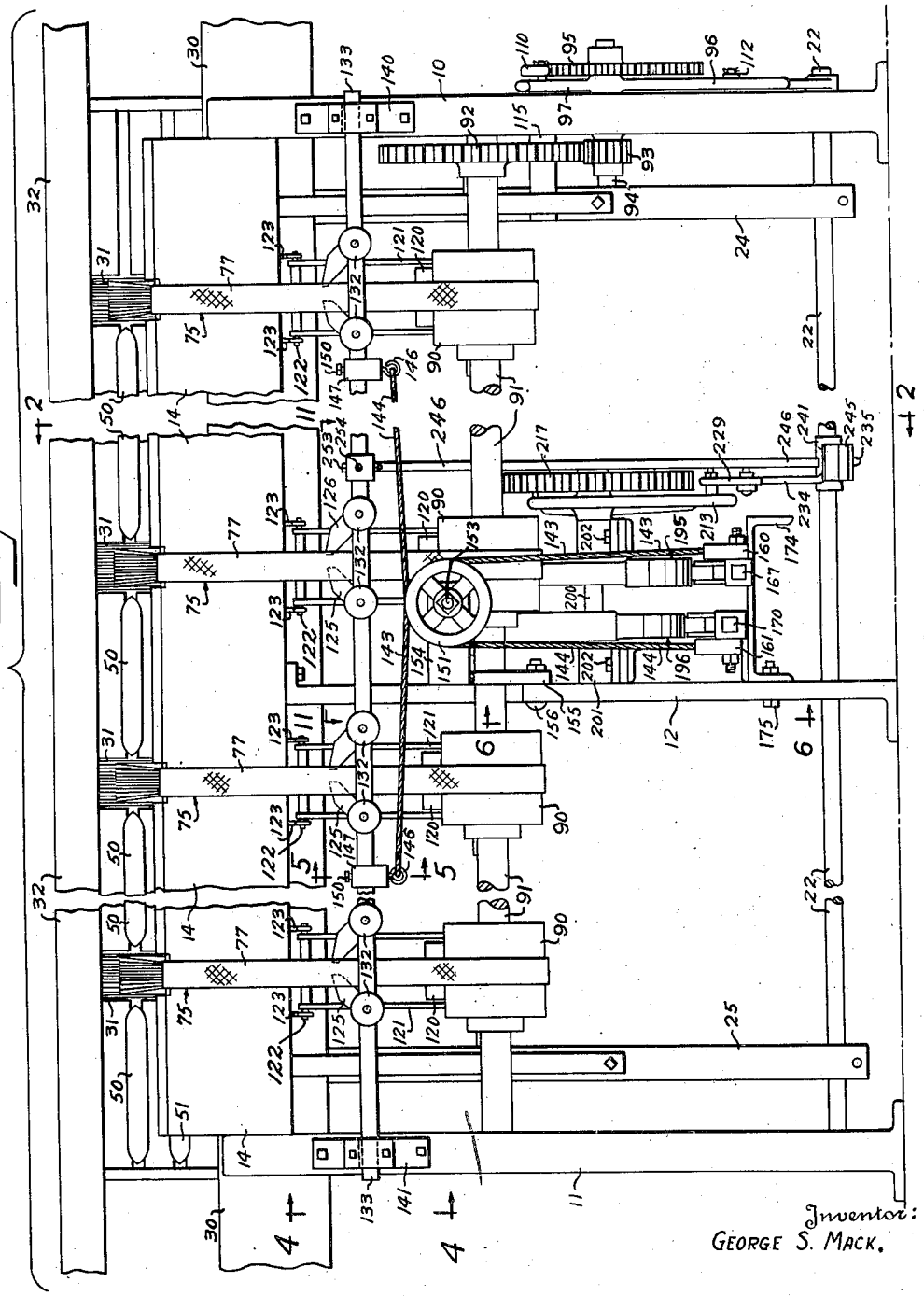
Oct. 4, 1949. G. S. MACK 2,483,587

APPARATUS FOR CUTTING VENETIAN BLIND TAPES

Filed May 28, 1948 6 Sheets-Sheet 1

Fig. 1



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APPARATUS FOR CUTTING VENETIAN BLIND TAPES

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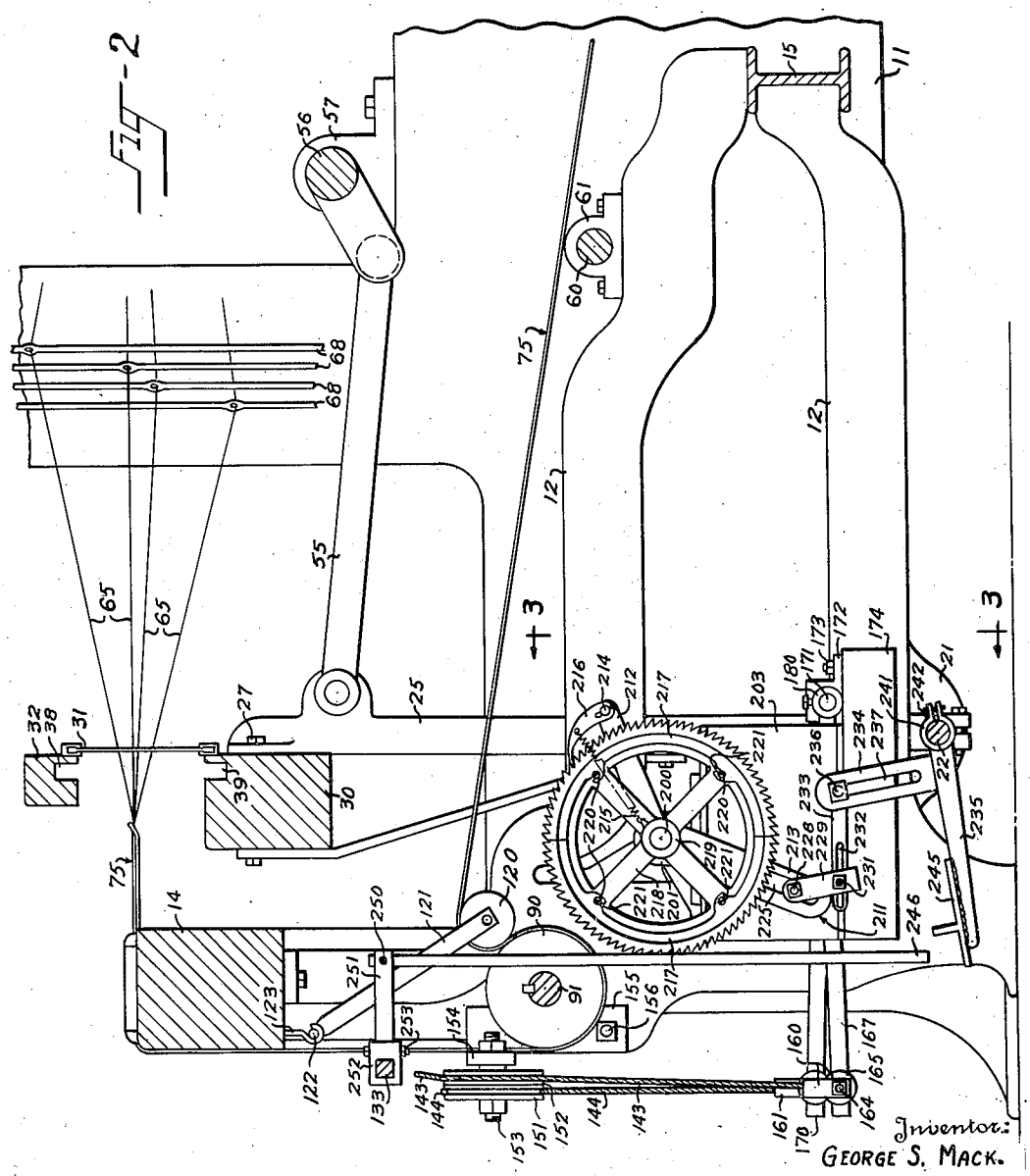
FIG-2



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APPARATUS FOR CUTTING VENETIAN BLIND TAPES

Filed May 28, 1948 6 Sheets-Sheet 3

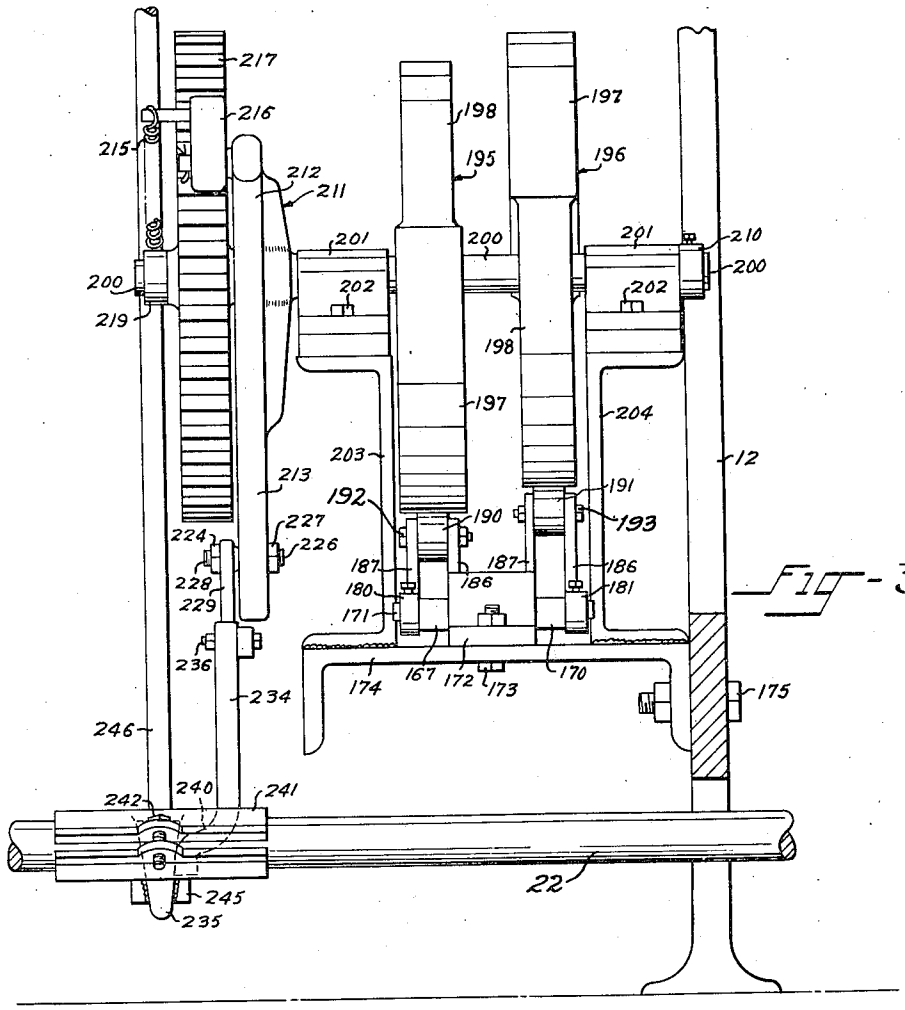

Fig. 3

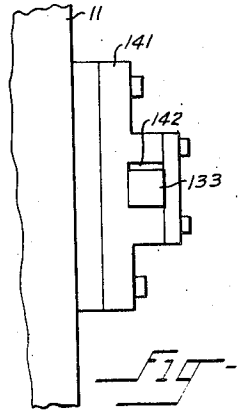

Fig. 4

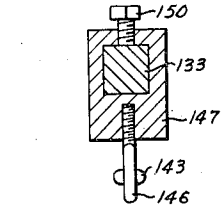

Fig. 5

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APPARATUS FOR CUTTING VENETIAN BLIND TAPES

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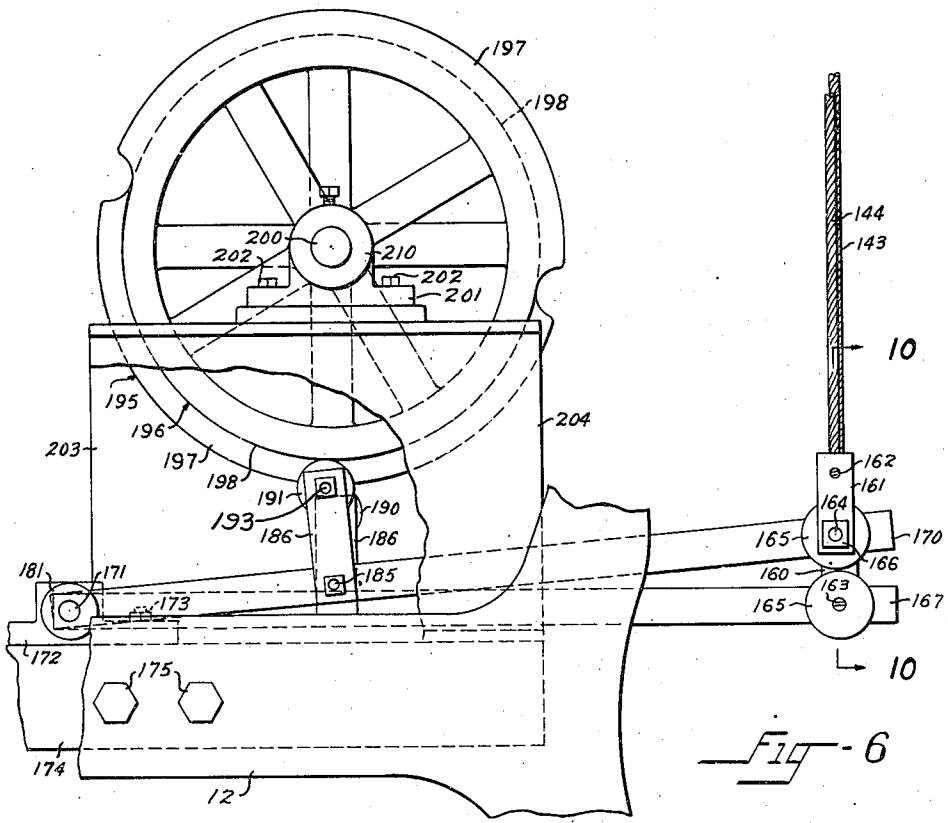

Fig. 6

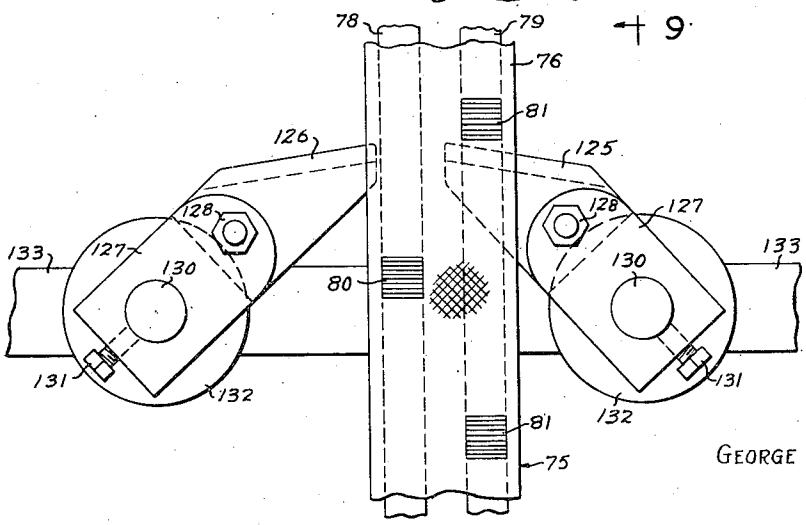

Fig. 7

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APPARATUS FOR CUTTING VENETIAN BLIND TAPES

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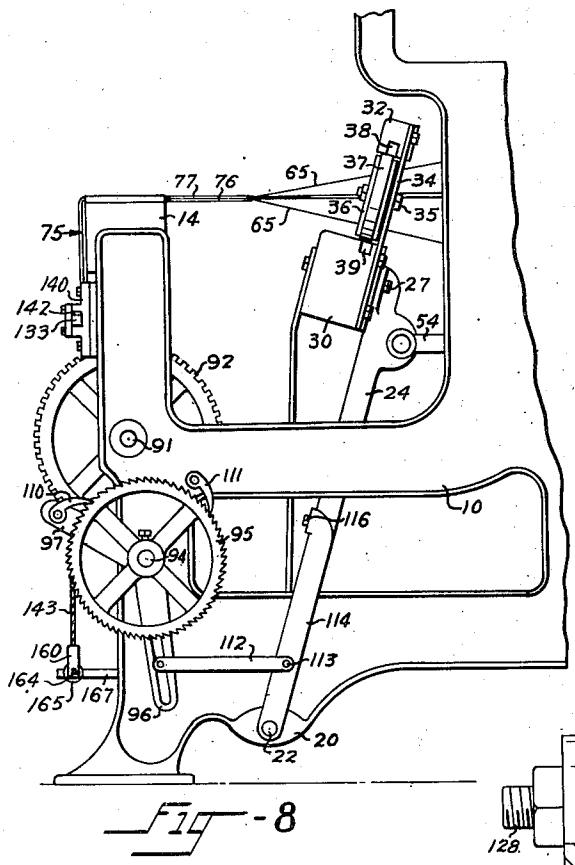

Fig-8

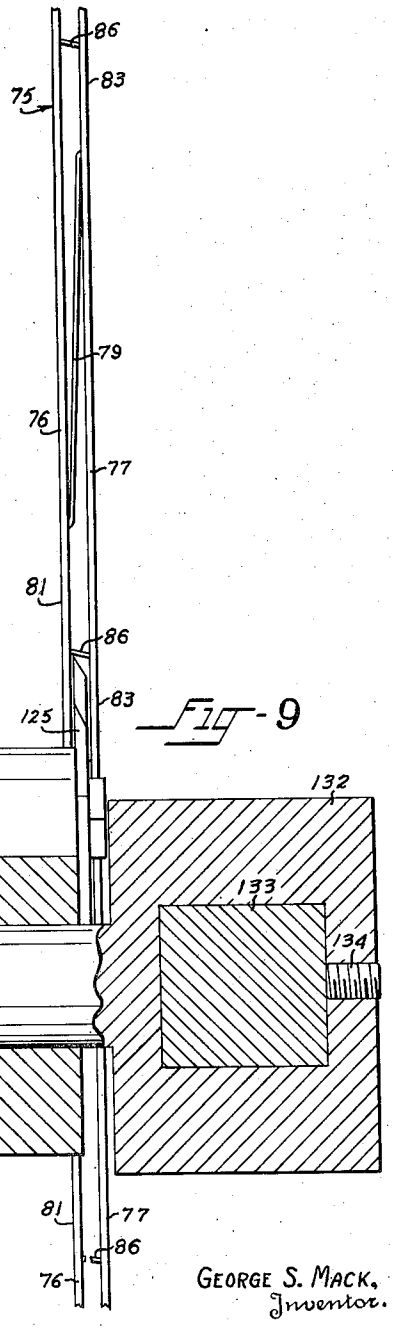

Fig-9

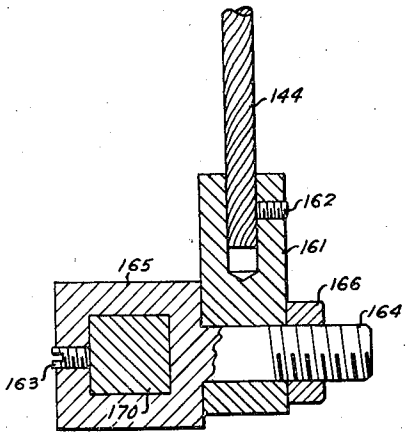

Fig-10

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APPARATUS FOR CUTTING VENETIAN BLIND TAPES

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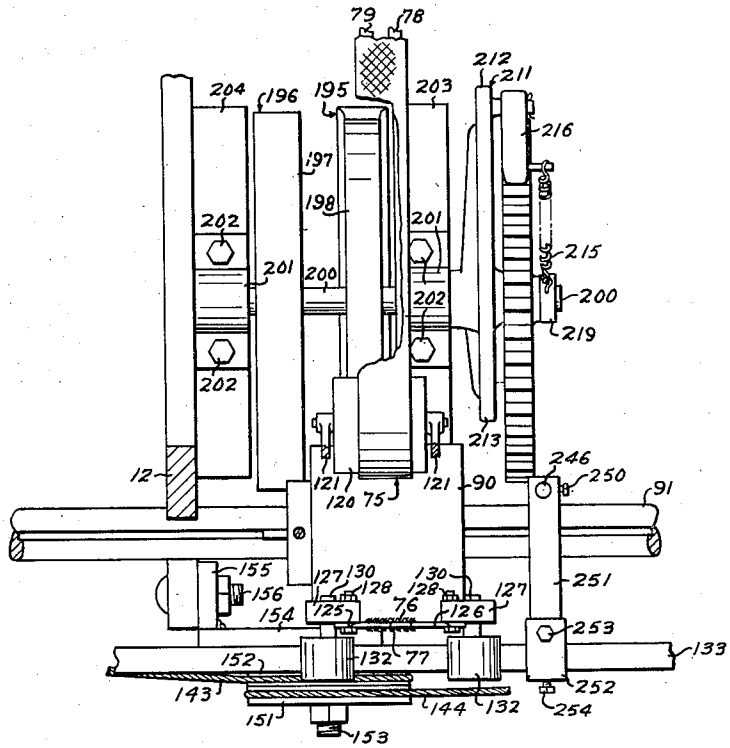

Fig-11

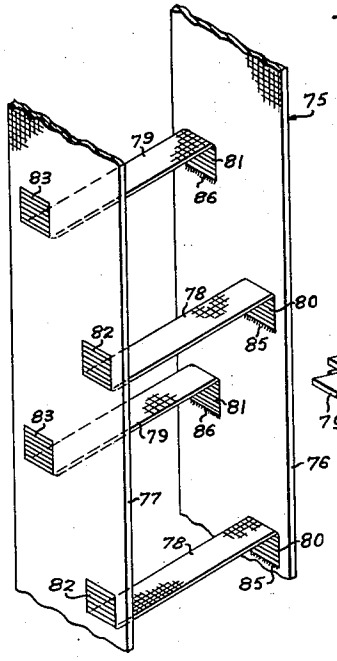

Fig-13

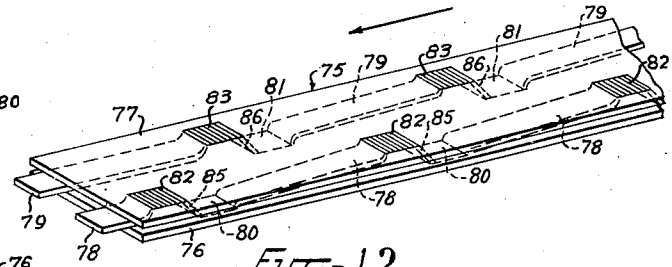

Fig-12

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Patented Oct. 4, 1949

2,483,587

UNITED STATES PATENT OFFICE

2,483,587

APPARATUS FOR CUTTING VENETIAN BLIND TAPES

George S. Mack, Anderson, S. C.

Application May 28, 1948, Serial No. 29,825

12 Claims. (Cl. 139—291)

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This invention relates to severing means adapted to be applied to a loom on which the weaving of multi-woven tapes or webs of the ladder type, such as are used for supporting the slats of Venetian blinds, is effected.

This invention relates more especially to apparatus to be applied to a loom for severing cross-over warp threads and the like between two superposed tapes and interconnecting straps, all of which are woven at the same time, so that the superposed tapes may be drawn apart from each other and will have disposed therebetween the interconnecting warp threads or straps, on which the slats of the Venetian blind are adapted to rest.

It is a well known fact, to those familiar with the art, that Venetian blind tapes consist of two body tapes which are woven simultaneously with connecting tapes or straps. The connecting straps are arranged in two parallel rows adjacent the opposite edges of the body tapes and, until these cross-over warp threads are severed, in the manner to be later described, the body tapes cannot be separated to form the ladder structure.

Heretofore, the severing of the cross-over threads has been done by various means, such as manually, or by machines removed from the loom, or in some instances they have been severed on the loom. However, the means heretofore used on looms for severing the cross-over threads has not been satisfactory in that it has been expensive to manufacture and has depended upon the function of various other parts of the loom which are disposed some distance away from the point at which the severing operation is to be performed on the loom.

It is an object of this invention to provide means driven by the rock shaft of a loom for alternately severing the cross-over threads, disposed between the two body tapes as they are woven on a loom, to thus form the ladder tapes heretofore described.

It is another object of this invention to provide means in combination with a loom for intermittently moving a pair of cutters, one at a time, between a pair of superposed body tapes, so that each of the cutter blades will alternately perform the operation of severing the cross-over threads disposed between the body tapes and to also provide means for oscillating the cutter blades in a vertical plane as as to assist in severing the cross-over threads, thereby assuring a smooth even edge to the threads that have been severed.

It is another object of this invention to provide a means for severing the cross-over threads at precisely the point intended in the tape so that in

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the event the conventional pick gearing has become out of proper timed relation, one of the blades would sever one of the connecting straps between the two main body tapes instead of the cross-over threads, which would serve as a warning to the operator of the loom that the correct number of picks were not being woven into the inter-woven portions on the connecting straps and the main body tapes.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which

Figure 1 is a front elevation of the lower part of a loom, that is, from the breast beam down to the floor, showing the apparatus applied thereto;

Figure 2 is an elevation, partly in section, and being taken along the line 2—2 in Figure 1 and showing various other parts of the loom schematically;

Figure 3 is an enlarged rear elevation of the driving mechanism associated with this invention and is taken along the line 3—3 in Figure 2 and being a reverse elevation of the lower central portion of Figure 1;

Figure 4 is an enlarged end elevation of one of the bearing blocks associated with this device and is taken along the line 4—4 in Figure 1;

Figure 5 is an enlarged vertical sectional view taken along the line 5—5 in Figure 1;

Figure 6 is an enlarged elevation of the driving mechanism associated with the thread cutting mechanism and is taken along the line 6—6 in Figure 1;

Figure 7 is an enlarged elevation of the cutting means associated with one of the interconnected tapes and is an elevation of the opposite side of the central portion of Figure 1;

Figure 8 is an elevation looking from the right-hand side of Figure 1 to the left, showing a portion of the loom frame and showing the lay in its rearmost position;

Figure 9 is an enlarged elevation with parts in section and is taken along the line 9—9 in Figure 7;

Figure 10 is an enlarged vertical sectional view showing that means which is nearest the observer in Figure 6 for connecting the cable to the lever arm associated therewith and is taken along the line 10—10 in Figure 6;

Figure 11 is a top plan view of the central structure shown in Figure 1 and is taken along the line 11—11 in Figure 1;

Figure 12 is an isometric view of a portion of the ladder tape as it is after it is removed from an

ordinary loom before the cross-over warp threads have been severed;

Figure 13 is an isometric view of a portion of the finished ladder tape after the cross-over threads have been cut and with the body tapes disposed in spaced relation to each other for receiving the slat of a Venetian blind.

Referring more specifically to the drawings, the numerals 10 and 11 indicate the right and left hand side frame members of a loom frame respectively which have disposed therebetween intermediate frame members or struts 12, only one of which is shown, and the side frame members 10 and 11 and the members 12 are interconnected by a breast beam 14 disposed on the upper front ends of the same. The rear ends of the side frame members 10 and 11, as well as the intermediate frame members 12, are interconnected by an I beam 15 (Figure 2).

The side frame members 10 and 11 have downwardly projecting bearing portions 20 and 21 respectively in which the opposite ends of a conventional rocker shaft 22 are oscillatably mounted. The rocker shaft 22 has fixedly secured thereon conventional upwardly projecting swords 24 and 25 which have secured to their upper ends, by bolts 27, a lay 30 to which the lower ends of a plurality of reed members 31 are secured, their upper ends being secured adjacent the lower edge of a conventional reed cap 32 which, on this particular type of loom, are connected to the lay 30 by interconnecting strap iron members 34 disposed at each end of the lay (Figure 8).

The vertical strap iron members 34 have studs 35 penetrating the same which have rotatably mounted thereon grooved pulleys 36 which have a belt 37 mounted on the same, one end of which is connected to a conventional driving means, not shown, and the other end of which is connected to a series of conventional gear racks, not shown, disposed in longitudinally extending grooves 38 and 39 in the reed cap 32 and the lay 30 respectively; which are adapted to transmit reciprocatory motion, by conventional means, not shown, to a plurality of upper shuttles 50 and lower shuttles 51 disposed between the lay 30 and the reed cap 32.

The swords 24 and 25 have pivoted thereto, adjacent the lay 30, pitman rods 54 and 55, respectively (Figures 2 and 8). These pitman rods extend rearwardly and are connected to a conventional crank shaft 56 which is rotatably mounted in bearing blocks 57 secured to the side frame members 10 and 11.

This crank shaft 57 is driven by conventional means, not shown, and there is disposed therebelow, a conventional cam shaft 60 which is rotatably mounted in the side frame members 10 and 11 and is also rotatably mounted in bearing blocks 61 fixedly mounted on the intermediate frame members 12 (Figure 2). The shaft 60 is driven by conventional means, not shown.

The loom has a plurality of sheets of warp yarns 65 which extend from suitable creels or a warp beam, not shown, and pass through suitable harnesses 68 (Figure 2). The warp threads then extend from the harnesses 68 through the reeds 31 to form a plurality of unfinished ladder tapes broadly designated at 75.

These tapes 75 are made up of two superposed parallel body tapes or webs 76 and 77 (Figures 7, 12 and 13) with two spaced rows of connecting tapes or cross straps 78 and 79 interwoven therebetween. The structure of the composite tape is fully shown and disclosed in Patents numered

2,226,093 of December 14, 1940, and 2,080,831 of May 18, 1937.

The ladder web or tape 75 is woven with the connecting tapes or cross straps being disposed approximately $\frac{3}{16}$ of an inch inwardly from each edge of the body tapes 76 and 77. The warp threads forming the connecting tapes 78 and 79 are interwoven with the tape 77 as at 82 and 83 and are then interwoven with the tape 76 as at 80 and 81. This causes cross-over warp threads 85 and 86 to be disposed between the interwoven spots 82 and 80 and 81 and 83 respectively. When so woven, the cross-over warp threads 85 and 86 respectively must be severed before the two body tapes 76 and 77 can be separated as shown in Figure 13 to receive the slats of a Venetian blind. It may be observed in Figures 12 and 13 that the portions 82 of the straps 78 are equally spaced apart from each other and the intervowen portions 83 of the cross-straps 79 are so arranged longitudinally of the tape 75 as to be disposed midway of the interwoven portions 82 at the opposite edge of the tape 75, the portions 83 also being spaced equal distances apart from each other throughout the entire length of the tape 75 and being in staggered relation to the interwoven portions 82 disposed in the opposite side of the tape.

Now, the ladder tapes 75 extend from the beat-up point and pass over the top surface of the breast beam (Figure 2) and downwardly along the front surface of the same and then around a plurality of take-up or sand rolls 90 which are fixedly mounted on a transverse shaft 91 which is rotatably mounted, at each end thereof, in the side frame members 10 and 11. The shaft 91 has a conventional pick gear wheel 92 (Figure 1) fixedly mounted thereon, adjacent the vertical side frame member 10, which engages a pinion 93 fixedly mounted on a shaft 94 which is rotatably mounted in the vertical side frame member 10 and has fixedly mounted on the other end thereof a ratchet wheel 95.

Disposed between the wheel 95 and the vertical side frame member 10 (Figure 1) is a bell crank lever 96 having an upwardly extending arm 97 integral therewith (Figures 1 and 8). The ratchet wheel 95 is engaged by ratchet pawls 110 and 111 one of which is pivotally mounted on the arm 97, and the other of which is pivotally mounted on the side frame member 10. The bell crank lever 96 has pivotally connected adjacent the lower end thereof a link member 112 which extends rearwardly and is secured to a conventional upwardly extending arm 114, as at 113. The arm 114 has, integral therewith, a horizontally disposed portion 115 (Figure 1), which is secured, by a bolt 116, to the front surface of the sword 24. The arm 114 extends downwardly below the link 112 and is secured, at its lower end, on the end of the rocker shaft 22 (Figure 8).

Thus, as the lay 30 moves forwardly, by means of the pitman rods 55 being pivotally secured to the swords 24 and 25, the arm 114 moves with the swords 24 and 25 and thus transmits oscillatory motion to the bell crank 96 to thus transmit step by step rotation to the ratchet wheel 95. This, of course, transmits partial rotation to the gear 92 by means of the pinion 93, and the shaft 91 on which the take-up rollers 90 are fixedly secured, to thus take up the ladder tapes 75 in a step by step relation each time the lay moves to a forward or beat-up position.

The tapes after passing around a portion of the periphery of the take-up rollers 90 are di-

rected over idler rollers 120 (Figures 1 and 2) which are rotatably mounted on conventional U-shaped members 121 which are pivotally mounted, as at 122, to downwardly projecting screw eyes 123 which are secured in the lower surface of the horizontally disposed breast beam 14. The tapes 75 then pass rearwardly to a suitable means for winding up the same, not shown. All of the parts which have heretofore been described are conventional and it is with these parts that this invention is adapted to be associated.

Now, as the tapes 75 pass downwardly from the breast beam 14, the cross-over warp threads 85 and 86 are severed before the tapes 75 engage the tape take-up rolls 90. It may be observed in Figures 7 and 9 that only one of the sets of cross-over threads 85 or 86 are severed at one time on each of the ladder tapes 75. Figure 7 shows a knife 125 in a position ready to sever the cross-over threads 86, they being disposed adjacent and above the interwoven portion 83, and, in this instance, the cutter blade 125 is shown to be partially disposed between the body tapes 76 and 77 and extends inwardly from one edge of the same to the center of the same and simultaneously there is projecting slightly inwardly between the body tapes 76 and 77, at the opposite edge thereof, a second blade 126 and it will be noted that this blade 126 is not in the path of the interconnecting straps 78 while the blade 125 is in the path of the connecting tapes 79. However, as soon as the blade 125 has severed the threads 86, the blades 125 and 126 then move from left to right in Figure 7 so that the blade 126 is in alignment with the connecting tapes 78 to thus sever the cross-over warp threads 85 and thus the knife 125 allows the connecting tapes 79 to pass without being severed. These blades 125 and 126 are caused to move back and forth simultaneously in step by step relation so that the cross-over threads 85 and 86 of each of the tapes 75 will thus be severed by the blades 125 and 126 as the body tapes 76 and 77 pass thereby. The means of transmitting the reciprocatory motion to the blades 125 and 126 is to be presently described.

There is one of each of these blades 125 and 126 disposed adjacent the sides of each of the tapes 75 in the identical manner to that shown in Figure 7, and these blades 125 and 126 are each secured to a block 127, by any suitable means such as a bolt 128. This block 127 is fixedly secured on a stub shaft 130, by any suitable means such as a set screw 131. The stub shaft 130 is integral with a cuff member or block 132 which is adjustably mounted on a rectangular shaft 133 and is secured to the same by a set screw 134.

The shaft 133 extends from the vertical side frame member 10 to the vertical side frame member 11 and is mounted at each end thereof in bearing blocks 140 and 141, respectively, and this shaft 133 has vertical reciprocatory movement in the bearing blocks 140 and 141 inasmuch as the bearing blocks 140 and 141 have slots 142 in the same which permit the vertical motion, said motion being transmitted to the shaft 133 in a manner to be later described.

The shaft 133 also has lateral or longitudinal sliding movement in the blocks 140 and 141 and this longitudinal motion is transmitted to the same by means of cables 143 and 144. The cables 143 and 144 are connected at one of their ends to screw eyes 146 (Figures 1 and 5) each of which is threadably imbedded in a block 147

which is adjustably secured on the shaft 133, by a screw 150. The ends of these cables 143 and 144 are disposed remotely from each other and extend towards each other (Figure 1) to where they pass over and down the opposite sides of a pair of grooved idler pulleys 151 and 152 which are rotatably mounted on a stud 153 and this stud 153 is fixedly mounted in a horizontally disposed portion 154 of a substantially inverted L-shaped bracket 155 which is secured, by means of bolts 156, to the intermediate frame member 12.

The cables 143 and 144 after passing over the pair of grooved pulleys 151 and 152 extend downwardly and each of them are mounted at their lower ends in block members 160 and 161 respectively each of which are identical and one of which is shown in detail in Figure 10. The cables 143 and 144 are secured in the block members 160 and 161, respectively, by set screws 162 and these block members 160 and 161 are slidably mounted on restricted portions 164 of block members 165 and are secured on the same by lock nuts 166. The block members 165 are adjustably secured, by set screws 163, on transverse lever bars 167 and 170 and near one end thereof. The lever bars 167 and 170 extend rearwardly and are disposed in spaced relation to each other and are pivotally mounted at their other ends on the ends of a transverse shaft 171 (Figure 3), which is fixedly secured in a bearing block 172 disposed between the other ends of the levers 167 and 170 and which is fixedly secured, by any suitable means such as a bolt 173, to a horizontally disposed channel member 174.

The channel member 174 is secured, by any suitable means such as bolts 175, to the same intermediate frame member 12 on which the bracket 155 is mounted, and these bolts 175 penetrate one of the flanges of the channel member 174. In this instance, the bolts 175 are the same bolts that normally secure an intermediate bearing block to the intermediate frame member 12 and in which an intermediate portion of the rock shaft is normally oscillatably mounted.

The bars 167 and 170 are pivotally mounted at their rear ends on the shaft 171 adjacent each side of the bearing block 172 and disposed against the remote sides of the bars 167 and 170 are collars 180 and 181, respectively, which are releasably secured on the shaft 171 to thereby prevent endwise movement of the lever bars 167 and 170 on the shaft 171.

Secured to intermediate portions of each of the lever bars 167 and 170, by any suitable means such as screws 185 (Figure 6), are upwardly projecting ears 186 and 187, between which are mounted cam follower rollers 190 and 191, respectively, which are rotatably mounted on bolts 192 and 193, respectively. These rollers 190 and 191 are adapted to engage cam wheels 195 and 196, respectively, disposed thereabove and each of which has a raised semicircular portion 197 and a semicircular portion of smaller diameter, indicated at 198. These cam wheels 195 and 196 are fixedly mounted on a transverse shaft 200 which is rotatably mounted in bearing blocks 201 which are secured by any suitable means such as screws 202 to the upper flanges of the two spaced vertically disposed channel bars 203 and 204, which are disposed at each side of the cam wheels 195 and 196 and extend downwardly and their lower flanges are welded to the upper surface of the horizontally disposed channel bar 174.

The right-hand end of the shaft 200, in Figure

3, has fixedly mounted thereon a collar 210 which engages the right-hand surface of the right-hand block 201 which thereby prevents endwise movement of the shaft 200. The other end of the shaft 200 has oscillatably mounted thereon a bell crank 211 comprising angularly disposed arms 212 and 213 integral therewith. The arm 212 has pivotally mounted thereon, as at 214, a ratchet pawl 216 which is adapted to engage sprocket toothed segments 217 of a sprocket wheel 218. The ratchet pawl 216 is urged toward the segments 217 by a tension spring 215 which is connected to the ratchet pawl at one end and the other end of which is connected to a collar or sleeve 219 loosely mounted on the transverse shaft 200.

The sprocket toothed segments 217 are secured to the sprocket wheel 218 per se, by any suitable means such as screws 220 and these screws 220 penetrated open-ended slots 221 in the sprocket toothed segments 217 to thus facilitate the removal of the same from the sprocket wheel 218 per se, so that these segments 217 may be replaced by like segments, or in the instance that it is desired to change the timing relation between the take-up of the tapes 75 and the reciprocatory movement of the horizontally disposed rectangular bars 133, on which the blades 125 and 126 are mounted, the overall diameter of the segments 217 may be decreased or increased as desired to obtain this result, by using longer segments.

The arm 213 of the bell crank 211, which projects downwardly from the shaft 220, has an elongated slot 225 therein which is penetrated by a stud 226 which has sliding movement lengthwise of the slot 225 and is confined in the arm 213 of the bell crank 211 by a lock nut 227.

The stud 226 has a restricted portion 228 integral therewith which extends through a link 229 (Figure 3) and is secured to the same by a nut 224 which is threadably mounted on the restricted portion 228 of the stud 226. The link 229 extends downwardly and is fixedly secured to a substantially horizontally disposed bar 233 (Figure 2), by a bolt 231 which penetrates an adjustment slot 232 in the horizontal bar 233. The horizontal bar 233 extends rearwardly, or to the right in Figure 2, and is fixedly secured at its rear end to an upwardly projecting portion 234 of a treadle bar 235, by any suitable means such as a bolt 236 which penetrates an adjustment slot 237 in the upwardly projecting portion 234.

The upwardly projecting portion 234 is connected to the treadle bar 235 by an inwardly projecting portion 240 (Figure 3) and this treadle bar has integral therewith a bearing portion 241 which is clamped, by any suitable means such as a screw 242 (Figure 2) to the rocker shaft 22 and the treadle bar 235 extends forwardly and has welded thereto an inverted T-shaped member 245 (Figure 2).

Now, as the lay 30 moves toward its rearmost position, the rocker shaft 22 will, of course, partially rotate in a clockwise direction, as observed in Figure 2, and this will cause the inverted T-shaped member 245, at the end of the treadle bar 235, to move upwardly. The upper surface of this inverted T-shaped member 245 then engages a vertically disposed rod 246 which extends upwardly between a pair of the take-up rollers 90 and rearwardly of the shaft 91, and at its upper end it has secured thereto, by any suitable means such as a set screw 250 (Figure 11), a horizontally disposed and forwardly projecting bar 251 having an enlarged portion 252 on the front end thereof. The enlarged portion 252 may be integral with the bar 251 or, as shown in this instance, the enlarged portion 252 may be secured to the bar 251 by any suitable means such as a bolt 253. This enlarged portion 252 is slidably penetrated by the horizontally disposed rectangular shaft 133 on which the blade assemblies 125 and 126 are secured and is locked in position on the shaft 133 by a set screw 254.

Every time the lay 30 moves to its rearmost position, the inverted T-shaped member 245, at the end of the treadle bar 235, engages the lower end of the vertically disposed shaft 246 to thus raise the horizontally disposed shaft 133 slightly and to thus cause reciprocatory vertical motion to be transmitted to the shaft 133 with every rearward stroke of the lay 30.

It is manifest that, in the event that the loom is very broad, and if it is deemed necessary, there may be any number of the treadle bars 235 mounted on the rocker shaft 22 and these treadle bars 235 will, of course, not require the upwardly projecting portion 234 integral therewith. These treadle bars 235 would then have the associated members 246, 251 and 252 so as to assist in transmitting reciprocatory vertical motion to the rectangular shaft 133.

The inverted T-shaped portion 245 on the end of the treadle bar 235 is of sufficient width so that the horizontal sliding movement of the rectangular shaft 133 will not cause the vertically disposed rod 246 to move out of alignment with the inverted T-shaped member 245 as it moves upwardly. It is thus seen that as the rocker shaft 22 oscillates, by means of the swords 24 and 25, the treadle bar 235 imparts movement to the upwardly extending portion 234, the link 229, and the bar 233, to thus cause the remote ends of the arms 225 and 212 to oscillate. Now, as the arm 212 moves in a counterclockwise direction, as observed in Figure 2, the ratchet pawl 216 engages the ratchet toothed segments 217 to partially rotate the shaft 200 in step by step relation in a counterclockwise direction with each rotation of the crank shaft 56.

This step by step partial rotation of the shaft 200 imparts like rotation to the cam wheels 195 and 196 so that, as shown in Figure 3, the roller 190 moves along the periphery of the cam wheel 195 until it passes off the raised portion 197 onto the smaller semicircular portion 198 and simultaneously the roller 191 moves from the smaller semicircular portion 198 of the cam wheel 196 onto the raised semicircular portion 197 and thus the lever 167 moves upwardly simultaneously with downward movement of the lever 170, at their outer ends. This, of course, causes the cable 144 to pull the shaft 133 from right to left, as observed in Figure 1, and permits enough slack in the cable 143 so that the cable 144 may move this shaft 133 from right to left in Figure 1.

Conversely, when the roller 190 moves from the smaller semicircular portion 198 of the cam wheel 195 to the enlarged portion 197 and the roller 191 moves from the enlarged portion 197 to the smaller portion 198 of the cam wheel 195, the rectangular shaft 133 then moves from left to right or back to the position shown in Figure 1. It is thus seen that the blades 125 and 126 on the horizontal shaft 133 move, say, from left to right and then they pause for a sufficient length of time to sever the cross-over warp threads 86, as observed in Figure 1, and then the blades 125 and 126 move from right to left, as observed in Figure 1, so that the blade 126 severs the cross-over

threads 85 and this is repeated as long as the loom is in operation.

It has already been described how the blades 125 and 126 are caused to reciprocate upwardly and downwardly in very sudden and short strokes by the oscillation of the rocker shaft 22 and, of course, this procedure continues at all times regardless of which blade 125 or 126 is doing the severing operation. This assures a smooth and even cutting of the cross-over threads and also, if the blades 125 and 126 happen to be a little dull, the vibration of the blades 125 and 126 further increases the efficiency of the cutting edge of the blades 125 and 126.

It has already been described how the ratchet pawls 110 and 111 impart step by step rotation to the ratchet wheel 95 on the shaft 94 to thus transmit step by step partial rotation to the shaft 91 on which the take-up rolls 90 are secured. Now, it often happens that the ratchet pawls 110 and 111 fail to engage the ratchet wheel 95 and thus the tapes 75 are not taken up properly with each beat-up stroke of the lay and this causes the space between the ladder straps 78 or 79 and the interwoven portions 82 or 83 to be of uneven length and consequently, this would result in an unsatisfactory ladder tape 75.

Now, inasmuch as the movement of the blades 125 and 126 into the path of the tapes 75 and 78 is controlled directly by the oscillation of the rocker shaft 22, and in the event that an uneven number of picks are woven into the interwoven portions 82 and 83, either of the blades 125 and 126, as the case may be, would not sever the cross-over threads 85 or 86 but would sever the connecting straps 78 or 79, as the case may be, instead, and it is probable that the operator of the loom would notice this at once, and proper steps could be taken to assure that the ratchet pawls 110 and 111 would engage the wheel 95, such as by removing any accumulations of lint or other foreign matter from the ratchet wheel 95 or by replacing the ratchet wheel in the event that any of the teeth in the ratchet wheel are broken away.

Heretofore it has been impossible to insure that all of the cross-over straps 78 and 79 would be of identical length by means of a severing operation performed by apparatus attached to the loom.

While in the drawings and specification I have described a particular form of tape which is being cut, which is known as a staggered ladder tape with two parallel ladders woven somewhat inside each edge of the tape and with one ladder stitched in at a point one-half the length of the other ladder, it is quite evident that by changing the timing and shape of the cams, many other types of tape could be cut with this apparatus, such as a double ladder tape and tapes having two parallel ladders on one side, and various other types of tapes.

In the drawings and specification there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In combination with a loom having mechanism for weaving a plurality of ladder tapes, said loom having a rock shaft and having means for taking up on the tapes as they are woven, said tapes having cross-over threads thereon, means for severing the cross-over threads of said tapes, means for moving the means for severing the cross-over threads into a severing position in advance of movement of the cross-over threads with the tapes, means for connecting the means for moving the means for severing the cross-over threads of said tapes to the rock shaft and whereby the means for moving the means for severing the cross-over threads of said tapes are actuated by oscillation of the rock shaft to cause the means for severing the cross-over threads to act on the same in a direction opposite to the direction of travel of the tapes.

2. In a loom for weaving pairs of superposed tapes between which cross-straps are interwoven, the ends of said cross straps being connected to each other by cross-over threads, said loom having a rock shaft and means for moving the woven superposed tapes as they are woven, cutting apparatus for severing the cross-over threads of said tapes, means actuated by said rock shaft for effecting movement of the cutting apparatus crosswise of the travel of the tapes and in advance of movement of the cross-over threads to thereby sever the cross-over threads with the cutting apparatus acting on the same in a direction opposite to the direction of travel of the tapes.

3. In a loom for weaving pairs of superposed tapes between which cross-straps are interwoven, the ends of said cross straps being connected to each other by cross-over threads, said loom having a rock shaft and means for moving the woven superposed tapes as they are woven, cutting apparatus for severing the cross-over threads of said tapes, means actuated by the rock shaft for moving the cutting apparatus into a cutting position in advance of the cross-over threads for severing the cross-over threads and means actuated by the rock shaft for repeatedly imparting a consistent range of intermittent reciprocatory movement to the cutting apparatus in a vertical direction during each severing operation to further assist in the severing operation.

4. In a loom on which ladder tapes for Venetian blinds are woven, said tapes comprising a pair of tapes having interconnecting cross straps and being connected by cross-over threads, an oscillatable rock shaft mounted on the loom and a conventional means for taking up the tapes after they are woven, cutting apparatus for severing the cross-over threads of said tapes, said cutting apparatus comprising cutting blades, means for effecting movement of said cutting blades in a direction transverse to and in timed relation with the movement of said tapes to bring the cutting apparatus into cutting position with relation to the tapes for the severing operation, said means for effecting movement of the cutting blades comprising a horizontal bar on which the blades are mounted, a pair of rotatable pulleys mounted below the horizontal bar, a pair of cables connected to the horizontal bar in spaced relation to each other, said cables extending toward each other to where they pass over the rotatable pulleys, a pair of spaced forwardly and rearwardly extending lever bars pivoted at one end, means for connecting the other ends of the cables to the free ends of the respective lever bars, a transverse shaft rotatably mounted between the horizontal bar and the rearwardly and forwardly extending bars, a pair of cam wheels fixedly mounted on the transverse shaft, the lever bars being adapted to engage the

surface of the cam wheels, a ratchet wheel fixedly mounted on the transverse shaft, a bell crank disposed between the ratchet wheel and the cam wheels, a ratchet pawl pivotally connected to one end of the bell crank and being adapted to engage the ratchet wheel, means driven by the rock shaft of the loom for transmitting oscillatory motion to the ends of the bell crank to cause the ratchet pawl to engage the ratchet wheel intermittently to thereby transmit intermittent partial rotation to the ratchet wheel to thus cause intermittent reciprocatory movement of the rectangular bar longitudinally of the horizontal bar.

5. In a structure according to claim 4, a treadle bar secured to the rock shaft and extending from the same forwardly, a vertically disposed shaft, the forward end of said treadle bar being adapted to engage the lower end of said vertically disposed shaft, means connecting the upper end of said vertically disposed shaft to the horizontal bar comprising means for transmitting vertical reciprocatory motion to the horizontal bar through oscillation of the rock shaft.

6. In a loom for weaving a pair of superposed tapes connected together by ladder straps and by cross-over threads interwoven between the two straps, said loom having a rocker shaft, means for severing the crossover threads comprising an oscillatable bar having knives thereon adapted to move into the path of the cross-over threads on one side of the tapes and to be moved to cause its other knife to be moved into the path of the cross-over threads on the other side of the tapes alternately, means driven by the rocker shaft of the loom for intermittently raising the oscillatable bar and the knives associated therewith to quickly sever the cross-over threads.

7. In a structure according to claim 6, means driven by the rocker shaft of the loom for advancing the tapes as woven through the loom.

8. In a loom for weaving Venetian blind tape which comprises a pair of tape members disposed in superposed relation and having ladder straps connecting the two in offset relation at each of the edges of the tape and having cross threads connecting the two tapes together, means for severing the cross threads comprising a laterally oscillatable bar having a pair of knives thereon, means for moving the bar longitudinally with its knives to cause one of the knives to be in the path of the cross threads near one side of the tapes and then for moving the bar to withdraw the first-named knife out of the path of the cross threads and the interconnecting tapes and to move the other knife into the path of the cross threads and means for moving the bar with its knives vertically upon each pick of the loom for severing the cross threads.

9. In a loom for weaving Venetian blind tapes which comprise two superposed tapes connected together by cross connecting straps and woven together by cross threads at spaced intervals along each side, said loom having a rocker shaft, means for severing the cross threads comprising a horizontally disposed bar having a pair of cutter means thereon, means driven by the rocker shaft of the loom for moving said bar longitudinally to cause one of the cutter means to be disposed within the path of the cross threads on one side of the tapes and to move the other cutter means out of the path of the cross threads and the connecting tapes on the other side of the tapes, means for imparting vertical oscillations to the horizontally disposed bar to assist the cutter means in cutting the cross threads, and means for moving the horizontally disposed bar in a reverse direction to move the first-named cutter means out of the path of the first-named cross threads on one side of the tapes and into the path of the cross threads on the other side of the tapes to sever the cross threads on the other side of the tapes.

10. In a structure according to claim 9, means driven by the rocker shaft of the loom for taking up the tapes as they are woven.

11. In a structure according to claim 9, means driven by the loom and operable upon each pick of the loom for taking up the tapes as woven.

12. In a structure according to claim 9, the means driven by the loom for moving the longitudinally extending bar with its cutter being operable after a predetermined number of picks have been executed by the loom.

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