July 9, 1940. R. G. TURNER 2,207,080

THREAD CUTTER FOR LOOMS

Filed March 2, 1939

FIG. 1

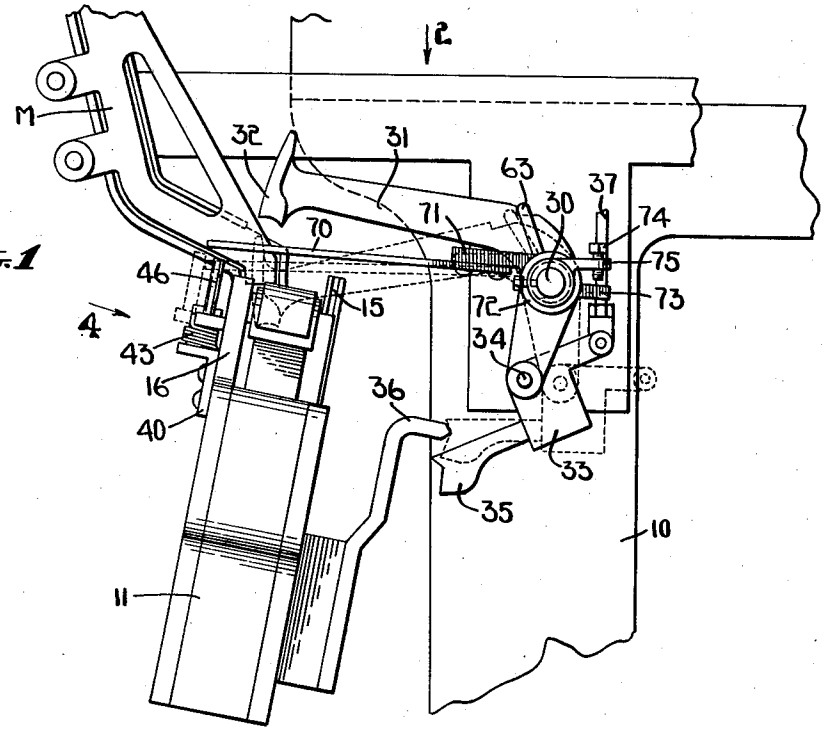


FIG. 2

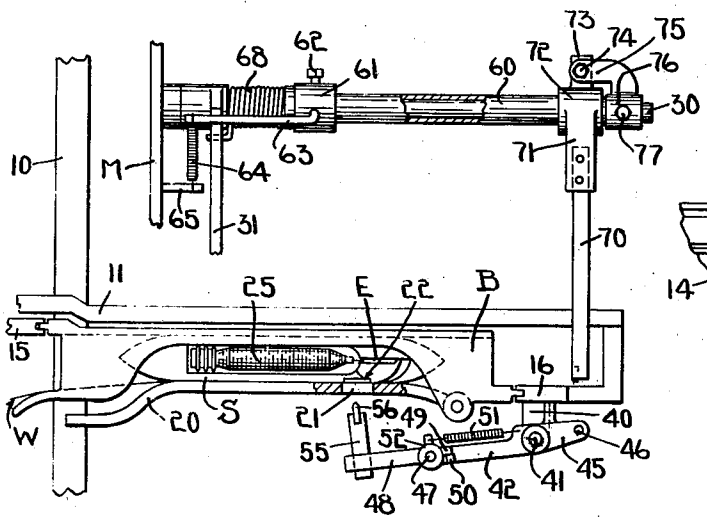


FIG. 4

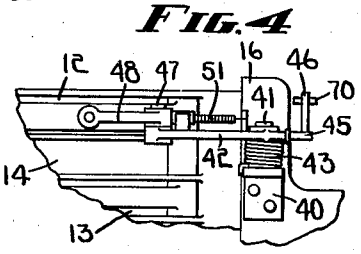
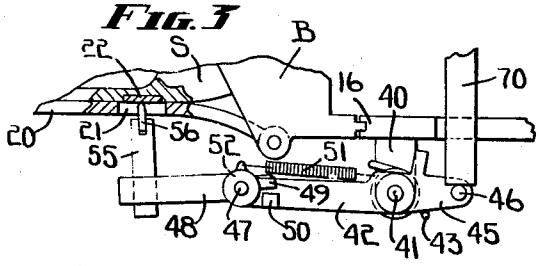


FIG. 3



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THREAD CUTTER FOR LOOMS

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18 Claims. (Cl. 139—265)

This invention relates to improvements in filling thread cutters for looms and it is the general object of the invention to provide a cutter which shall operate at a relatively high rate of speed and preferably by a force derived primarily from motion of the lay.

Payne Patent No. 1,881,920 shows a thread cutter movable about a fixed pivot and carrying a blade to engage a metallic plate on the front shuttle wall. The weft leads from the shuttle eye across the plate in a position to be severed by the cutter. In that patent the lay has a single shuttle box which moves the boxed shuttle forwardly toward the cutter and the latter operates substantially at front center.

It is an important object of my present invention to mount the cutter carrying lever on the lay and provide an operating element for the lever which shall be substantially stationary at least during the time of operation of the cutter. By this arrangement the cutter lever can be made to move more quickly since its pivot moves with the lay.

It is a further object of my present invention to joint the cutter supporting lever so that it will have a cutter carrying arm movable about a pivot on the lever close to the shuttle and so located as to cause a substantial sliding motion of the cutter along the metallic plate carried by the shuttle.

Another object of my present invention is to adapt the cutter of the general type set forth in the Payne patent for use on looms having shifting shuttle boxes. My prior Patent No. 2,123,321 shows an automatic pick and pick loom with shuttle boxes which are stationary with respect to the lay when the latter is in its rearmost position. My present cutter operates during that part of the loom cycle when the lay is rearmost and the shuttle boxes are at rest relatively to the lay. It is to be understood that my present invention is not limited to use with shifting shuttle boxes nor to an operation occurring when the lay is in its rear position.

In bobbin changing looms there is usually employed a transferrer arm which descends to insert a fresh bobbin into the depleted shuttle. It is a further object of my present invention to provide operating means for the cutter carrying lever which shall be positioned to cause actuation of the cutter when the transferrer arm is down, the operating means at other times being out of the path of the cutter lever so that the latter will be actuated only on transferring beats of the loom. It is important that the cutter operate to sever the weft in sufficient time to permit the outgoing bobbin to unthread the shuttle eye. This result I achieve by causing the operating means to move the cutter against the metallic plate of the shuttle at a time in the pick of the loom not later than completion of transfer.

In the particular embodiment of my invention set forth hereinafter the transfer occurs when the lay is on back center or in its rearward position. The weft thread is delivered from the front of the shuttle and the cutter plate is therefore on the front wall of the shuttle. Under these conditions the shuttle is moved rearwardly by the lay for transfer and it is desirable to provide some means for controlling the thread cutter so that it will cooperate with the plate on the front wall of the shuttle when the lay is in rearward position. This general result I accomplish by mounting the cutter mechanism on the lay so that it moves rearwardly with the shuttle toward transfer position and provision is made for requiring the cutter to move rearwardly with respect to the lay on transferring beats to overtake the shuttle and engage the shuttle carried plate to cut the thread. While this last mentioned feature of my invention is illustrated in connection with a transfer arm which is pivoted behind the lay, I am not necessarily limited to such an arrangement, the significant part of this feature of my invention being that the thread is cut at the front wall of the shuttle when the lay is on back center.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawing, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is an end elevation of a portion of the loom having my invention applied thereto and showing the parts in normally non-operating position in full lines and in operating position in dotted lines,

Fig. 2 is a plan view taken in the direction of arrow 2, Fig. 1, parts being removed and with the lay in a position prior to operation of the cutter,

Fig. 3 is a view similar to a portion of Fig. 2 on a somewhat larger scale showing the cutter in operation, and

Fig. 4 is a front view taken in the direction of arrow 4, Fig. 1.

Referring to the drawing, I have shown a loom frame 10 and a lay 11 with shifting shuttle boxes

B mounted for vertical motion relatively to the lay by mechanism not shown but well understood. These boxes B may have upper and lower cells 12 and 13 spaced by an intermediate empty bobbin discharging chamber 14. The lay has inner and outer box guides 15 and 16, respectively, fastened thereinto in the usual manner.

The upper shuttle box in the present instance has a binder 20 having a cutter receiving slot 21 which renders accessible a metallic plate or anvil 22 carried on the front wall of the shuttle S when the latter is boxed as shown in Fig. 2. The shuttle carries a bobbin 25 from which a weft thread W extends to pass through the shuttle eye E and then in front of and across the plate 22 to the left as viewed in Fig. 2. When the shuttle is properly boxed as set forth in Figs. 2 and 3 the plate will align with the slot or aperture 21 to afford cutting access to the weft W.

The loom frame carries a stationary stud 30 on which is pivotally mounted a transferrer arm 31 having a hammer 32 to transfer a reserve bobbin from the magazine M to the shuttle S. A latch carrier 33 is pivoted to the transferrer arm as at 34 and carries a forwardly extending transfer latch 35 which normally clears but is adapted for cooperation with a dagger 36 mounted on and projecting rearwardly from the lay. An ascending rod 37 is connected to the latch carrier 33 and is operated by means not shown to rock the latch in a clockwise direction around its pivot 34 as viewed in Fig. 1 when a transfer is to occur.

In the operation of the mechanism thus far described the boxes B may reciprocate vertically in response to pattern demands to place the upper box 12 in an elevated position as shown in Fig. 4. When the shuttle is empty the transferrer arm 31 will descend to insert a reserve bobbin into the shuttle when the lay is in the rear position shown in Fig. 1. The weft replenishing features may be substantially as set forth in my aforesaid patent and the weft cutter to be described in detail hereinafter will operate in a manner somewhat analogous to the cutter and shuttle of the Payne patent.

In carrying my present invention into effect I secure to some part of the lay, such as outer box guide 16, a bracket 40 having a vertical stud 41 on which is pivotally mounted a lever 42. A coil spring 43 acts to hold the left end of lever 42 yieldingly forward in the position shown in Fig. 2. The outer arm 45 of the lever has an upwardly projecting pin 46 while the left end of the lever carries a pivot stud 47 on which is mounted a finger 48. A stop 49 on the finger 48 is held yieldingly against a corresponding stop 50 on the lever 42 by means of a light tension spring 51 connecting the hub 52 of the finger and a part of the lever 42 adjacent the pivot 41 therefor, as shown more particularly in Fig. 3. The spring 51 permits a yielding angular motion of the finger 48 in a counterclockwise direction around the center 47 during the cutting operation, after which contraction of spring 51 will bring the stops 49 and 50 together to determine the position of the finger 48 relatively to the lever 42.

Projecting rearwardly from the finger 48 is a stem 55 carrying a cutter blade 56. This stem and cutter may be substantially as shown in the aforesaid Payne patent and the cutter is so proportioned that it can enter the slot 21 to engage the metallic plate 22. The cutting edge of the blade 56 extends above and below the normal horizontal position of the weft W which leads from the shuttle eye to the left and across the plate 22. Under normal conditions the spring 43 will hold the blade 56 forwardly so that it will not interfere with the shifting of the shuttle boxes.

To provide for actuation of the lever 42 I extend the stud 30 and mount thereon a sleeve 60 having an inner collar 61 held adjustably thereon by set screw 62. A small rod 63 projects to the left from the collar 61 over and in engagement with the transferrer arm and is attached to one end of a light tension spring 64, the other or forward end of which is attached to a lug 65 projecting laterally from the magazine frame M. The normal action of the spring 64 is to tend to turn the sleeve 60 in a counterclockwise direction as viewed in Fig. 1. The usual heavy torsion spring 68 on the stud 30 acts to hold the transferrer arm 31 yieldingly in the full line raised position shown in Fig. 1.

An operating arm 70 is part of a small lever 71 the hub 72 of which is fastened to the sleeve 60. A stop finger 73 projects rearwardly from hub 72 for engagement with an adjusting stop screw 74 carried by a projection 75 integral with a collar 76 held in fixed position on the stud 30 by means of a set screw 77. Set screw 74 and stop 73 are normally spaced. The wire 63 extends over the transferrer arm 31 and the latter when in normal raised position limits the left hand position of the wire, the latter being held against the transferrer arm by spring 64. Spring 68 is sufficiently strong to resist the pull of spring 64 transmitted through the wire 63 pressing on the transferrer arm, and the latter is therefore in a stable position when shown in the full line position of Fig. 1.

In operation, the transferrer arm 31 is normally raised and acts through the wire 63 to hold arm 70 above the top of pin 46. The latter therefore normally moves back and forth on the lay under the arm 70 without engagement therewith. When a transfer occurs the lay dagger 36 will engage the latch 35 which has been raised at the dotted position of Fig. 1 for a purpose and rearward motion of the lay rocks the transferrer arm around the stud 30 to the dotted position. When descending the transferrer arm permits the light spring 64 to pull on wire 63 and rock collar 61 and sleeve 60 in such a direction as to lower the arm 70 to the dotted position of Fig. 1, in which position the forward end of the arm 70 will lie in the path of the upper end of pin 46. The descent of arm 70 occurs early enough in the backward motion of the lay to allow arm 70 to engage the pin 46 as the lay approaches back center. The down position of the arm 70 is determined by engagement of the stop 73 with the adjusting screw 74.

When arm 70 engages pin 46, the latter is prevented from having further rearward movement and temporarily becomes the pivot for lever 42. Under these conditions power is transmitted to the lever 42 by the stud 41 which is moving rearwardly with the lay and as a result the rod 55 and cutter 56 are projected rearwardly at a rate considerably higher than the backward motion of the lay. The cutter therefore not only overtakes the lay and engages the plate 22, but has an excess motion which will cause angular movement of the finger 46 around center 47 against action of spring 51.

By referring to Fig. 2 it will be seen that the cutting edge of the blade 56 is considerably behind center 47. As the latter center continues to

move rearwardly after engagement of the blade with plate 22 the cutter moves forwardly relatively to center 47 around the latter as an axis. There results a sliding of the cutter along the plate 22 to the left which assists in severing the weft W. I have found in practice that this sliding motion, together with the initial blow of the latter on plate 22 is sufficient to cut relatively coarse yarns.

As the lay starts forwardly the dagger 36 relieves its pressure on latch 35 and the spring 68 restores the transferrer arm to its raised position. At this time the wire 63 is swung in a clockwise direction around stud 30 back to the full line position of Fig. 1 against the action of light spring 64 and the arm 70 is raised to normal position.

While I have illustrated my invention as applied to a shifting shuttle box loom, yet certain features are not necessarily restricted to use with this type, since the shuttle box is normally at rest with respect to the lay throughout the transferring operation and the invention may therefore be used with a box permanently fixed to the lay. While I have shown the pivot 41 as supported from one of the box guides I do not wish to be limited to such a construction as the significant feature of the mounting for lever 42 is that it shall have a movable support and any form of mounting lever 42 which effects this result will be within the spirit of my present invention.

In adaptations heretofore made of thread cutters of the general type set forth herein the cutter mounting has been stationary while the lay has moved the shuttle toward and from the cutter. If a mounting of that type were to be used with shifting shuttle boxes it would be necessary to provide clearance to prevent the boxes in their shifting movements from striking the cutter. I obviate the necessity for such a clearance in the present instance by mounting the cutter on the lay and because of this construction the shuttle boxes can shift without danger of damaging the thread cutter.

From the foregoing it will be seen that I have provided a thread cutter mounted on the lay to move backwardly and forwardly therewith and to be operated by a relatively fixed part which temporarily becomes the pivot for the cutter supporting lever. With this arrangement the boxes can have their shifting movements relatively to the lay without danger of striking or otherwise damaging the thread cutter since the latter moves back and forth with the lay and normally is spaced a safe distance from the boxes throughout the whole back and forth sweep of the lay. By having the arms of the lever of unequal length I am enabled to move the cutter blade 56 rearwardly at a rate much faster than that at which the lay travels and am therefore able to subject the weft extending across plate 22 to an abrupt cutting action. It will further be seen that the cutter is controlled by the transferrer arm and cannot come into action until permitted to do so by descent of arm 31. It will further be seen that the pivoting of the blade carrying arm around pivot 47 results in a sliding action of the blade along the plate 22 so that if the initial blow of the cutter does not sever the thread there will be a sliding abrading action which will tear the thread apart. The fact that center 47 is moving rearwardly while the blade contacts plate 22 increases the sliding motion of the cutter.

It will further be seen that I have provided mechanism for cutting the thread on the front wall of the shuttle when the transfer occurs on the backward stroke of the lay, this result being effected by mounting the cutter so that it can move rearwardly from a position in front of the shuttle and overtake the latter.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a pair of cooperating weft parting members one of which is carried by the shuttle and across which the weft thread extends, a carrier for the other member, a support for the carrier, means to move the support on replenishing beats of the loom, and means to engage the carrier while the support is moving to project said other member toward the member on the shuttle due to motion of the support.

2. In a thread controlling mechanism for a weft replenshing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the thread lies, a movable cutter to cooperate with the plate to sever the thread, a lever on which the cutter is mounted, a support for the lever, means to move the support on replenishing beats of the loom, and an operating member to engage the lever and cause movement thereof in a direction to project the cutter against the plate on the shuttle due to motion of the support of the lever.

3. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the weft thread lies, a cutter to cooperate with the plate to sever the thread, a lever on which the cutter is mounted, a pivotal support for the lever intermediate the ends of the latter, means to move the support on replenishing beats of the loom, the cutter to be on one end of the lever, and means to engage the other end of the lever and cause rocking of the lever about the pivotal support therefor in a direction to project the cutter toward the plate due to motion of the support of the lever.

4. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the weft thread lies, a cutter to cooperate with the plate on the shuttle to sever the thread, a lever having the cutter mounted on one end thereof, a pivotal support for the lever located at a point intermediate the ends thereof, means to move the support on replenishing beats of the loom, and means stationary during the cutting operation to engage the other end of the lever to become a temporary pivot for said lever and cause the lever to move in a direction to project the cutter toward the plate due to motion of the pivotal support.

5. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the weft thread lies, a lay on which the shuttle is mounted, a lever pivoted to the lay at a point intermediate the ends thereof, a cutter carried by one end of the lever to cooperate with the plate on the shuttle in a thread cutting operation, and means stationary during a cutting operation to engage the other end of the lever and become a temporary pivot for the latter to rock the lever due to motion of the lay and move

the cutter against the plate on the shuttle to cut the thread.

6. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the weft thread lies, a lay to support the shuttle, a lever, a pivotal support for the lever intermediate the ends thereof and carried by the lay, a cutter mounted on one end of the lever and arranged to have cutting cooperation with the plate on the shuttle, and means acting on the other end of the lever to cause rocking of the latter by a movement derived from the lay to turn the lever on the pivotal support therefor in a direction to project the cutter toward the plate.

7. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the weft thread lies, a lay reciprocating between back and front center positions, a lever having a pivot on the lay, a cutter mounted on one end of the lever to have cutting cooperation with the plate on the shuttle, and means to engage the lever and cause the same to turn on its pivot in a direction to project the cutter toward the plate on the shuttle due to motion of the lay when the latter approaches the back center position thereof.

8. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the weft thread lies, a lay reciprocating between back and front center positions, a cutter to cooperate with the plate on the shuttle to sever the thread, a support for the cutter carried by and movable with respect to the lay, and means operating during a backward stroke of the lay to engage the support due to motion of the lay and cause movement of the support relatively to the lay to project the cutter against the plate.

9. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a plate on the shuttle across which the weft thread lies, a lay reciprocating between back and front center positions, a cutter to cooperate with the plate on the shuttle to sever the thread, a support for the cutter carried by and movable with respect to the lay, and means operating during a backward stroke of the lay to engage the support and cause movement of the latter relatively to the lay due to motion of the latter to project the cutter against the plate to cut the thread.

10. In a weft replenishing loom having a lay reciprocating between back and front center position, shifting shuttle boxes on the lay to shift relatively to the latter when the lay is adjacent front center position and to be stationary with respect to the lay when the latter is adjacent back center position, a shuttle in one of the shuttle boxes having a plate across which a thread extends from the shuttle, a thread cutter to have thread parting cooperation with the plate on the shuttle, a carrier for the cutter pivoted to the lay, and means operative during backward movement of the lay to engage the carrier at one side of the pivot thereof and cause movement of the carrier due to motion of the lay in a direction to cause engagement between the cutter and the plate on the shuttle to part the thread.

11. In a weft replenishing loom having a shuttle provided with a plate across which a thread extends from the shuttle eye, a lay supporting the shuttle and reciprocating between back and front center position, a thread cutter element having a cutting edge to have thread parting cooperation with the plate on the shuttle, a lever pivotally mounted on the lay, a pivotal connection between the lever and the cutter element located at a point to one side of the cutting edge and displaced from the latter in the direction in which the lay moves, and means to engage the lever as the lay is moving toward one of said center positions to cause the lever to turn with respect to the lay due to motion of the latter and move the cutting edge of the element into engagement with the plate on the shuttle, continued lay motion toward said center position after engagement of the cutting edge with the plate causing angular motion of the element with respect to the lever around said pivotal connection to effect a sliding of the cutting edge along the plate on the shuttle.

12. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, a thread parting element on the shuttle and across which the thread lies, a second thread parting element to cooperate with the first element to sever the thread, a lever to support the second parting element, a yielding connection between the lever and said second parting element, a moving pivotal support for the lever, and means to engage the lever positively as the latter is moved by said movable support to cause said lever to move positively in a direction to cause engagement between the parting elements due to motion of the moving support.

13. In a thread controlling mechanism for a weft replenishing loom having a shuttle from which a weft thread extends, weft replenishing mechanism to insert a fresh supply of weft in the shuttle, a thread parting element on the shuttle across which the weft thread extends, a reciprocating lay to move the shuttle back and forth, a lever supported by and mounted for pivotal motion relatively to the lay, a second thread parting element mounted on the lever for cooperation with the element on the shuttle, and means operated by the weft replenishing mechanism to cause pivotal motion of the lever with respect to the lay in a direction to effect weft thread severing cooperation between said elements due to motion of the lay.

14. In a weft replenishing loom having a reciprocating lay carrying a shuttle provided with a cutter plate across which the weft thread from the shuttle extends to the adjacent selvage, said lay reciprocating between front and back center positions, a lever pivoted to the lay at a point between the ends thereof, a cutter element on one end of the lever to cooperate with the plate to sever the thread, and means stationary on a replenishing beat of the loom to engage the other end of the lever when the lay is moving toward one of said center positions to become a temporary pivot for the lever, the lay acting on the lever to move the latter around the temporary pivot and move the cutter element on the lever toward said center position at a rate faster than that at which the lay approaches said center position to cause said element to overtake and engage the plate to cut the thread.

15. In a weft replenishing loom having a lay reciprocating between front and back center positions and operating with a shuttle having a cutter plate on the front wall thereof across

which the weft thread extends from the delivery eye of the shuttle to the adjacent selvage and having provision for inserting a fresh supply of weft into the shuttle and expelling the depleted supply of weft from the shuttle when the lay is in back center position, that improvement which comprises a cutter element to cooperate with the plate on the shuttle to sever the thread, a carrier for the cutter element pivoted to and movable with the lay, and means operative on a replenishing beat of the loom to engage the lever on the backward stroke of the lay to become a temporary pivot for the lever and thereby cause motion of the lay to turn the lever pivotally and project the cutter element against the plate on the shuttle to sever the thread.

16. In a weft replenishing loom having a lay reciprocating between front and back center positions and operating with the shuttle having a cutter plate on the front wall thereof across which the weft thread extends from the delivery eye of the shuttle to the adjacent selvage and having provision for inserting a fresh supply of weft into the shuttle and expelling the depleted supply of weft from the shuttle when the lay is in back center position, that improvement which comprises a cutter element to cooperate with the plate on the front wall of the shuttle to cut the thread, a lever pivoted between its ends to the lay and having the cutter element mounted on one end thereof, and means operative on a replenishing beat of the loom to engage the other end of the lever on the backward stroke of the lay to prevent said other end from moving rearwardly with the lay, the lever thereafter being rocked pivotally due to motion of the lay in a direction to project the element against the plate on the front wall of the shuttle to sever the thread.

17. In a weft replenishing loom having a lay reciprocating between front and back center positions and operating with a shuttle having a cutter plate on the front wall thereof across which the weft thread extends from the delivery eye of the shuttle to the adjacent selvage and having provision for inserting a fresh supply of weft into the shuttle and expelling the depleted supply of weft from the shuttle when the lay is in back center position, that improvement which comprises a cutter element to cooperate with the plate on the front wall of the shuttle to cut the thread, an actuator for the cutter element carried by and movable with respect to the lay and having a part thereof connected to the cutter element to cause the latter to move against the plate on the shuttle when said part of the actuator moves in a given direction with respect to the lay, and means operative on a replenishing beat of the loom during and dependent upon backward motion of the lay to cause the actuator to move said part and the cutter element connected thereto in said given direction with respect to the lay and thereby cause the element to move against the plate on the front wall of the shuttle to sever the thread.

18. In a weft replenishing loom having a shuttle provided with a plate across which a thread extends from the shuttle eye, a thread cutter to have thread parting cooperation with the plate on the shuttle, a carrier for the thread cutter, a lever to which one end of the carrier is pivoted at a point to one side of the cutter, a pivotal support for the lever at a point intermediate the ends of the latter, means to move the pivotal support with the shuttle on replenishing beats of the loom, and means to engage that end of the lever opposite the end of the lever to which the carrier is pivoted as the pivotal support for the lever moves to cause angular motion of the lever and move the carrier and cutter toward the plate on the shuttle due to motion of the pivotal support, the aforesaid point at which the carrier is pivoted to the lever being displaced from the cutter in a direction opposite to that in which the carrier moves toward the shuttle, engagement of the plate and cutter causing the carrier to move relatively to the lever in a direction to cause sliding of the cutter along the plate on the shuttle.

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