Aug. 11, 1953 F. C. MOSTERTZ 2,648,355

THREAD CUTTING MECHANISM

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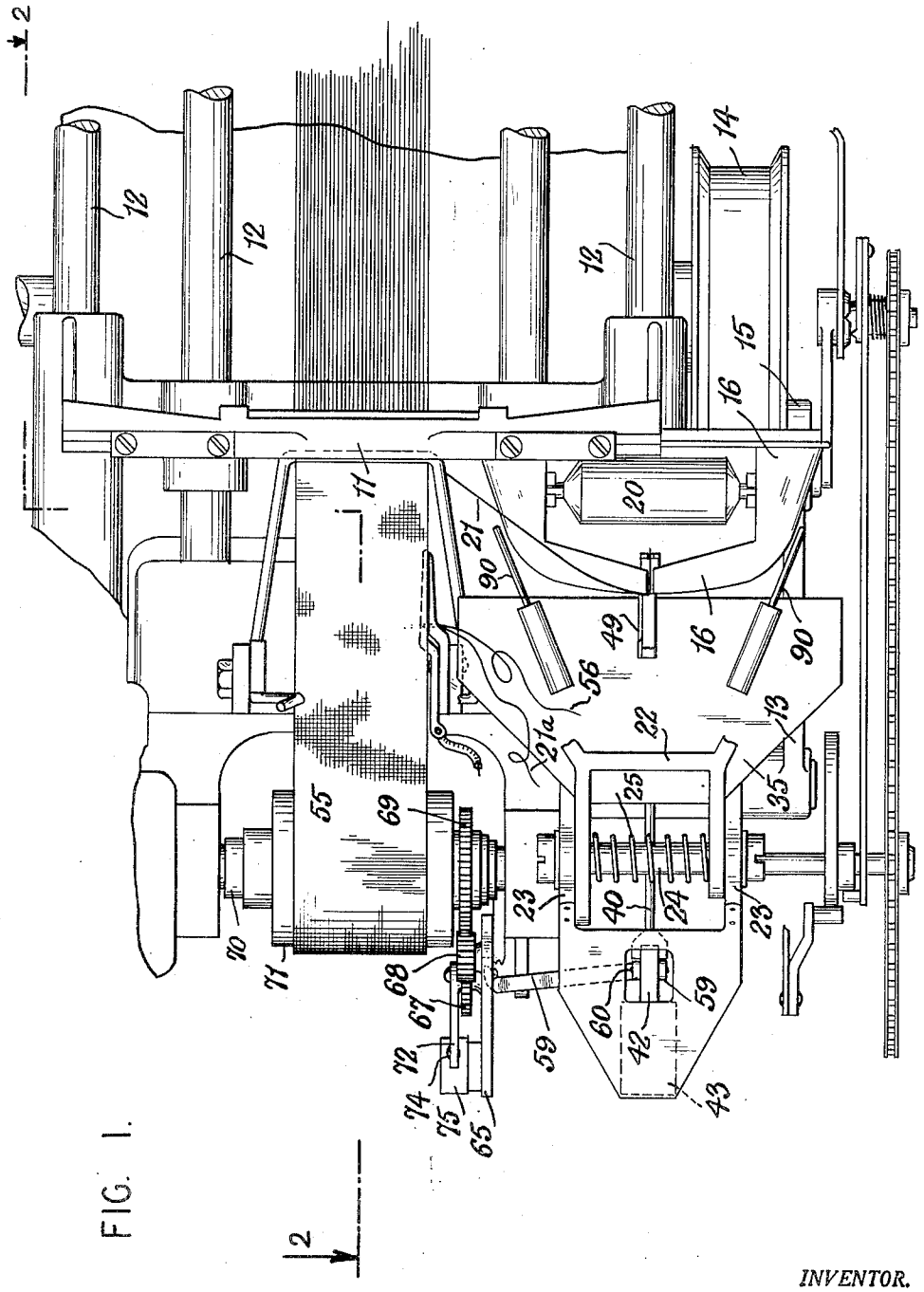

FIG. 1.

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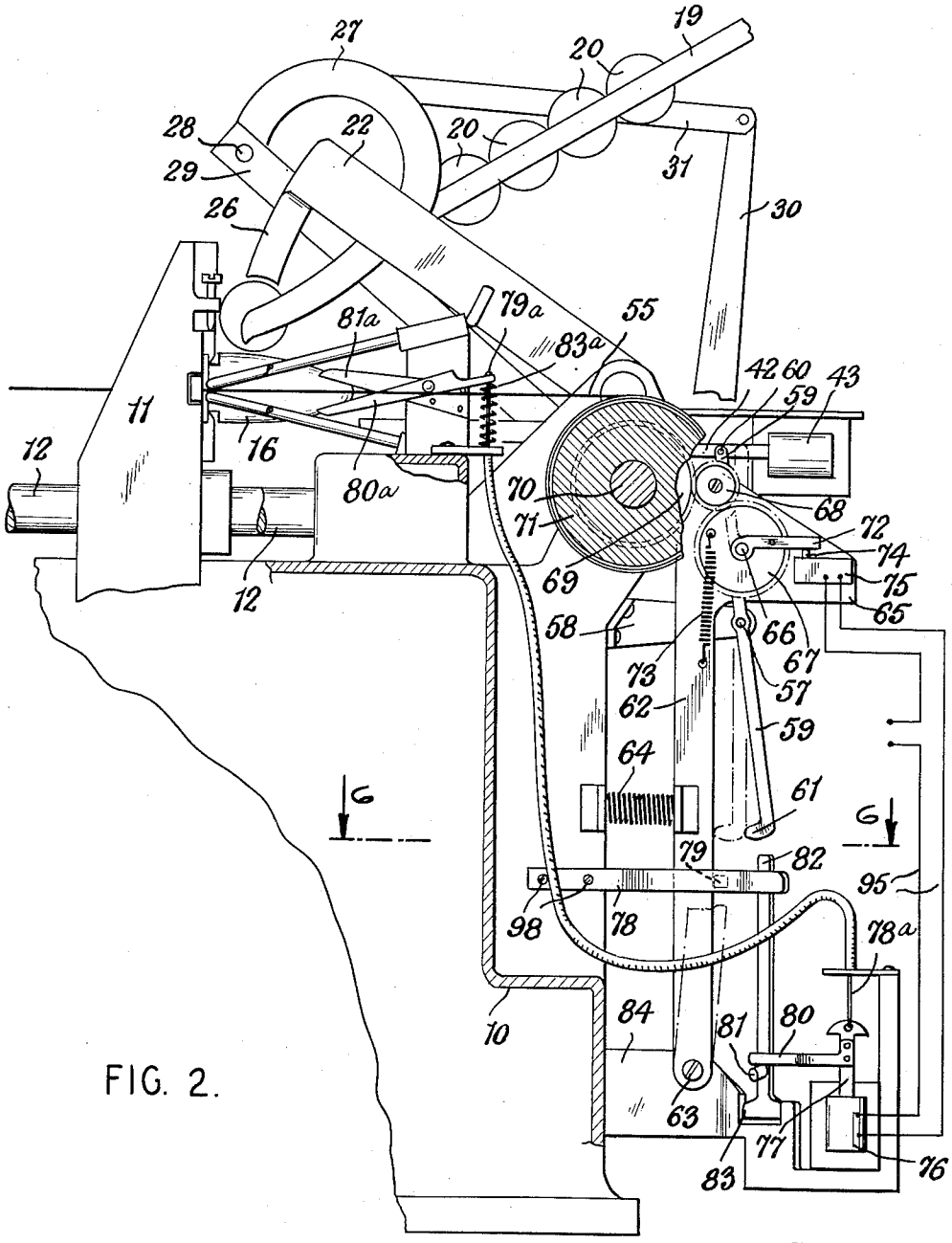

FIG. 2.

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FIG. 5.

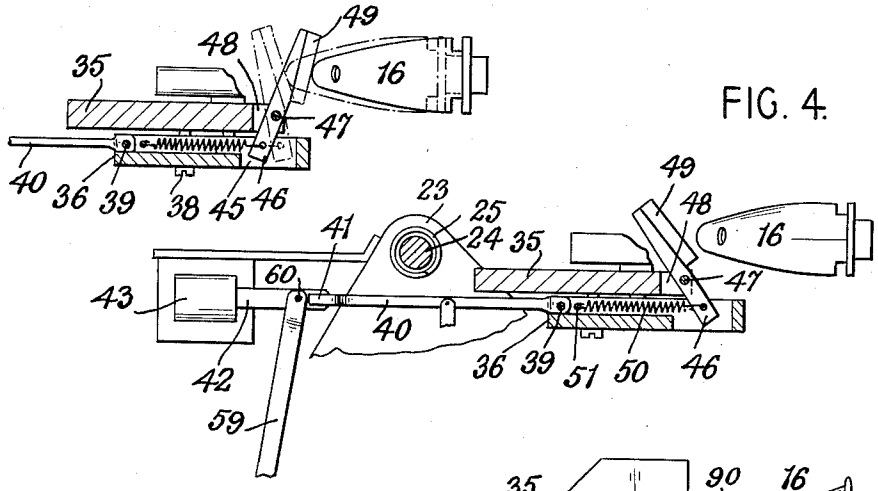

FIG. 4.

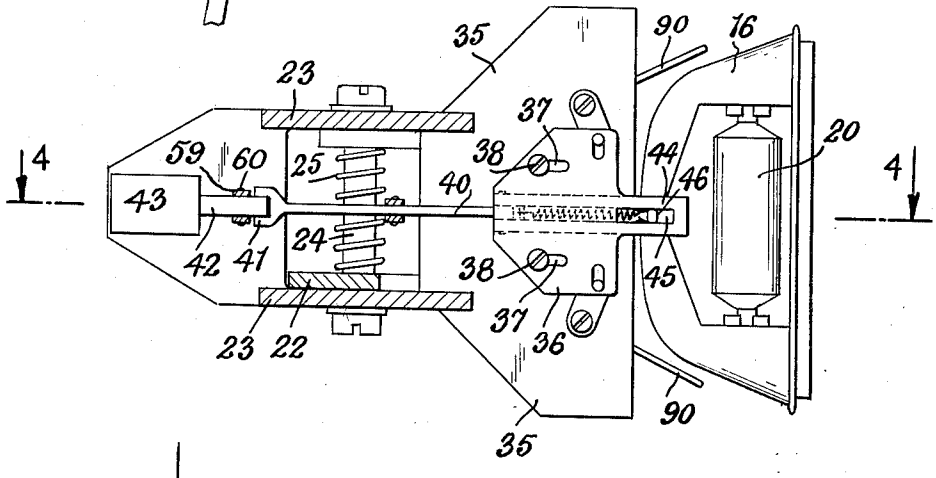

FIG. 3.

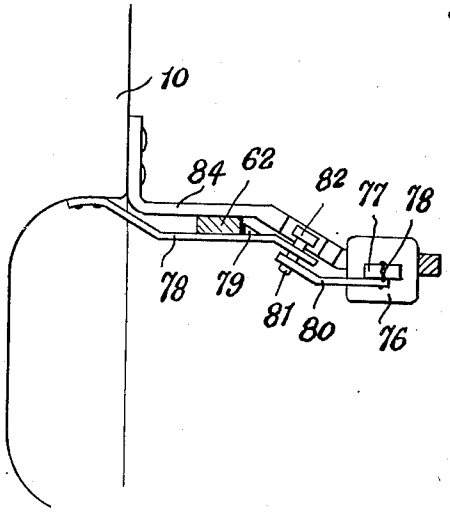

FIG. 6.

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UNITED STATES PATENT OFFICE

2,648,355

THREAD CUTTING MECHANISM

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Application May 11, 1951, Serial No. 225,880

7 Claims. (Cl. 139—263)

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This invention relates to improvements in loom construction, and more particularly to looms of the narrow fabric type employed for the weaving of ribbons, tapes and similar fabrics. An example of the type of loom to which the present invention relates will be found in the co-pending application of Richard A. Griefen and Franz C. Mostertz, Serial No. 120,078, filed October 7, 1949, now Patent No. 2,579,491.

In the above-mentioned application is disclosed a loom construction provided with a quill-magazine in which a plurality of quills are held and from which quills are successively delivered into the shuttle upon the depletion of the thread on the preceding quill in the shuttle, the empty quill being ejected from the shuttle on insertion of the filled quill. The present invention has reference to cutting means by which any remaining thread-end appearing on the quill about to be replaced will be severed, and also to cutting means by which weft-thread ends appearing in the fabric and dependent therefrom, shall be cut away.

When the nearly-emptied quill carried by the shuttle is moved by the shuttle to the position where a fresh quill is to be inserted and the empty quill is to be ejected, it is desirable that the small amount of thread then remaining on the shuttle be severed between the quill and the shed, so that any small end remaining on the quill will be free to descend with the quill out of the shuttle. For this purpose, it is an object of the present invention to provide a cutting means operative adjacent to the shuttle and at one end of the trajectory of movement of the shuttle, and by which the thread, extending then between the quill in the shuttle and the shed, will be cut off at the shuttle.

When the thread is so severed, an end thereof will project from the fabric-edge and when the fresh quill is inserted in the shuttle it will have its thread inserted as weft in the fabric, and such thread will also result in an end projecting from the edge of the fabric and situated adjacent to that which was carried by the previous quill. Thus, the fabric in progressing to the take-up roll will have two projecting thread-ends which must be cut off. It is, therefore, a further object of the present invention to provide cutting means by which these two threads will be severed adjacent to the edge of the woven fabric as the fabric proceeds from the shed to the take-up roll and at a predetermined point in the travel of the fabric.

The present invention, therefore, has for its primary object the provision of thread-cutting

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means by which thread-ends are cut at the required points in the operation of the machine during the weaving operation.

The foregoing objects, as well as additional objects and advantages of the invention, will be readily apparent in the course of the following detailed description taken in connection with the accompanying drawings which illustrate the preferred embodiment of the invention, and wherein

Fig. 1 is a plan view of those parts of a narrow fabric loom which embody the features of the present invention;

Fig. 2 is a sectional view, taken on the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a view from below, of the cutting means which severs the thread adjacent to the shuttle at one end of the trajectory of movement of the shuttle;

Fig. 4 is a sectional view, taken on the line 4—4 of Fig. 3, looking in the direction of the arrows;

Fig. 5 is a sectional view of a part of the structure shown in Fig. 4, showing the cutter in operative or cutting position; and

Fig. 6 is a sectional view, taken on the line 6—6 of Fig. 2, looking in the direction of the arrows.

Referring now to the drawings in greater detail, and more particularly to Figs. 1 and 2, the invention is shown as applied to a narrow fabric loom having a frame, a portion of which is shown at 10, and which supports an oscillating batten 11. The batten 11 reciprocates on guide rods 12 and is oscillated by means of a crank rod 13 connected to the main driving wheel 14 of the loom at 15, as seen in Fig. 1. As is conventional and well known, the shuttle 16 is reciprocated transversely with respect to the batten 11 as well as longitudinally with respect to the warp threads, since the shuttle is supported on the batten 11. The reciprocation of the shuttle 16 with respect to the batten 11 is effected by means of driving gears or other means commonly employed in the construction of looms of this general character, not described in detail herein since the same form no part of the present invention.

In the loom of the present construction, it is intended that a plurality of quills 20 be retained in stacked relationship in a magazine 19 slightly above the shuttle 16 so as to permit the feeding of a fresh quill into the shuttle when the shuttle is at the end of its trajectory, or substantially at

the position shown in Fig. 1 and when the quill then in the shuttle is depleted or very nearly depleted of its thread. The construction and mode of operation of the quill-magazine and the elements cooperating therewith is fully shown and described in the before-mentioned Griefen and Mostertz application and will, therefore, not be described in detail herein. It is sufficient to herein state that when the shuttle 16, carrying a depleted or nearly-depleted quill, reaches the position substantially shown in Fig. 1, a fresh quill 20 will be forced down out of the magazine 19 and into the shuttle 16, and said quill, by its entry into the shuttle, forcing the empty quill out of the shuttle.

The empty quill that is so forced out of the shuttle, usually has a small amount of thread on it and it is desirable that this thread, shown at 21 in Fig. 1, be severed at the shuttle and at a point between the shed and the quill then in the shuttle. For this severing operation, a cutting device, shown more clearly in Figs. 3 to 5 inclusive, is provided and will be presently described.

The means for inserting the fresh quills into the shuttle includes a hammer-supporting yoke 22 pivotally mounted on the loom frame between upright bearing supports 23 on a shaft 24 and is normally urged to elevated inoperative position by means of a spring 25. The forward end of the yoke member 22 is formed as a hammer 26 adapted to drive a fresh quill into the shuttle 16 upon indication of weft exhaustion. A pair of transferring arms 27 is fixed to a rocker shaft 28 mounted on a suitable support 29. Rocker shaft 28 is actuated upon indication of weft exhaustion, to move the transferring arms 27 from quill-transferring position above the shuttle to quill-receiving position at the bottom of the magazine 19. For this purpose a cam lever 30, actuated by suitable cam means, not shown, is connected by means of linkage, including the link 31, to the rocker shaft 28.

When the shuttle reaches the position shown in Fig. 1 and is holding a quill containing an exhausted or nearly exhausted weft, the mechanism just described is operative to insert a fresh quill in the shuttle, which quill will act to force the then-exhausted quill out of the shuttle. Before the fresh quill is inserted in the shuttle it is desirable that the weft thread 21 extending between the shed and the quill then in the shuttle, be severed. Referring to Figs. 3 to 5 inclusive, it will be noted that a supporting plate 35 is mounted on the frame. Slidably secured to the under side of the plate 35 is a slide 36, provided with the slots 37 guided by the pins or screws 38, permitting the slide to have a limited sliding movement as defined by the slots 37. The elements shown at 90 are actuating fingers for moving thread tensioning guides to position for effecting automatic threading of the shuttle. These fingers 90 are also moved by the plate 35. The slide 36 is pivotally connected at 39 to one end of a link 40 which has a clevis 41 at its opposite end pivotally connecting that end of the link 40 to the solenoid plunger 42 of a solenoid 43. The slide 36 is provided with an extended forward end 44 having a slot 45 in which the lower end of a knife-bar 46 is located. Said knife-bar 46 is pivoted at 47 in a slot 48 provided in the end of the plate 35, and the knife-bar carries a cutting blade 49 adapted to sever the weft thread 21 against the end of the shuttle 16. The lower end of the knife-bar 46 is attached to one end of a spring 50 which has its opposite end attached at 51 to the slide 36. The spring 50 is unstressed so that the normal position of the knife is that shown in Fig. 4.

When the shuttle reaches the position shown in Fig. 1 and is in readiness to receive a fresh quill, the solenoid 43 will be energized by closure of a suitably placed and operated switch and will draw its plunger 42 to the left, as viewed in Fig. 4, so that the link 40 and the slide 36 attached thereto, will be drawn in the same direction, and such movement of these parts will cause the knife-bar 46 to be swung on its pivot 47, to the position shown in full lines in Fig. 5, to thereby bring the cutting edge of the blade 49 into contact with the thread 21 where it emerges from the shuttle, and thereby severs the thread. The pivotal movement of the knife-bar 46 is such as to impart an arcuate swing to its blade 49 to thereby enable the blade to positively sever the thread 21 despite the fact that the thread may in some instances be located at slightly different positions with respect to the cutting blade.

The end of the thread 21 thus severed will dangle or project from the edge of the woven fabric 55, said thread end being shown at 21*a* in Fig. 1. When a fresh quill is inserted in the shuttle 16 and the shuttle moves across the shed and inserts the first weft thread from the new quill, said first weft thread will have a dangling end shown at 56 in Fig. 1, such weft thread being located adjacent to that having the end 21*a*. It is now desirable to cut off the thread ends 21*a* and 56, and the mechanism for severing these ends will now be described.

Pivotally mounted at 57 on a lug 58 secured to and extending from the frame 10 is a lever 59 which has its upper end pivotally attached at 60 to the solenoid plunger 42. At the lower end of the lever 59 is an off-set portion 61 operative against a lever 62 pivoted at 63 in a bracket 64 on a lower portion of the frame. The normal position of the lever 62 is shown in dotted lines in Fig. 2, and the normal position of the lever 59 is shown in full lines in that figure. When the solenoid 43 is energized, the connection of the lever 59 with the solenoid plunger 42 will cause the lever 59 to be swung on its pivot 57 to the position shown in dotted lines in Fig. 2, and the offset end 61 of the lever 59 will during such swing exert pressure against the lever 62 to swing said lever on its pivot 63 toward the left in Fig. 2 to compress the spring 64 normally tending to urge the lever 62 toward the right.

The upper end of the lever 62 is in the form of a bracket 65 having a spindle 66 on which a gear 67 is rotatably mounted. Said gear 67 meshes with a pinion gear 68 which is adapted, when the lever 62 is swung to the left by the lever 59, to be brought into mesh with a gear 69 secured on the shaft 70 of the take-up roll 71 on which the woven fabric 55 is wound. Attached to the gear 67 is a switch-actuating finger 72 which normally occupies the inoperative position shown in dotted lines in Fig. 2, and is held in such position by means of the coil spring 73, attached at one end to the gear 67 and at its other end to the lever 62. When the gear 67 is rotated for a part of a revolution by means of the gears 68 and 69, the arm 72 will be swung down to the position shown in full lines in Fig. 2 and brought into contact with the switch button 74 to thereby depress the same and close the switch 75, thus closing circuit through the wiring 95 shown in Fig. 2, to a solenoid 76 which has a plunger 77 connected to one end of a sheathed cable control 78*a* that

has its other end attached at 79*a* to the pivotal blade 80*a* of a scissor-like cutter. Said movable blade 80*a* cooperates with a fixed blade 81*a* secured on the bracket 82. The blades 80*a* and 81*a* are held normally in open position, by means of the spring 83*a* so that by movement of the fabric 55 the thread ends 21*a* and 56 will enter between the blades 80*a* and 81*a* and when the solenoid 76 is energized and its plunger 77 drawn downwardly, the cable 78 will pivotally close the blade 80*a* and the thread ends will be cut off close to the edge of the fabric 55.

When the lever 62 is swung to the left in Fig. 2 by pressure of the lever 59, lever 62 is retained in such position for a period of time sufficient to enable the gear 67 to be rotated for the required extent to cause its switch-operating finger 72 to close the switch 75. The lever 62 is retained in its position to the left for such required period of time, by means of a leaf spring 78 having one end fastened to the frame 10 by screws 93 and provided near its free end with a tooth 79 behind which the lever 62 engages. The spring 74 thus constitutes a latch for holding the lever 62 toward the left, said lever, when so held, maintaining the pinion 68 in mesh with the gear 69 and thus causing the gear 67 to be slowly rotated and to an extent sufficient to cause the switch-operating finger 72 to close switch 75. When the solenoid 76 is energized and exerts a pull on its plunger 77, the cutting blade 80*a* will be moved to cut the threads 21*a* and 46 and as the plunger continues its downward movement, an arm 80, secured to and extending from the plunger 77, will exert a downward pressure upon a pin 81 extending laterally from a pivoted lever 82 to cause said lever to swing on its pivot 83 in the bracket 84 extending from the frame 10.

The lever 82 has its upper end portion extending across the spring 78 near the free end of the spring, and when the lever 82 is pivotally moved by the arm 80, the lever 82 will flex the spring 78 to an extent necessary to move the tooth 79 out of the path of the lever 62, causing the spring 64 to swing the lever 62 to the right and to the dotted line position of Fig. 2. This movement of the lever 62 will move the pinion 68 out of mesh with the gear 69, and the spring 73 will then rotate the gear 67 in a counterclockwise direction to bring the switch-operating finger 72 away from the switch button 74 or to the dotted line position shown in Fig. 2.

It will be noted that the cutting off of the threads 21*a* and 56 occurs at a point remote from the point at which the thread 21 is cut by the cutter 49 despite the fact that the solenoid 43 is the element which controls the operation of the two cutting devices. The delay between the cutting off of the thread 21 and the severance of the threads 21*a* and 56 is caused by the fact that the take-up roll rotates at a relatively slow speed and the closure of the switch 75 causing operation of the cutter blade 80, takes place only after the fabric has been moved for a considerable distance from the shed. This enables the cutting off of the threads 21*a* and 56 to take place remote from the shed and well out of the path of movement of the batten and shuttle carried thereby.

From the foregoing, the operation of the improved thread-cutting means will be readily apparent. When a depleted or nearly depleted quill is carried by the shuttle to the point at which a new quill is to be inserted, the weft thread extending from the fabric to the quill is cut off by the cutter blade 49 operated in the manner described. The thread end 21*a* is the result. The fresh quill is then inserted in the shuttle which thereupon lays its weft thread in place in the shed, leaving a free end of the thread projecting as indicated at 56. By energizing of the solenoid 43, lever 59 is swung in a manner to cause the same to move lever 62 to the left and cause gears 67, 68 and 69 to be placed in mesh and gear 67 rotated to an extent to cause its finger 72 to close switch 75. Threads 21*a* and 56 have now been carried along by the fabric to a point where the same enter between the cutting blades 80*a* and 81*a*, and when the switch 75 is closed and the solenoid 76 is energized, the cutter blade 80*a* is closed to cut off the threads. Following this cutting operation, descent of the solenoid plunger 77 causes arm 80 to swing the lever 82 in a manner to cause the lever 62 to flex spring 78 and release the lever 62 which swings back, or to the right, under pressure of the spring 74, thus moving pinion 67 out of mesh with gear 69 and causing spring 73 to restore the switch-operating finger 72 to its inoperative position shown in dotted lines in Fig. 2.

Since certain modifications may be made in the device of the present invention without departing from the scope thereof, it is intended that all matter contained in the foregoing specification and shown in the accompanying drawings be interpreted merely as illustrative and not in a limiting sense.

What I claim is:

1. In a loom having a reciprocating shuttle carrying a quill and having means for inserting successive quills into the shuttle and ejecting depleted quills, a slide supported adjacent to the shuttle at one end of the path of movement of the shuttle, a pivoted cutter blade, a resilient connection between said blade and the slide whereby the blade will be swung toward and will resiliently contact with the shuttle and sever a thread extending from the quill in the shuttle toward the shed, and a solenoid for moving the slide in one direction to bring said cutter blade toward the shuttle to sever said thread.

2. In a loom having a reciprocating shuttle carrying a quill and having means for inserting successive quills into the shuttle and ejecting depleted quills, a take-up roll on which woven fabric is wound, a cutting device for severing thread-ends projecting from the fabric on its way to the take-up roll, said cutting device including a fixed blade and a movable blade, a solenoid for closing the movable blade, a switch for controlling the energizing of the solenoid, and means for operating said switch at a predetermined time, said means including gearing driven by the shaft of the take-up roll, and means for placing said gearing into or out of mesh.

3. In a loom, a take-up roll for the woven fabric, a gear carried on the shaft of said roll, a pivoted lever adapted to be moved to or from said gear, gearing carried by said lever and adapted to be meshed with the gear on the roll-shaft, a solenoid for causing swinging the lever and the gearing carried thereby toward the take-up roll to bring the gearing into mesh with the gear on the roll-shaft, switch-operating means controlled by the gearing, a switch adapted to be closed by said switch-operating means when the gearing is driven by the gear on the roll-shaft, a solenoid, an electrical circuit connected to the solenoid and controlled by the switch whereby closing of the switch will energize the solenoid, a cutter for severing thread ends pro-

jecting from the fabric while said fabric is moved toward the take-up roll, a connection between the solenoid and the cutter whereby said cutter will be operated upon energizing of the solenoid, means controlled by the solenoid for bringing the gearing out of mesh with the roll-shaft gear after the cutter has operated, and means for causing opening of the switch when the gearing is unmeshed from the roll-shaft gear.

4. In a loom having a reciprocating shuttle carrying a quill and having means for inserting successive quills into the shuttle and ejecting depleted quills, a pivoted knife operative against the shuttle for severing a thread extending from a quill in the shuttle, means including a solenoid for swinging said knife to cutting position, means for cutting off a thread-end produced in the fabric by the cutting of the thread at the shuttle, said cutting means including movable and fixed blades, a solenoid for causing cutting operation of the movable blade at a predetermined time after the severance of the thread at the shuttle, the operation of said last-mentioned cutting means being controlled by the closing of the circuit to the solenoid which causes cutting operation of the knife.

5. In a loom having a reciprocating shuttle carrying a quill and having means for inserting successive quills into the shuttle and ejecting depleted quills, a movable knife operative against the surface of the shuttle for cutting a thread extending from a quill in the shuttle, means including a solenoid for causing cutting movement of the knife, means for cutting off a thread-end produced in the fabric by the cutting of the thread at the shuttle, said cutting means being operated by a solenoid, and means for energizing the last-mentioned solenoid at a predetermined time after circuit to the first solenoid has been closed.

6. In a loom having a reciprocating shuttle carrying a quill and having means for inserting successive quills into the shuttle and ejecting depleted quills, a movable knife operative at the shuttle for cutting a thread extending from a quill in the shuttle, electrically-controlled means for causing cutting movement of said knife, a second knife located adjacent to the selvage of the woven fabric in the loom and operative to cut off a thread end caused by the first cutting operation, electrically-controlled means for causing cutting movement of said second knife, a switch for controlling operation of the last-mentioned electrically-controlled means and means for causing closure of said switch at a predetermined time after circuit to the first-mentioned electrically-controlled means is closed.

7. In a loom having a reciprocating shuttle carrying a quill and having means for inserting successive quills into the shuttle and ejecting depleted quills, a take-up roll on which woven fabric is wound, a cutting device for severing thread ends projecting from the fabric on its way to the take-up roll, said cutting device including a fixed blade and a movable blade, a solenoid for closing the movable blade, a switch for controlling the energizing of the solenoid, means for operating said switch at a predetermined time, said means including gearing driven by the shaft of the take-up roll, means for placing said gearing into and out of mesh, and a solenoid for operating the last-mentioned means.

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