to be sufficient to state that engagement of bunter **106** with lever **98** as the lay advances, in the direction of arrow **139**, will effect release of the weft held by the jaws **95** and **96**.

In the modified form of the pick placer shown in FIGURE 10 the pick placer rod **125** is similar to rod **80** but instead of pivoting as the latter does, it slides by reason of a block **126** slidable in a groove **127** in a temple **128**. In FIGURES 6 and 10 the rods **80** and **125** are shown in the forward position to which they are moved by the lay. A spring **131** has one end fastened at **132** to the temple **128** and the other end secured to the block. The spring normally holds rod **125** and block **126** in rear position but enables the reed to move the rod forwardly at full beat-up.

FIGURE 11 shows a pin **135** depending from rod **125** which serves the function of the usual "crow-hop" in that it extends down far enough to end at a point below the weft and forward of it and therefore keeps the weft from moving toward the fell. If desired, the rod **80** can also be provided with a pin **135**.

It is to be understood that the mechanism for forming terry piles need not necessarily be just as shown, nor must the weft laying mechanism necessarily follow every detail shown.

From the foregoing it will be seen that the loom set forth herein will weave terry fabric the pile loops of which are of uniform height. By locating the weft presenters in register with the first and second picks of the three pick cycle there is reduction in the waste weft at the selvages and the amount of weft lost by the third pick is not materially more than the yarn needed for pile loops. The pick placers cause the first two picks of the cycle to be parallel to the fell. Also, the shuttle shown in FIGURE 12 is controlled in a way that will release the weft when at least one weft will be laid in a partially beaten-up position parallel to the fell and in register with a presenter. It will also be seen that the presenters move in curved paths P concave from the front and that the path crosses two important points, namely, shuttle threading position, and a point on a vertical line passing substantially through the intersection of an edge or selvage thread E and a crosswise line defining substantially the partial beat-up position of picks one and two of a three pick terry cycle. Furthermore, each presenter retrieves or recovers its weft on the backward stroke of the lay when the presenter reaches the position of said partially beaten-up picks one and two.

What is claimed is:

1. In a terry cloth loom having a warp shed, a reed which operates in cycles of partial beat-up followed by a full beat-up to the fell of the cloth, a gripper shuttle which is picked through the shed for inserting weft lengths from an outside weft supply source, weft presenting and retrieving means comprising:

(a) means for presenting weft from said outside supply to said gripper shuttle before said shuttle is picked and for retrieving said weft after said shuttle is picked, said weft being retrieved at the intersection formed by the selvage and the weft at one of said beat-up positions, which retrieval position is a substantially constant distance from said fell of the cloth; and

(b) a pick placer for positioning a portion of a weft from the other of said beat-up positions to said intersections for retrieval by said presenter.

2. The loom as set forth in claim **1** wherein said weft is retrieved at the intersection formed by the selvage and partially beaten-up weft, whereby the partially beaten-up wefts are maintained parallel for uniformity of terry loops.

3. The loom as set forth in claim **2** wherein said pick placer comprises:

(a) an elongated rod pivoted to a fixed part of the loom and extending above the level of the cloth and swingable so as to intersect a portion of the weft which extends between said selvage and said presenter; and

(b) spring means normally urging said elongated rod rearwardly toward said partial beat-up position.

4. The loom as set forth in claim **3** wherein said elongated rod has a notch for engaging said weft.

5. The loom as set forth in claim 3 wherein a pin extends downwardly from said elongated rod to assist extends downwardly from said elongated rod to assist said and said presenter.

6. The loom as set forth in claim 3 wherein said pick placer includes a stop for limiting the rearward motion of said elongated rod.

7. The loom as set forth in claim 3 wherein said pick placer comprises:

(a) an elongated rod mounted for horizontal motion above the fabric wherein said rod remains parallel to the fell during its motion; and

(b) spring means normally urging said elongated rod rearwardly toward said partial beat-up position.

8. The loom as set forth in claim 7 wherein a pin extends downwardly from said elongated rod to assist said rod in engaging the weft extending between said selvage and said presenter.

9. The loom as set forth in claim 7 wherein said elongated rod has a notch for engaging said weft.

10. The loom as set forth in claim 2 wherein there are means effective to cause said shuttle to release the weft being drawn into the shed when the weft, as it is beaten-up by the reed, reaches said partial beat-up position.

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HENRY S. JAUDON, Primary Examiner

U.S. Cl. X.R.

139—122