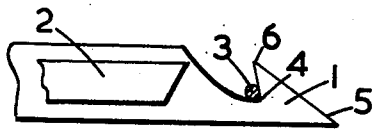
Jan. 26, 1954 S. JEFFERSON 2,667,187

YARN CUTTING ARRANGEMENT IN AUTOMATIC LOOMS

Filed June 12, 1951

4 Sheets-Sheet 1

Fig.1. (a)



(b)

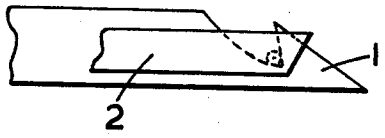
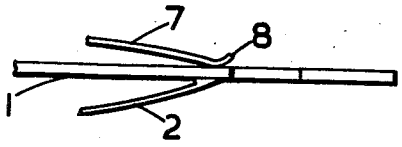


Fig.2.



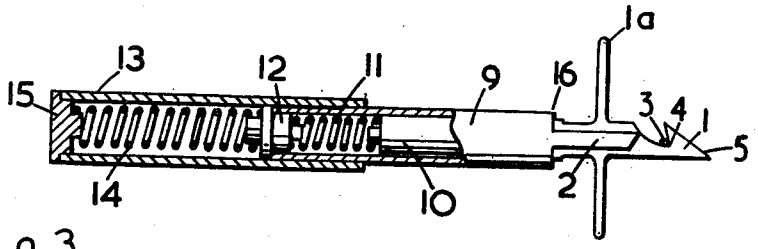


Fig.3.

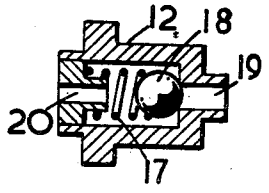


Fig. 4

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YARN CUTTING ARRANGEMENT IN AUTOMATIC LOOMS

Filed June 12, 1951

4 Sheets-Sheet 2

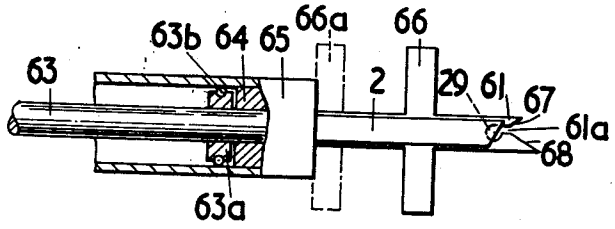


Fig. 5

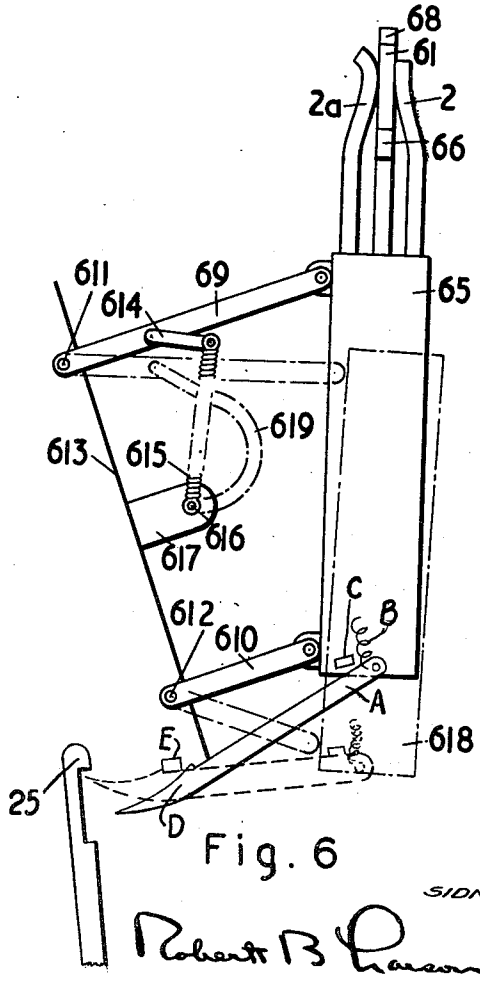


Fig. 6

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YARN CUTTING ARRANGEMENT IN AUTOMATIC LOOMS

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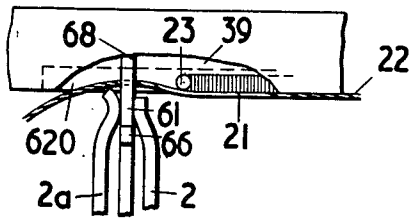


Fig. 7.

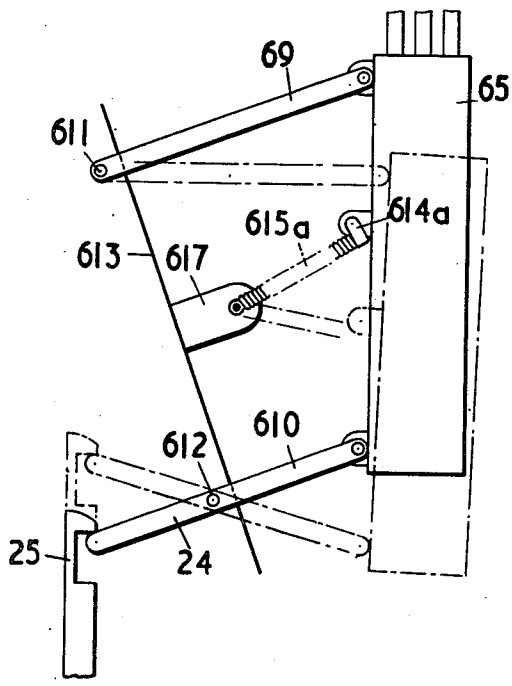


Fig. 8.

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YARN CUTTING ARRANGEMENT IN AUTOMATIC LOOMS

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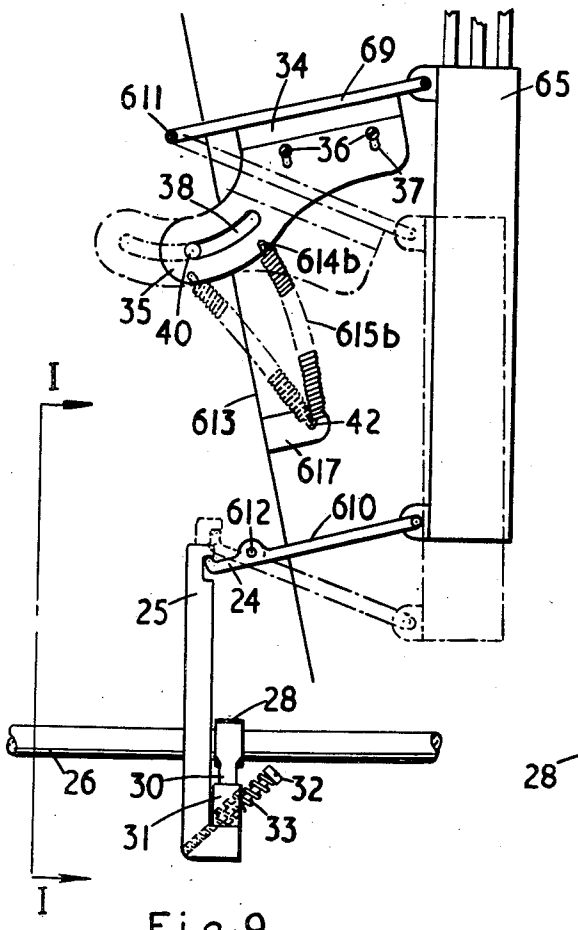


Fig. 9

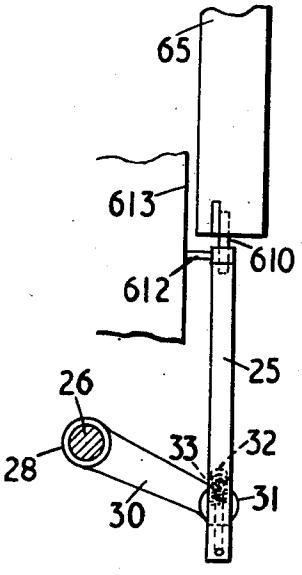


Fig. 10

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2,667,187

UNITED STATES PATENT OFFICE

2,667,187

YARN CUTTING ARRANGEMENT IN AUTOMATIC LOOMS

Sidney Jefferson, Malvern, England, assignor to National Research Development Corporation, London, England, a British corporation

Application June 12, 1951, Serial No. 231,177

Claims priority, application Great Britain June 16, 1950

33 Claims. (Cl. 139—263)

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This invention relates to yarn-cutting arrangements for use in automatic looms during the replacement of exhausted pirns by full ones; it is necessary to cut the yarn between the fabric and the exhausted pirn.

A special requirement exists in these circumstances that, after cutting, the end of the yarn attached to the fabric must be held for a short while to prevent its being drawn into the fabric by subsequent passages of the shuttle through the shed whereas the end of the yarn still attached to the exhausted pirn must be left free.

Hitherto it has been the common practice to cut the yarn by an automatically operated pair of cutters similar to domestic scissors but having a third non-cutting blade to enable the scissors to hold one part of the yarn whilst releasing the other by cutting the yarn. The use of this type of cutter involves arrangements for moving the cutters into position, opening and closing them, and withdrawing them at appropriate times during repirning, which, in general, means a complex control mechanism. Moreover, cutting cannot take place as early as might be desirable from some points of view and it would be advantageous if the end of the yarn which is held could be conveniently held after cutting for a protracted period. It would be of further advantage if the duration of this period could be simply controlled.

The object of the invention is therefore to provide an arrangement for cutting yarn in automatic looms in which the cutter operation is simplified and in which cutting may take place early if required.

Another object of the invention is to provide a cutting apparatus in which the end of the yarn which is held may be held for a controllably long period.

A further object of the invention is to provide in such cutter arrangements alternative mounting arrangements for controlling the action of the cutter and for bringing it into and out of engagement with the yarn at the desired times.

A still further object of the invention is to provide an improved shuttle for use with cutter arrangements according to the invention.

Yet another object of the invention is to provide a cutter which will catch and cut the yarn in spite of variations of the position of the thread which may be liable to occur when the cutter encounters the thread.

According to the invention therefore there is provided a yarn cutting arrangement of the kind referred to comprising a hook member adapted

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to engage the yarn at or about the desired cutting point as an exhausted pirn is being removed, a non-cutting member arranged to move relative to the hook member and hold the yarn on one face of the hook member and a cutting member adapted to move across the other face of the hook member to cut the yarn.

According to a feature of the invention said hook member is slidably mounted in a body member to which said cutting and non-cutting members are attached, and operating means are provided adapted to coact with the sley of the loom after the yarn has been caught, to move the hook member, relative to the body member and said cutting and non-cutting members, to actuate the mechanism in the manner above defined.

Further features of the invention include the provision of a restoring spring to restore said hook member to its starting position with respect to said body member, slidably mounting said body member in a holding member and providing a thrust spring stronger than said restoring spring, to oppose movement of said body member in said holding member whilst cutting is taking place, and provision of a stop for said hook member which acts after the yarn has been held and cut to prevent further relative movement between the hook member and the body member and allow further co-operation between the sley and said operating means to move said body member into said holding member against said thrust spring whereby holding of the yarn continues during the action of the sley after cutting has taken place.

In a still further feature of the invention the hook member acts as a piston in the body member which forms a cylinder, a valve is provided to allow air to escape as the hook member presses into the body member but to prevent rapid ingress of air when the hook member restores under the action of the restoring spring, and a restricted inlet is provided to allow air to enter the cylinder slowly when the hook member restores whereby restoration of said hook member is delayed. The delay may be adjusted by changing the magnitude of the restricted inlet.

According to an alternative feature of the invention, the hook member is slidably arranged in the body member, and the body member is mounted on means permitting said body member to move in a desired path against a restoring means during the cutting and holding action, the arrangement being such that said body member is held substantially stationary by said restoring means whilst the hook member is impelled

thereinto during yarn cutting, and said restoring means restores said body member during a restoring action, so that, by making the hook member freely movable with respect to the body member, when the body member ceases to move at the conclusion of its own restoration the hook member is carried forward into its initial position by its own inertia. The return of the hook member to its initial position may be damped by an air piston attached to the hook member.

Conveniently said mounting means comprises, pivoted arms to constrain said body member to move in said desired path, and a spring member adapted to act as a strut to prevent movement of the body member during yarn cutting but as a restoring spring thereafter. This spring member may comprise a longitudinal helical spring which opposes the body member movement by being in compression initially and in bending subsequently. The force applied to the spring by the body member is then arranged to act through a point on the longitudinal axis of the spring at one end of the spring and through a point slightly displaced from the longitudinal axis of the spring at the other end of the spring thus giving, initially, a high resistance and then, once the spring bends and breaks down in its strut action, a lower resistance.

According to an aspect of the invention said mounting means comprises, pivoted arms to constrain the movement of said body member to said desired path, and a spring member adapted to ensure that the body member has two stable positions, one in the initial state and the other in the actuated state after the cutting action, said mounting means being adaped to be operated from the loom mechanism to restore said body member from the actuated to the initial state.

According to yet a further feature of the invention the hook member comprises an eye adapted to receive the yarn whether it is above or below the middle of the eye by the provision of an open slot converging into the eye.

According to an interesting feature of the invention a normal shuttle is modified when used with the invention by the insertion of a friction pad along that part of the side of the shuttle where the pirn end of the yarn engages it when pressed into the eye of the shuttle by the hook member. This prevents the hook member from pulling more yarn from the pirn and the formation of too large a loop of yarn in the shuttle eye. Incidentally, the cutting action is assisted by the added friction on the pirn side of the yarn.

A minor feature of the above is the provision in the shuttle of a small pillar or bearing post upon which the yarn bears at the edge of the friction pad where the yarn runs into the eye of the shuttle. This prevents excessive wear or cutting of the edge of the friction pad which may be made of lamb's wool or velvet.

To illustrate the manner in which the invention may be carried into effect several embodiments thereof will now be described reference being made to the accompanying drawings in which:

Fig. 1 (*a* and *b*) shows elevational views of a cutting arrangement (in the unoperated and operated positions respectively) used in carrying out the invention,

Fig. 2 shows in plan the arrangement of the cutting, holding and hook members of the mechanism of Fig. 1,

Fig. 3 shows a part-sectional view of a yarn-cutting apparatus according to the invention employing the aforesaid arrangement of cutting, holding and hook members,

Fig. 4 shows a detailed sectional view of a valve used in the apparatus of Fig. 3,

Fig. 5 shows a partly sectioned side view of part of an alternative cutter arrangement used in carrying out the invention,

Fig. 6 shows, in diagrammatic form, a mounting arrangement used for a cutter of the alternative type shown in Fig. 5,

Fig. 7 shows a modification of a normal shuttle preferred for use with cutter arrangements according to the invention,

Fig. 8 shows, in diagrammatic form, an alternative cutter (mounting) arrangement to that shown in Fig. 6,

Fig. 9 shows, in diagrammatic form, a further alternative arrangement to that shown in Figs. 6 and 8 and shows in more detail the arrangements for controlling the movement of the cutter apparatus and its mounting, and

Fig. 10 shows, in diagrammatic form, a side view of part of the arrangement of Fig. 9.

In Fig. 1*a* a hook member 1 is shown which co-operates with a cutting member 2. A piece of yarn 3 is positioned for cutting in the notch 4 of the hook member 1. This position is reached by the yarn advancing against the sloping edge 5 from near the point of the hook member 1 and slipping over the peak 6 into the notch 4. The edge of the notch 4 is ground to give a shear edge.

To cut the yarn 3 the cutting member 2 moves across the side of the notch 4 into the position shown in Fig. 1*b* and co-operating with the shear edge thereof cuts the yarn 3 (shown dotted behind the member 2 in Fig. 1*b*).

Now, during cutting and afterwards it is desired to hold the yarn and to this end a holding member 7 is provided as illustrated in Fig. 2. This holding member 7 has a raised and rounded leading edge 8 under which the yarn is caught when the member 7 is moved forward across the side of the notch 4. The leading edge 8 acts, of course, sufficiently far in advance of the cutting member 2.

In Fig. 3 the elements of Fig. 2 as far as they are visible in the view shown, can be easily recognized as they bear the same reference numbers in both Figs. 2 and 3. The cutting member 2 and the holding member 7 (not seen in Fig. 3) are made integrally with a body member 9 of cylindrical shape in which a piston portion 10 of the hook member 1 is slidably mounted. A pair of arms 1*a* is fixed to the hook member 1 and enables a suitable member or link in the loom to move the hook member 1 into the body member 9 by exerting a force on the arms 1*a*.

When the piston 10, which is part of the hook member 1, slides in the body 9 it is opposed by a restoring spring 11 which bears against the end 12 of the body member 9. This end 12 comprises a valve which allows air to escape from the cylindrical part of the body member 9 when the piston 10 is moved against the restoring spring 11 but does not allow air to reenter when the spring 11 acts to restore the piston 10.

The body member 9 is itself slidably mounted in a holding member 13 but is prevented from sliding into it whenever the spring 11 is compressed by thrust spring 14. This spring 14 is designed to be much stronger, therefore, than the restoring spring 11. The thrust spring 14 bears against a plug 15 which closes the end of the holding member 13. A suitable air inlet and exhaust (not shown) is arranged in this member 13 so that the body member 9 in the holding member 13 is sub-

ject only to the opposition or restoration of the thrust spring 14.

In action in a loom the operation of the apparatus is as follows.

During replacement of an exhausted pirn the sley in moving forward brings with it the exhausted pirn which is at this stage, of course, still connected to the fabric by the remnant of yarn left unused in the pirn.

The yarn cutting apparatus shown in Fig. 3 is moved bodily towards the sley (not shown) by a mechanism (not shown) attached to the holding member 13 and takes up a position such that with further movement of the sley the yarn rises up the sloping edge 5 of the hook 1 and slips into the notch 4. In the drawing the fabric should be imagined to be behind the apparatus, the shuttle eye, from which the yarn, still attached to the exhausted pirn, emerges, in front, and the sley now moving from right to left.

Just at this point an appropriate part of the sley, for example the front of the shuttle box or in some cases maybe, the shuttle itself, begins to bear against the pair of arms on cross bar 1a. Further movement of the sley thus causes the hook member 1 to slide into the body member 9 against the restoring spring 11 displacing air from the cylindrical part of member 9 through the valve 12 as it does so. Relative motion between member 9 and member 10 means that the non-cutting member 7 moves to hold the yarn 3 against the hook 1 whilst the cutting member 2 moves past the notch 4 and cuts the yarn 3.

After the yarn 3 has been cut the sley continues to move and the pair of arms 1a soon encounters the end 16 of the body member 9. The body member 9 is then compelled to move into the holding member 13 against the thrust spring 14.

It will be easily seen that this action provides for a degree of lost motion in the operative action of the hook member 1 in that the sley may continue to move forward, the yarn-end from the fabric still remaining held and the yarn-end attached to the pirn being free to allow removal of the exhausted pirn to be completed.

When the sley returns, the spring 14 presses the body member 9 from the holding member 13 and the restoring spring 11 attempts to restore the hook member 1. Due to the valve 12 however air can only enter through a small inlet hole (not shown) in the body member 9. The hook member 1 thus restores only slowly and enables the non-cutting member 7 to hold the yarn-end from the fabric for a still longer time.

In Fig. 4 a detailed drawing of the valve 12 is shown; a spring 17 presses a ball 18 against an orifice 19 in the body of the valve 12 which connects with the cylindrical part of the body member 9. When the air pressure in body member 9 increases due to the hook member 1 being pressed into it the ball 18 is forced back and the air escapes via the orifice 19 to the further orifice 20. The spring 17 retains the ball 18 over the orifice at all other times and so the ingress of air when the hook 1 restores is limited. It will be apparent that the inlet hole previously mentioned may be dispensed with if the valve 12 is suitably modified (i. e. allowed to leak a little) so as to allow a small ingress of air during restoration of the hook member 1 dependent upon the restoration delay required.

An alternative arrangement, shown in Figs. 5 and 6, is particularly suitable for use where the cutter is required to have a predetermined path of approach to the cutting position.

In Fig. 5 the hook member 61 cooperates with the cutting member 2. The hook member 61 moves relative to the cutting member 2 by virtue of its attachment to a sliding member 63 which is able to slide longitudinally through a bushing 64 secured in the body member 65. The cutting member 2 is attached to the body member 65.

When the sley (not shown) is impelled against the arms 66, which are attached to the hook member 61, the hook member 61 enters the shuttle eye (not shown) and catches the yarn, and then, due to the movement of the sley, retreats into the body member 65. The narrow mouth 61a of the hook member 61 is formed by two inclined edges 67 and 68 leading into an open eye 29, so ensuring that the yarn, which should be considered as running perpendicularly to the plane of the paper, goes into the eye 29, whether the yarn is above or below the centre-line shown, when it encounters the hook member 61.

As the impact upon the arms 66 continues, the tip of the cutting member 2 advances across the open eye 29 (from left to right in the Fig. 5) and so shears the yarn lying in the eye 29. The forward rake of the tip of the cutting member 2 also ensures that the yarn is guided downwards towards the bottom of the eye 29 for cutting to take place. When the arms 66 reach the body member 65 (as shown by the dotted position 66a of the arms 66) the relative movement between the hook member 61 and the body member 65 ceases and further pressure of the sley on the arms 66 is transmitted directly to the body member 65.

At the same time as the cutting action takes place a holding member (not shown in Fig. 5 but shown at 2a in Fig. 6), attached to the body member 65 and bearing on the hook member 61 on the opposite side to the cutting member 2, moves so as to hold the thread between itself and the hook member 61 during and after the cutting action. This holding member functions in the same way as that described above with reference to Figs. 2 and 3.

Whilst the shuttle-box has been impinging on the arms 66 during the cutting action the body member 65 relies on its inertia and the resistance of its mounting, which will be referred to now, to give sufficient reaction to prevent its moving substantially during this cutting action.

The mounting adopted for the body member 65 is shown in Fig. 6 in which the body member 65 is shown pivotably mounted on two arm links 69 and 610 which are themselves pivoted at points 611 and 612 respectively on a fixed mounting 613.

A helical spring strut 615 is mounted between a bracket 614 fixed on the arm 69 and a point 616 on a pillar 617 mounted on the fixed mounting 613. The centre line of the spring 615, considered as a strut, is through the point 616 but is slightly to one side of the point where the bracket 614 joins the arm link 69.

Thus, when the sley first impinges on the arms 66, the hook member 61 retreats into the body member 65 as described and owing to the inertia of body member 65 and the strut action of the spring 615 the body member 65 does not move appreciably.

When, however, the cutting action is complete the arms 66 transmit the impulse of the sley to the body member 65 and so the spring 615, still acting as an eccentrically loaded strut, is subjected to an increased force and eventually bends. Once bending begins to take place the spring 615

can only exert a very limited resistance; that owing to its bending action as opposed to that previously exerted by virtue of its strut action. The body member 65 therefore swings on its arms 69 and 610 into a position shown dotted at 618. The spring 615 assumes a position shown dotted at 619. It will be appreciated that this use of the spring 615, first as a strut, whilst the cutting action is taking place, and then only in bending, whilst the body member 65 is moving, is most advantageous, especially, as the sley may be decelerated considerably after giving the cutting action impulse to the arms 66 and as the body member 65 is required to swing back relatively freely, into the position 618 shown dotted, by virtue of the impulse given it by the sley. On reaching the position 618 the body member 65 is retained in that position by a catch mechanism which is released by the loom when the body member 65 is required to move into the cutting position again.

A swivel arm A is pivotably mounted on the end of the body member 65 and is urged by a spring B toward a stop C, which stop is also fixed on the body member 65. The swivel arm A carries at its end a latch D which clicks over a fixed stop E when the body member 65 swings back into the position 618. The catch D is released by the action of the latch arm 25 which pulls the swivel arm A; the latch arm 25 acts at the appropriate time by virtue of its being mounted on the loom change shaft. The latch D then releases from the fixed stop E and the body member 65 moves forward to the cutting position.

The action of the spring 615 in bending allows the body member 65 to engage with the catch easily without any tendency to bounce out of engagement but, is sufficiently strong to restore the body member 65 smoothly when the retaining catch is released. Upon the restoration of the body member 65, when the catch is released, the hook member 61 is thrown into its initial position, by its own inertia, when the body member 65 has restored fully. A stop 63*a* is shown fastened to the shaft 63 of Fig. 5. This stop 63*a* prevents the hook-member 61 attached to the shaft 63 from advancing too far out of the body member 65; it engages with the bushing 64 when the hook member 61 reaches the correct initial position. It is desirable under these circumstances to damp this restoring motion of the hook member 61 so that, when it reaches its initial position, bounce does not occur. This is achieved by making the stop 63*a*, as a disc, to act as a leaky air piston in the body member 65. To this end a piston ring 63*b* is located in a groove in the circumference of the stop 63*a*. So, when the stop 63*a* approaches the bushing 64, the air in the intervening space is compressed and can leak only slowly by the ring 63 and through the bushing 64. This damps the movement of the hook member 61 which therefore comes gently to rest without bounce with the stop 63*a* against the bushing 64.

The action from first catching the yarn to the engagement of the body member 65 by the catch may be referred to as the cutting and holding action because the yarn is held by the holding member 2*a* all this time. The yarn is, of course, also held from the time when the catch is released until the body member 65 has restored and the inertia of hook member 61 has restored the hook member 61 to its initial position. This latter action is known, however, as the restoring action since it restores the cutter apparatus to the initial or cutting position.

In some looms it may be that the impulse given by the sley to the arms 66 of the cutter apparatus is insufficient to ensure that the body member 65 is fully in the actuated position by the end of the cutting and holding action. In such cases an alternative arrangement is used. The essential parts of such an arrangement are shown in Fig. 8 in which, as before, the body member 65 is constrained to move in a desired path by arm links 69 and 610 which pivot at points 611 and 612 respectively on the fixed mounting 613.

A longitudinally helical spring 615*a*, connected to the fixed mounting 613 at the pillar 617, is connected to a pivot 614*a* on the body member 65. This arrangement acts to ensure that the body member 65 always occupies the position shown or the position shown by dotted lines and is stable in either of these positions. In any other position the body member 65 is of course unstable toward these other two positions.

Thus, when the impulse from the sley commences to move the body member 65, the body member 65 moves against the resistance of the spring 615*a* until it is approximately a little more than half way towards its actuated position. At this point the spring 615*a* assists in completing the movement and eventually maintains the body member 65 stable in the actuated position (as shown dotted). Any diminution of the shuttle force is thus counteracted by the assistance of the spring 615*a* in the final part of the movement.

Of course, it will be realised that, the body member 65 will not now be self-restoring to return the cutter when required, into its initial, cutting position again. An extension 24 is therefore arranged on the arm link 610 so that, at an appropriate time, a latch arm 25 driven from the change shaft (not shown) of the loom may pull the body member 65, together with the cutter head, back to the cutting position.

Another arrangement which is preferred for certain applications will now be described with reference to Figs. 9 and 10. A particular arrangement of the latch arm 25 in relation to the change shaft is also given.

In the Fig. 9 the body member 65 is again pivotably mounted on two arm links 69 and 610 which are themselves pivoted at points 611 and 612 respectively on the fixed mounting 613.

A guiding plate 35, with a guide slot 38 cut in it, is fastened, by screws 36 in adjustment slots 37, to an extension plate 34 on the arm link 69. A guide pin 40 fixed in the mounting 613 and cooperating with the guide slot 38 guides the guiding plate 35 and the body member 65. The body member 65 is thus prevented from further forward movement from its initial, forward position when the guide pin 40 is at the end of the slot 38 as shown in the Fig. 9. When the body member 65 is in its backward position (shown dotted in the Fig. 9) the guide pin 40 being in contact with the other end of the slot 38 (shown dotted in this position) prevents further backward movement of the body member 65 towards the actuated position.

The body member 65 is held in either its backward (actuated) or forward (initial or cutting) position by means of a spring 615*b*. The spring 615*b* is fastened at one end to a pivot 42 on a pillar 617; the pillar 617 is mounted on the fixed mounting 613. The other end of the spring 615*b* is fastened to a pivot 614*b* on the guiding plate 35. The spring 615*b* is arranged, as shown (full

line and dotted line) to be bowed when the body member 65 is in either the forward or the backward position. When the body member 65 is in any position in between the forward and backward positions the distance between the pivots 42 and 614b of the spring 615b is shorter than in either of these two positions. Thus, the spring 615b continually urges the body member 65 towards one or other of the two positions, forward or backward; therefore the body member 65 is held stably only when in either of these two positions.

Referring now to Fig. 10 as well, the movement of the body member 65 from its initial forward position to its backward position is controlled by the latch arm 25 which is flexibly mounted on the end 31 of a crank arm 30. The crank arm 30 is attached to the loom change shaft 26 by an end bushing 28. The flexible mounting of the latch arm 25 comprises a screw 32 screwed through a suitable clearance hole in the end 31 of the crank arm 30 into a threaded hole in the end of the latch arm 25.

A coil spring 33 encircling the screw 32 ensures that the latch arm 25 only moves according to the clearance provided in the hole in the crank arm end 31.

The movement of the loom change shaft 26 is very suitable for use for the purpose of controlling the movement of the body member 65 and the action is as follows.

With the body member 65 in the backward position (shown dotted in the Fig. 9) when the change shaft 26 rotates, the latch arm 25 is pulled backwards by the crank arm 30 and pulls the extension 24 of the arm link 610; the body member 65 is thus moved into the forward position shown (in full line in Figs. 9 and 10). The forward movement is limited by the guide pin 40 in the guiding plate 35; the spring 615b passes from one stable position to the other and serves to hold the body member 65 in the forward position.

After the yarn cutting and holding action the body member 65 is restored to the backward position by the pressure of the sley on the arms 66 of the hook-member 61 (Fig. 5). The loom change shaft 26 does not move at this stage but the extension 24 in moving back merely deflects the flexibly mounted latch arm 25 so that it remains operated but the body member 65 returns to the backward position. When, later, the loom change shaft 26 in restoring rotates in the opposite way to that in which it rotated when sending the body member 65 forward, the latch arm 25 restores forwardly and by virtue of its flexible mounting is able to re-engage its latch with the extension 24. The original conditions now obtain and the body member 65 is positioned and ready for another cycle of operations.

For looms in which the yarn cutter is employed, it is preferable, although not essential, to use an improved shuttle, part of which is shown in Fig. 7.

In a recess 39 to the side of the shuttle eye 620 is placed a friction pad 21 made of a material such as velvet or lamb's wool. It is on the same side of the eye 620 as the part of the yarn 22. In the Fig. 7 the yarn 22 is shown as coming from the pirn at the right-hand side and becoming the weft at the left-hand side. The hook member 61 of the yarn cutter is shown inserted into the shuttle eye 620.

Thus, when the hook member 61 is inserted into the shuttle eye 620 the yarn 22 is pressed,

during the cutting action, by the hook member 61 against the friction pad 21 and so, the tendency of the hook member 61 to pull still more yarn from the pirn is reduced. An improvement in the cutting action results, owing to the steadying action of the friction pad 21 preventing the formation of a slack loop in the shuttle-eye 620 itself. A pillar 23, over which the yarn bears, prevents excessive wear of the end of the friction pad 21.

I claim:

1. A yarn cutting arrangement of the kind referred to comprising a hook member adapted to engage in its hook the yarn to be cut, a non-cutting member comprising a longitudinal member adapted to move longitudinally along one side of the hook and on encountering the engaged yarn to hold it against the hook, and a cutting member adapted to move longitudinally along the other side of the hook and on encountering the yarn to cooperate with the hook in a shear action to cut the yarn.

2. A yarn cutting arrangement as claimed in claim 1, in which said non-cutting member comprises a longitudinal member out of contact for part of its length with said hook member and resiliently in contact at one end with said hook member.

3. A yarn cutting arrangement as claimed in claim 2 in which said one end of the longitudinal member comprises a member having a rounded portion and a raised leading edge portion, said hook member being disposed tangentially to the rounded edge portion and making pressure contact therewith.

4. A yarn cutting arrangement of the kind referred to comprising a body member, a hook member slidably supported along part of its length in said body member and having a hook at one end, a non-cutting member secured to said body member and having its end bearing against one side of the hook member, a cutting member secured to said body member and bearing in shearing cooperation on the other side of the hook member, the arrangement being such that when the yarn to be cut enters into the hook of the hook member and the hook member slides into said body member, the non-cutting member encounters the yarn and holds it between its end and the hook member and the cutting member cooperating in a shear-like manner with the hook of the hook member thereafter encounters the yarn and cuts it.

5. A yarn cutting arrangement as claimed in claim 4 in which said non-cutting member comprises a longitudinal member out of contact for part of its length with said hook member and resiliently in contact at one end with said hook member.

6. A yarn cutting arrangement as claimed in claim 5 in which said one end of the longitudinal member comprises a member having a rounded portion and a raised leading edge portion, said hook member being disposed tangentially to the rounded edge portion and making pressure contact therewith.

7. A yarn cutting arrangement as claimed in claim 4 comprising means adapted to determine the path of said body member when moving between two extreme positions, and means for resiliently connecting the body member and a fixed point to give said body member two positions of stable equilibrium one at each extreme position.

8. A yarn cutting arrangement as claimed in claim 4 comprising one link on one fixed pivot

at one end and on one pivot on the body member at its other end, a second link on a second fixed pivot at one end and on a second pivot on the body member at its other end, a longitudinally helical spring arranged as an eccentrically loaded strut connected at one end to said one link and at its other end to a third fixed pivot, and catching means on said body member adapted to engage with an appropriate part of the loom to retain said body member in its actuated position under the control of the loom.

9. A yarn cutting arrangement as claimed in claim 4 comprising one link on one fixed pivot at one end and on one pivot on the body member at its other end, a second link on a second fixed pivot at one end and on a second pivot on the body member at its other end, a longitudinally helical spring arranged as an eccentrically loaded strut connected at one end to a third fixed pivot and at its other end to a third pivot on said body member, latch arm means, and an extension link secured to one of said links, said latch arm cooperating with an appropriate part of the loom and thereby adapted to pull said body member by means of said extension link into position for the cutting and holding action.

10. A yarn cutting arrangement as claimed in claim 4 comprising one link on one fixed pivot at one end and on one pivot on the body member at its other end, a second link on a second fixed pivot at one end and on a second pivot on the body member at its other end, a bracket on one of said links adapted to cooperate with a fixed stop to determine two extremes of position for said link, and a longitudinally helical spring attached at one end to a pivot on said bracket and at its other end to a fixed pivot, said spring being in bowed configuration when said link is in either of its two extreme positions and the distances apart of the bracket pivot and the fixed pivot of the spring being smaller at the two extreme positions than any they assume when the link is between said two extreme positions.

11. A yarn cutting arrangement as claimed in claim 4 comprising one link on one fixed pivot at one end and on one pivot on the body member at its other end, a second link on a second fixed pivot at one end and on a second pivot on the body member at its other end, a bracket on one of said links adapted to cooperate with a fixed stop to determine two extremes of position for said link, a longitudinally helical spring attached at one end to a pivot on said bracket and at its other end to a fixed pivot, said spring being in bowed configuration when said link is in either of its two extreme positions and the distances apart of the bracket pivot and the fixed pivot of the spring being smaller at the two extreme positions than any they assume when the link is between said two extreme positions, a latch arm means, and an extension link secured to one of said links, said latch arm cooperating with an appropriate part of the loom and thereby adapted to pull said body member by means of said extension link into position for the cutting and holding action.

12. A yarn cutting arrangement as claimed in claim 11 comprising a crank arm attached at one end to the change shaft of the loom and at its other end to said latch arm, and flexible latch-arm mounting means adapted to allow said latch arm to move aside when said link extension restores independentally of the latch arm.

13. A yarn cutting arrangement as claimed in claim 4, in which means are provided cooperating between the hook member and the body member to restrict the distance the hook member may advance from out of the body member.

14. A yarn cutting arrangement of the kind referred to comprising a hook member adapted to engage in its hook the yarn to be cut, a body member, said hook member being slidably supported in said body member, a non-cutting member mounted on said body member and bearing onto one side of the hook member, a cutting member mounted on said body member and bearing on the other side of the hook member, and arms laterally attached to said hook member and adapted to cooperate with the sley of the loom so that the sley when moving before an empty pirn is ejected from the loom forces the hook member into said body member said non-cutting member thereby advancing to the yarn to hold the yarn between itself and the side of the hook and said cutting member advancing to the yarn to cut the yarn between shears formed by the cutting member and said other side of the hook.

15. A yarn cutting arrangement as claimed in claim 14 in which there is a holding member, said body member being mounted in said holding member to remain substantially stationary during the cutting and holding action said laterally secured arms being arranged to encounter said body member and limit entry of the hook member thereinto at the end of the cutting and holding action, so that further pressure of the sley onto said arms is transmitted to the body member, and said holding member carrying a spring connected to said body member and adapted to resiliently oppose motion of said body member under the further pressure transmitted thereto by said arms.

16. A yarn cutting arrangement as claimed in claim 14 comprising a stop secured to said hook member said body member being adapted to restrain said stop to restrict the distance the hook member may advance from out of the body member.

17. A yarn cutting arrangement as claimed in claim 14 in which said body member comprises a hollow tube, said hook member is slidably mounted in a bush at one end of the hollow tube, a disc fitting in the hollow tube is secured to the hook member on the appropriate side of the bush to restrict the distance the hook member may advance from out of the body member and air-sealing means are associated with the disc to restrict the passage of air between the space between the disc and the bush and the atmosphere.

18. A yarn cutting arrangement as claimed in claim 14, in which resilient means are adapted to oppose the hook member as it is forced into said body member and to restore said hook member when due to the motion of the loom the sley no longer cooperates with said arms to force the hook member into said body member.

19. A yarn cutting arrangement as claimed in claim 18 in which there is a holding member, said body member being mounted in said holding member to remain substantially stationary during the cutting and holding action, said laterally secured arms being arranged to encounter said body member and limit entry of the hook member thereinto at the end of the cutting and holding action, so that further pressure of the sley onto said arms is transmitted to the body member, and said holding member carrying a spring connected to said body member and adapted to resiliently oppose motion of said body member

under the further pressure transmitted thereto by said arms.

20. A yarn cutting arrangement as claimed in claim 18, in which said resilient means comprise a spring interposed between said hook member and said body member to oppose the hook member as it is forced into said body member.

21. A yarn cutting arrangement as claimed in claim 20 in which there is a holding member, said body member being mounted in said holding member to remain substantially stationary during the cutting and holding action, said laterally secured arms being arranged to encounter said body member and limit entry of the hook member thereinto at the end of the cutting and holding action, so that further pressure of the sley onto said arms is transmitted to the body member, and said holding member carrying a spring connected to said body member and adapted to resiliently oppose motion of said body member under a further pressure transmitted thereto by said arms.

22. A yarn cutting arrangement as claimed in claim 18, in which said hook member has a main body of cylindrical external form, said body member defines the walls and one end of a hollow cylinder, said resilient means are positioned within the walls of the hollow cylinder and adjacent to the one end, said main body fitting as a piston in the other end of the hollow cylinder, and said cutting and non-cutting members being attached to said body member so that they extend beyond the other end of the hollow member to bear upon the sides of the hook member.

23. A yarn cutting arrangement as claimed in claim 22 in which the end of the hollow cylinder contains a unidirectional air valve adapted to allow air to pass between the cylinder and the atmosphere.

24. A yarn cutting arrangement as claimed in claim 23 in which there is a holding member, said body member being mounted in said holding member to remain substantially stationary during the cutting and holding action, said laterally secured arms being arranged to encounter said body member and limit entry of the hook member thereinto at the end of the cutting and holding action, so that further pressure of the sley onto said arms is transmitted to the body member, and said holding member carrying a spring connected to said body member and adapted to resiliently oppose motion of said body member under the further pressure transmitted thereto by said arms.

25. A yarn cutting arrangement as claimed in claim 22 in which there is a holding member, said body member being mounted in said holding member to remain substantially stationary during the cutting and holding action, said laterally secured arms being arranged to encounter said body member and limit entry of the hook member thereinto at the end of the cutting and holding action, so that further pressure of the sley onto said arms is transmitted to the body member, and said holding member carrying a spring connected to said body member and adapted to resiliently oppose motion of said body member under the further pressure transmitted thereto by said arms.

26. A yarn cutting arrangement as claimed in claim 22 in which a holding member defining a hollow cylinder closed at one end holds closely in the hollow cylinder the outside of the cylindrical form comprising the body member, a helical spring located in the hollow cylinder of the holding member between the one end and the body member and adapted to remain substantially uncompressed during the cutting and holding action and to compress when the body member experiences the pressure of the loom sley when the arms bear against it.

27. A yarn cutting arrangement as claimed in claim 22 in which said resilient means comprise a helical spring inside said hollow cylinder bearing between the end of said hollow cylinder and the piston end of the hook member.

28. A yarn cutting arrangement as claimed in claim 27 in which the end of the hollow cylinder contains a unidirectional air valve adapted to allow air to pass between the cylinder and the atmosphere.

29. A yarn cutting arrangement of the kind referred to comprising a hook member adapted to engage in its hook the yarn to be cut, a body member, said hook member being slidably supported in said body member, a non-cutting member mounted on said body member and bearing on the other side of the hook member, and arms laterally attached to said hook member and adapted to cooperate with the sley of the loom so that the sley when moving before an empty pirn is ejected from the loom forces the hook member into said body member said non-cutting member thereby advancing to the yarn to hold the yarn between itself and the side of the hook and said cutting member advancing to the yarn to cut the yarn between shears formed by the cutting member and said other side of the hook, resilient means adapted to oppose the hook member as it is forced into said body member, and to restore said hook member when due to the motion of the loom the sley no longer cooperates with said arms to force the hook member into said body member, the part of said body member acting to support said hook member being in the form of a tube closed at one end, a unidirectional air valve in the end of the tube communicating in the one way between the inside of the closed tube and the atmosphere, and the walls of the tube defining restricted air inlet means.

30. A yarn cutting arrangement as claimed in claim 29 in which there is a holding member, said body member being mounted in said holding member to remain substantially stationary during the cutting and holding action, said laterally secured arms being arranged to encounter said body member and limit entry of the hook member thereinto at the end of the cutting and holding action, so that further pressure of the sley onto said arms is transmitted to the body member, and said holding member carrying a spring connected to said body member and adapted to resiliently oppose motion of said body member under the further pressure transmitted thereto by said arms.

31. A yarn cutting arrangement of the kind referred to comprising a hook member adapted to engage in its hook the yarn to be cut, a body member, said hook member being slidably supported in said body member, a non-cutting member mounted on said body member and bearing on the other side of the hook member, and arms laterally attached to said hook member and adapted to cooperate with the sley of the loom so that the sley when moving before an empty pirn is ejected from the loom forces the hook member into said body member said non-cutting member thereby advancing to the yarn to hold the yarn between itself and the side of the hook

and said cutting member advancing to the yarn to cut the yarn between shears formed by the cutting member and said other side of the hook, resilient means adapted to oppose the hook member as it is forced into said body member and to restore said hook member when due to the motion of the loom the sley no longer cooperates with said arms to force the hook member into said body member, the part of said body member acting to support said hook member being in the form of a tube closed at one end, a unidirectional air valve in the end of the tube communicating in the one way between the inside of the closed tube and the atmosphere, said air valve being arranged to leak in its conventionally non-flow direction.

32. In combination, in an automatic loom, a yarn cutting member comprising a body member, a hook member slidably supported along part of its length in said body member and having a hook at one end, a non-cutting member secured to said body member and having its end bearing against one side of the hook member, a cutting member secured to said body member and bearing in shearing cooperation on the other side of the hook member, the arrangement being such that when the yarn to be cut enters into the hook of the hook member and the hook member slides into said body member, the non-cutting member encounters the yarn and holds it between its end and the hook member and the cutting member cooperating in a shear-like manner with the hook of the hook member thereafter encounters the yarn and cuts it.

33. In combination, in an automatic loom, a yarn cutting member comprising a hook member adapted to engage in its hook the yarn to be cut, a body member, said hook member being slidably supported in said body member, a non-cutting member mounted on said body member and bearing onto one side of the hook member, a cutting member mounted on said body member and bearing on the other side of the hook member, and arms laterally attached to said hook member and adapted to cooperate with the sley of the loom so that the sley when moving before an empty pirn is ejected from the loom forces the hook member into said body member said non-cutting member thereby advancing to the yarn to hold the yarn between itself and the side of the hook and said cutting member advancing to the yarn to cut the yarn between shears formed by the cutting member and said other side of the hook.

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