

March 14, 1933.

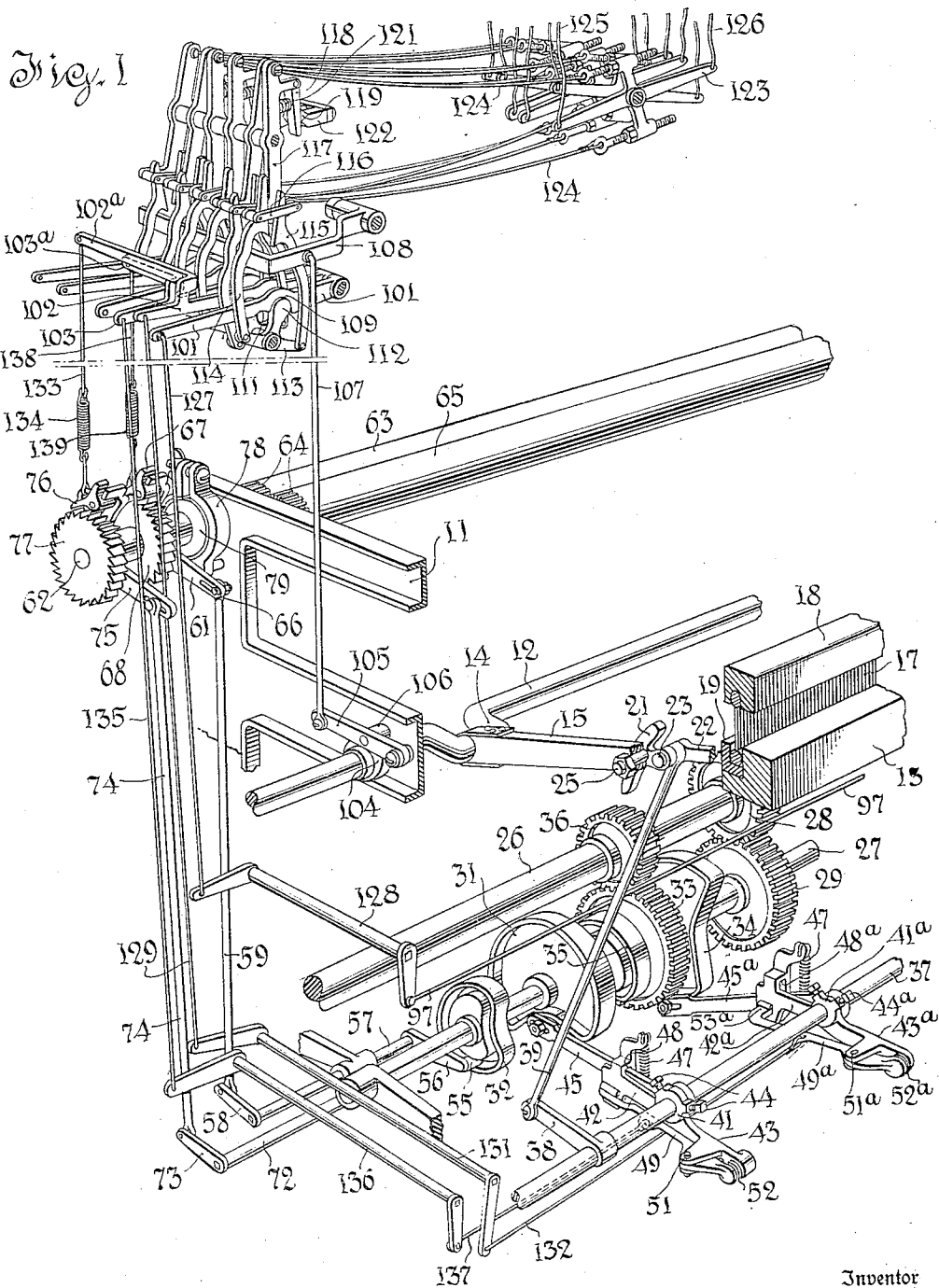
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1,901,769

LOOM

Filed Feb. 1, 1932

3 Sheets-Sheet 1



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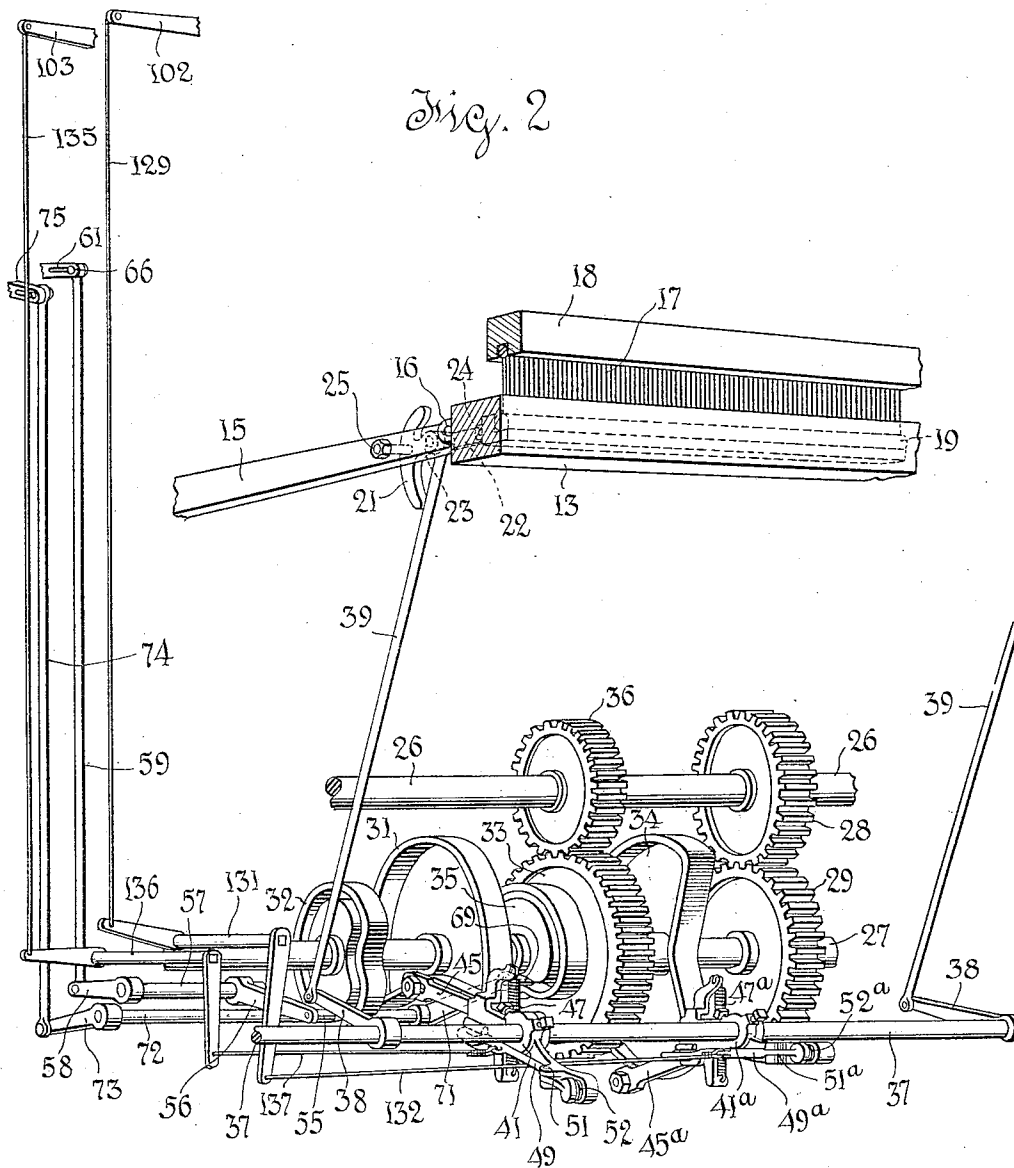
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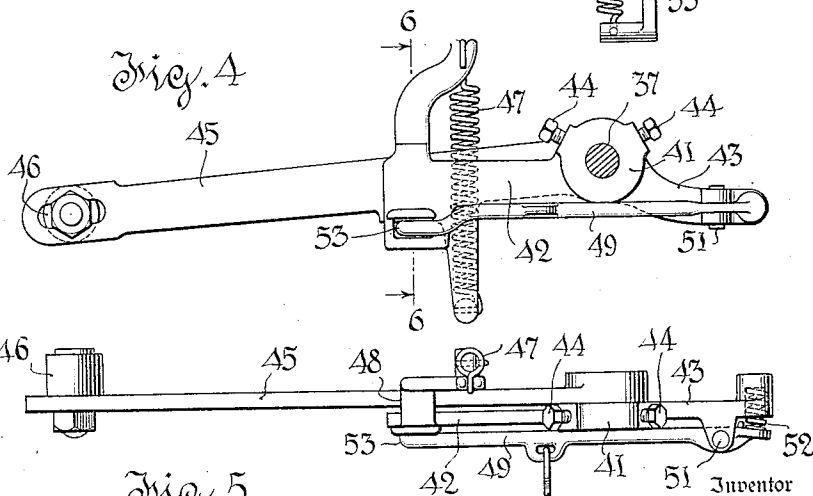
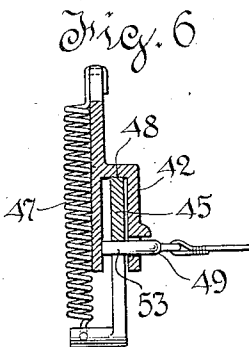
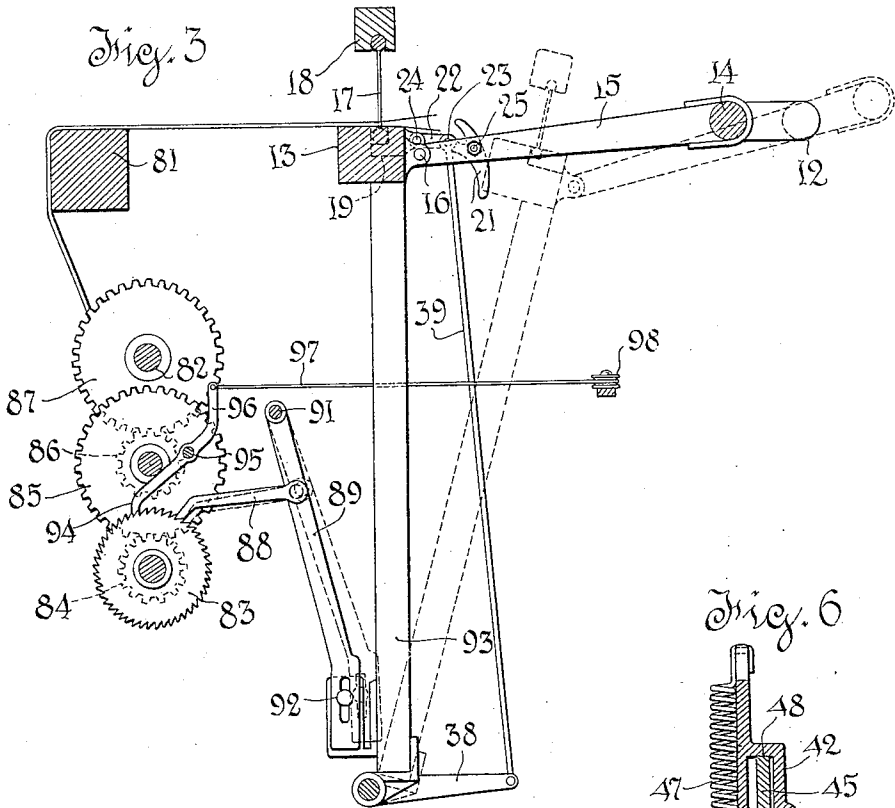
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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LOOM

Application filed February 1, 1932. Serial No. 590,215.

This invention relates to textiles and particularly to looms for weaving terry fabrics.

The principal object of the invention is to produce a loom which will alternately weave a soft long pile terry, and a more closely woven shorter pile terry better suited for pattern effects.

In the manufacture of towels, for example, it is often desirable to produce a towel having a soft texture and long pile, and to weave color contrast patterned terry cross borders on the ends of the towel. The long pile soft texture terry produces a pattern with such irregular outlines that only broad effects can be attempted. Hence it is desirable to change the weave in the border and produce a short pile closely woven terry, to permit the weaving of more intricate patterns.

The loom herein described meets these requirements by simultaneously changing the terry warp let-off, the reed motion, and the take-up. The change in the reed motion involves not merely the extent of motion, corresponding to the height of pile, but also the timing so that the character of the terry is changed as to the number of picks for each row of loops.

As at present used in practice, and as hereinafter described, the loom weaves in the body of the towel a rather loosely woven (and hence soft) long pile three-pick terry. In changing from body to border, the terry warp let-off is reduced to shorten the pile, the take-up on the cloth beam is reduced in proportion to increased picks per inch in the weave, the set back of the reed in the partial beat-ups is reduced to correspond with the reduced height of pile, and the timing of the reed is changed so that it makes one complete beat-up in four instead of in three picks. Thus, in the borders, a closely woven, short pile four pick terry is produced.

At the end of the border area the initial conditions may be restored. The loom will also weave plain weave, for example, in the hem strips between towels.

The change-over mechanism is controlled by the pattern mechanism which may be, for

example, a jacquard, and the pattern mechanism simultaneously changes the shedding of the terry warp to correspond to the changes between three pick and four pick terry.

The preferred embodiment of the invention will now be described in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of portions of a loom and related control mechanism, showing the parts essential to the invention and their relations to each other and to well known parts of a loom. The loom is set to weave three pick long pile terry.

Fig. 2 is a fragmentary perspective view on a somewhat enlarged scale showing the cams which control the reed and their relations to other parts.

Fig. 3 is a fragmentary view showing the mechanism for varying the take-up.

Fig. 4 is a side view of one of the cam actuated levers for controlling the reed.

Fig. 5 is a plan view of the same.

Fig. 6 is a section on the line 6-6 of Fig. 4.

A portion of the loom frame is shown at 11. Mounted in bearings in the frame is the usual crank shaft 12 having two cranks for actuating the lay 13, one such crank appearing at 14. The lay is driven by the cranks 14 through connecting rods 15 which are pivoted to the lay at 16 (see Fig. 3).

The reed 17 is pivoted at its top to the rail 18 carried by the lay 13 and is connected at its bottom to the retractible rail 19. Retraction of the rail 19 and reed 17 is controlled by two toggle links 21 and 22 pivoted to one another at 23. One is pivoted to rail 19 at 24 and the other to connecting rod 15 at 25. The toggle when straightened holds the reed forward in its normal position. The toggle breaks downward to permit retraction of the reed, the timing and degree of retraction being controlled as hereinafter described. There are two sets of toggle links.

The pick shaft is shown at 26 and turns at half the angular velocity of crank shaft 12. Mounted slightly below the pick shaft 26 is the terry-cam shaft 27 which is driven

at $\frac{2}{3}$ the angular velocity of shaft 26 (and hence at $\frac{1}{3}$ the angular velocity of crank shaft 12) by the gears 28 and 29.

Fast on shaft 27 is the three pick terry cam 31, and a corresponding let-off cam 32 for driving the positive let-off of the terry warp, at a suitable rate and time for the three pick terry.

Swiveled on the shaft 27 is the four pick cam unit made up of gear 33, four pick cam 34 and a let-off cam 35 for driving the positive let-off of the terry warp at a suitable rate and time for the four pick terry. The gear 33 is driven by a gear 36 fast on shaft 26 and turns at $\frac{1}{2}$ the angular velocity of shaft 26 (consequently at $\frac{1}{4}$ the angular velocity of crank shaft 12).

Means are provided to render the cams 31 and 34 effective selectively, by rendering the associated cam-follower operative or inoperative at will.

The three pick cam 31 has a short radius dwell for something less than $\frac{1}{3}$ of its circumference, and a long radius dwell for approximately the remainder. The four pick cam 34 has a short radius dwell for something less than $\frac{1}{4}$ of its circumference and a long radius dwell for approximately the remainder. Thus the short radius dwell of cam 31 reaches its cam follower every third turn of shaft 12 while that of cam 34 is effective every fourth turn of shaft 12. When the follower reaches the short radius dwell of whichever cam is active, toggles 21, 22, are straightened and the reed makes a full beat-up. The larger radius dwell of the active cam holds the toggles 21, 22, broken, and the reed retracted, the amount of such retraction being fixed by angular adjustment of the follower arms on the rock shaft 37, which will now be described.

The toggles 21, 22 are actuated by rock shaft 37 through arms 38 and links 39 connected to pivots 23. The cam followers are arms which may be latched to or unlatched from shaft 37. The two followers are identical and that associated with cam 31 will be described (see also Figs. 4 to 6).

A hub 41 with arms 42 and 43 is fixed on shaft 37 by set screws 44 so as to be adjustable angularly. Swiveled on shaft 37 adjacent hub 41 is follower arm 45 with longitudinally adjustable roller 46 which engages the cam. A tension spring 47, mounted as shown, draws arm 45 toward stop shoulder 48 on arm 42. The spring 47 is strong enough to lift lever 45 but not to rock shaft 37. A latch arm 49 pivoted at 51 on arm 43 and urged in an engaging direction by compression spring 52 has a nose 53 (see Fig. 6) which works through a slot in arm 42, and when allowed to move inward will enter beneath arm 45 and lock it against stop shoulder 48. When drawn outward the

latch releases the arm 45, rendering the follower inoperative to rock the shaft 37.

The follower for cam 34 is identical and its parts 41_a to 53_a are distinguished by the subscript from identical parts of the follower for cam 31. In Fig. 1 latch arm 49 is shown engaged and latch arm 49_a retracted so that the reed is controlled by three pick cam 31.

Only one of the latches 53, 53_a is allowed to engage at one time and in weaving plain fabric (for example in plain weave cross stripes and in the area between successive towels) both latches are disengaged, so that toggle 21, 22 remains straight, and the reed makes a full excursion each pick.

The hubs 41 and 41_a are differently adjusted angularly with reference to shaft 37, so that the follower arms have different angular adjustments and consequently produce different retractions of the reed. When the three pick cam 31 is operative its follower arm 45 produces one degree of set-back, and when the four pick cam 34 is operative its follower arm 45_a gives a different degree of set-back and consequently a different height of pile.

The cam 32 acts through roller 55, arm 56, rock shaft 57, arm 58 and link 59 to oscillate arm 61 which is swiveled on shaft 62. Shaft 62 carries terry let-off roll 63, and is geared at 64 with the companion terry let-off roll 65. The connection at 66 between arm 61 and link 59 is adjustable to vary the throw of arm 61. Arm 61 carries a retractible pawl 67 which coacts with a ratchet wheel 68 having a relatively small number of teeth, say twenty. The ratchet 68 is fast on shaft 62 and when pawl 67 is lowered into action ratchet 68 is fed one tooth for each three picks. This is the action in weaving long terry.

The cam 35 acts through roller 69, arm 71, rock shaft 72, arm 73 and link 74 (see Fig. 2) to oscillate arm 75 which also is swiveled on shaft 62. The connection between arm 75 and link 74 is also adjustable to vary the throw of arm 75, and the arm carries a retractible pawl 76 which coacts with a ratchet 77 fast on shaft 62 and having a relatively large number of teeth, say forty. When pawl 76 is lowered into action it feeds ratchet 77 one tooth for each four picks. This is the action in weaving short terry.

The pawls 67 and 76 are lowered selectively under control of a mechanism which also controls the latches 53 and 53_a. Rotation of the let-off rolls 63 and 65 is retarded by the usual spring urged clasp brake 78 co-acting with drum 79 on shaft 62.

The take-up mechanism is illustrated in Fig. 3. The breast beam is shown at 81 and the take-up roll at 82. The roll 82 is driven by ratchet wheel 83 through a reducing train

made up of the gears 84, 85, 86, 87. The ratchet 83 is fed by a pawl 88. This is pivoted to a swinging arm 89 which is pivotally supported at 91 and has a pin and slot driving connection 92 with a sword 93. Retrograde motion is normally prevented by pawl 94 pivoted at 95.

As so far described the take-up mechanism is of ordinary form. According to this invention the pawl 94 is provided with a tail 96 to which is attached a pull cord 97 guided by sheave 98.

Under certain conditions when reduced take-up is desired, cord 97 is pulled periodically by the pattern mechanism, periodically disengaging pawl 94, so that for one pick, ratchet 83 follows pawl 88 back when the pawl is retracted after a feeding stroke. Thus if cord 97 is pulled every twelfth pick ratchet 83 will be fed only eleven teeth in twelve picks; instead of twelve teeth, the normal number.

Thus, selection between the cams 31 and 34 controls both the timing of the reeds recessive motion and the range of such motion, the selection between pawls 67 and 76 controls the rate at which the terry warp is let off and the control of pawl 94 controls the rate of take-up.

A coordinated control of these three elements can be effected by various mechanisms, preferably some mechanism associated with the jacquard or other pattern mechanism which controls the shedding of the warp. I prefer and illustrate a lever mechanism of a known type intended for actuation by a jacquard. Its use involves slight modifications by which a single lever controls a latch and pawl simultaneously. Thus only three levers are required. In the drawings a six-lever unit is illustrated because this is the standard unit and because the remaining levers are available and useful for other purposes.

Referring now to Fig. 1, the three levers of the six-lever unit, used in the present invention are indicated at 101, 102 and 103. Levers 102 and 103 are specially formed, each having a lateral extension indicated at 102_a and 103_a respectively.

Motion for the entire unit is derived from the crank shaft 12 of the loom by means of a cam 104 which drives the rock lever 105 through the follower roller 106. A link 107 connects lever 105 with the rocking lifting yoke 108 common to all six levers of the lever unit.

Except for yoke 108 each lever controlling mechanism is distinct from the others and all are identical. Hence a description of the controlling mechanism for lever 101 will suffice.

The lever 101 has on its lower side a deep notch 109 and a shallow notch 111 engaged

by the upstanding head 112 on rock-lever 113. The notches retain the head 112 impositively and the lever 101 is raised or lowered according as the head 112 is in one or another notch. The ends of the rock-lever 113 carry each a corresponding upstanding hook 114 and 115 embraced by a yoke 116 on a second rock-lever 117, so that the hooks are brought selectively into position to engage yoke 108 according as lever 117 is in one or the other of two characteristic positions.

The lever is held impositively in these positions by hinged detent 118 having a reversely beveled nose 119 which is urged by spring 121 into engagement with a fixed reversely beveled nose 122. The lever 117 is shifted by a four-armed rock-lever 123 two of whose arms are connected by pull cords 124 with the ends of lever 117, and two of whose arms are connected to harness cords 125 and 126 connected to hooks in the jacquard (not shown). Equivalent connections could be made to other pattern mechanisms. The jacquard or other pattern mechanism also controls shedding in the usual manner.

The parts 109 to 126 are duplicated for each of the levers 101, 102, 103 and so on and operate independently. The pattern mechanism may operate on any pick to shift lever 123 for example and hence to interchange hooks 114 and 115 relatively to the path of yoke 108. The rise of yoke 108 then shifts lever 113 and raises or lowers lever 101.

Lever 101 is connected by pull wire 127 and bell crank 128 with pull cord 97 which retracts pawl 94.

Lever 102 is connected by pull wire 129, bell crank 131 and pull wire 132 with latch arm 49_a which when disengaged throws out the four pick terry reed motion. Branch arm 102_a is connected by pull wire 133 and tension spring 134 with pawl 76 which when lifted throws out the terry let-off for low (four pick) terry.

The motion of lever 102 from lower to upper position disengages latch 49_a and renders pawl 76 inoperative. Thus, upward motion of lever 102 destroys the set-up for short four pick terry.

Lever 103 is connected by pull wire 135, bell crank 136 and pull wire 137 with latch arm 49, which when disengaged throws out the three pick terry reed motion. Branch arm 103_a is connected by pull wire 138 and tension spring 139 with pawl 67 which when lifted throws out the terry let-off for high three pick terry.

The motion of lever 103 from lower to upper position disengages latch 49 and renders pawl 67 inoperative. Thus, upward motion of lever 103 destroys the set-up for long three pick terry.

The three settings are thus as follows:

Long three pick terry

Lever 101-----down constantly

Lever 102-----up

5 Lever 103-----down

Short four pick terry

Lever 101----- $\left\{ \begin{array}{l} \text{moved} \\ \text{up periodically for} \\ \text{one pick} \end{array} \right.$

10 Lever 102-----down

Lever 103-----up

Plain weave

Lever 101-----either (as above)

Lever 102-----up

15 Lever 103-----up.

While the mechanism has been described as applied to the weaving of a particular fabric, it can be modified to weave somewhat different fabrics. The embodiment described was worked out to make use, so far as possible, of standard loom parts. Equivalent mechanisms for some of the selected components are well known and may be substituted, and other substitutions may be made without departure from the spirit of the invention.

While I have described the invention with considerable particularity as applied to that type of terry loom in which the reed is shifted on the lay, the invention is, in its broadest aspects, applicable to other types of terry looms.

No claim is here made to the fabric or fabrics which the above described loom is capable of weaving. The fabrics form a separate invention broader than the concept of the loom and capable of manufacture in various ways. They form the subject matter of a separate application Serial No. 590,216 filed February 1, 1932.

Terry looms have been heretofore devised to weave fabrics having different heights of pile in adjacent areas, but so far as applicant is advised no one has heretofore provided means for changing the character of weave (that is, for example, changing from three to four pick terry). Nor has any one proposed to change the take-up concurrently with either change of height of terry or change of character of terry weave. The present invention can be availed of to change height of terry and take-up concurrently or character of terry weave and take-up concurrently or character of terry weave alone or as above described all three concurrently.

In certain of the claims the term "set-back" will be used to define the amount the reed is spaced from the fell of the cloth at the termination of partial beat-ups. As the desired result can be accomplished in various ways no limitation to the structure illustrated is implied by the use of this term.

What is claimed is:—

65 1. The combination with a terry loom of

the type in which the reed is shiftable to vary the effective range of its excursions during the beating up of the lay and in which the extent and timing of such shifting are controlled by a cam mechanism; of a second cam mechanism similar to the first-named cam mechanism but arranged to give a different extent of shifting; and means for rendering said cam mechanisms effective selectively to control the reed.

2. The combination with a terry loom of the type in which the reed is shiftable to vary the effective range of its excursions during the beating up of the lay, and in which the extent and timing of such shifting are controlled by a cam mechanism; of a second cam mechanism similar to the first-named cam mechanism but arranged to give a different timing and extent of shifting; and means for rendering said cam mechanisms effective selectively to control the reed.

3. The combination in a terry loom of the type in which the reed is shiftable to vary the effective range of its excursions during the beating up of the lay, and in which the reed shifting mechanism is adapted for actuation by a cam; of two cams similar to one another but each arranged to give a different timing of shifting with respect to the cycle of the loom; and means for rendering said cams effective selectively to control the reed.

4. The combination of claim 2 further characterized in that the means for rendering said cam mechanisms effective selectively includes a follower for each cam and a latch for putting each follower into and out of action.

5. The combination with a loom of the type in which the reed is shiftable to vary the effective range of its excursions during the beating up of the lay, and in which the extent and timing of such shifting, and the timing of the terry warp let-off are capable of control by cam mechanisms; of two cam mechanisms similar to one another but each arranged to give a different extent and timing of such shifting and a different timing of the let-off with respect to the cycle of the loom; and means for rendering said cam mechanisms operative selectively.

6. In a terry loom, the combination of a crank shaft; a lay driven thereby; a reed shiftable mounted on the lay to vary its approach toward the fell of the cloth being woven; a pair of cams each capable of shifting said reed on said lay, said cams being driven at different angular velocity ratios with respect to said crank shaft; and means for rendering said cams selectively operative to shift said reed.

7. The combination of claim 6, further characterized in that each of said cams has a follower having adjusting means which

determine the amount that the reed is retracted.

8. In a terry loom, the combination of a crank shaft; a lay driven thereby; a reed shiftable on said lay to vary its approach toward the fell of the cloth being woven; terry warp let-off rolls; two drive mechanisms for said rolls, said drives giving characteristically different let-off rates and including means for disconnecting the drives; two sets of cams, said sets turning at different angular velocity ratios with respect to said crank shaft, each set of cams comprising a cam for controlling said reed and a cam for actuating a corresponding one of said let-off drives in timed relation; and a single controlling means serving to render said sets of cams effective selectively to control said reed and simultaneously to connect a corresponding one of said drives to drive the let-off rolls.

9. The combination defined in claim 8, further characterized in that the loom includes a take-up roll; a take-up mechanism for actuating said roll; means for varying the rate of motion imparted to the take-up roll thereby; and means for controlling the last-named means in timed relation with the control of said cams.

10. In a terry loom, the combination of a terry warp let-off; a reciprocating lay; a reed shiftable on said lay to vary its approach toward the fell of the cloth being woven; two distinct mechanisms operable selectively to control the motions of the reed on the lay; two distinct feed mechanisms for the terry let-off, each such mechanism being capable of being brought into and out of action independently of the other; and a control mechanism including two independently shiftable members, one of which is connected to put one of said reed controlling mechanisms and one of said feed mechanisms simultaneously into action and out of action, and the other of which brings the other of said reed controlling mechanisms and the other of said feed mechanisms simultaneously into action and out of action.

11. In a terry loom, the combination of a terry warp let-off; a cloth take-up; a reciprocating lay; a reed shiftable on said lay to vary its approach toward the fell of the cloth being woven; two distinct mechanisms, each capable of being brought into operative relation with said reed to control the shifting thereof on the lay; two independent and disengageable mechanisms for driving the terry let-off; means for driving the take-up; means for varying the rate of said drive; and a control mechanism comprising three independently movable members, one of which functions to place one of said reed controlling mechanisms and one of said let-off drives simultaneously into and out of

action, another of which functions to place the other of said reed controlling mechanisms and the other of said let-off drives simultaneously into and out of action, and the third of which is operatively connected to said rate varying means to control the rate of take-up.

12. In a terry loom, the combination of a terry warp let-off; a cloth take-up; a reciprocating lay; a reed shiftable on said lay to vary its approach toward the fell of the cloth being woven; two distinct mechanisms, each capable of being brought into operative relation with said reed to control the shifting thereof on the lay; two independent and disengageable mechanisms for driving the terry let-off; means for driving the take-up; means for varying the rate of said drive; a control mechanism comprising three independently movable members, one of which functions to place one of said reed controlling mechanisms and one of said let-off drives simultaneously into and out of action, another of which functions to place the other of said reed controlling mechanisms and the other of said let-off drives simultaneously into and out of action, and the third of which is operatively connected to said rate varying means to control the rate of take-up; a pattern mechanism for controlling the shedding in said loom; and connections from said pattern mechanism for shifting said three movable members.

13. The combination of a terry loom; means for varying the rate of let-off of the terry warp to provide at least two different let-off rates; means for varying the rate of take-up of the cloth to provide at least two different take-up rates; means for varying the amount of set-back to provide for weaving at least two different heights of pile; and controlling mechanism for actuating the three means aforesaid in timed relation with each other, while the loom is in operation.

14. The combination of a terry loom; means for varying the let-off of the terry warp to provide at least two different rates of let-off; means for varying the amount of set-back to provide for weaving at least two different heights of pile; means for varying the cycle of motion of the reed to change the number of picks woven for each row of terry loops; and means for controlling the three means aforesaid in timed relation with each other, while the loom is in operation.

15. The combination of a terry loom; means for varying the rate of let-off of the terry warp to provide at least two different rates of let-off; means for varying the amount of set-back to provide for weaving at least two different heights of pile; means for varying the cycle of motion of the reed to change the number of picks for each

row of terry loops; means for varying the take-up to provide at least two different rates of take-up; and means for controlling the aforesaid means in timed relation with each other, while the loom is in operation.

16. The combination of a terry loom; means for varying the set-back to provide for weaving at least two different heights of pile; means for varying the cycle of motion of the reed to vary the number of picks of each row of terry loops; and means for controlling the aforesaid means in timed relation with each other, while the loom is in operation.

17. The combination of a terry loom; means for varying the amount of set-back to provide for weaving at least two different heights of pile; means for varying the take-up to provide at least two different take-up rates; and means for controlling the aforesaid means in timed relation with each other, while the loom is in operation.

18. The combination of a terry loom; means for varying the amount of set-back to provide for weaving at least two different heights of pile; means for varying the cycle of motion of the reed to vary the number of picks for each row of terry loops; means for varying the take-up to provide at least two different rates of take-up; and means for controlling the aforesaid means in timed relation with each other, while the loom is in operation.

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

SAMUEL PINKNEY PARKER.

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