Nov. 5, 1940. K. SCHWABE 2,220,665

WEFT CUTTER FOR LOOMS

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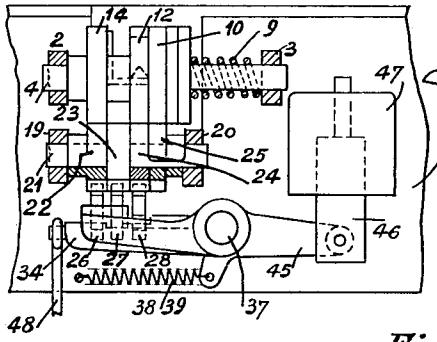


Fig.1



Fig. 4

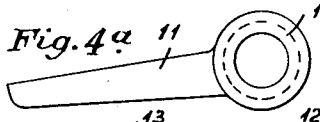


Fig. 4a

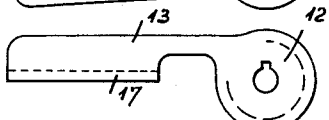


Fig. 4b

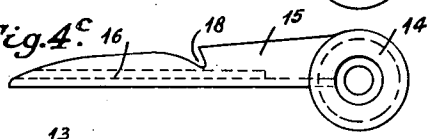


Fig. 4c

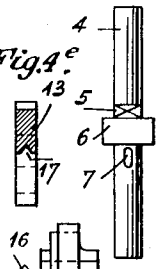


Fig. 4e

Fig. 4f

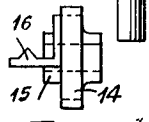
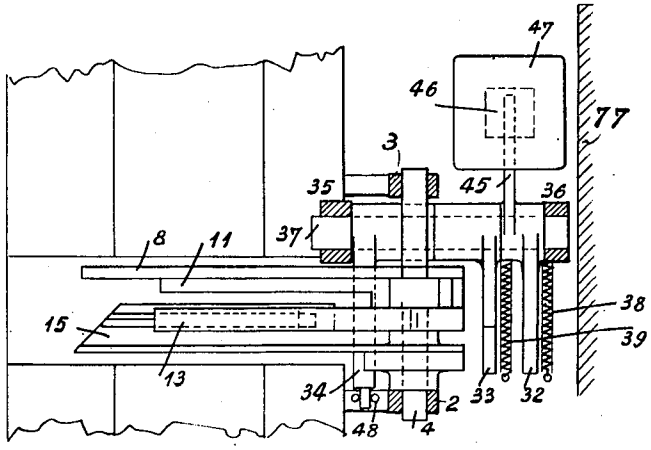


Fig. 4d

Fig. 2

Fig. 3



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Fig. 5

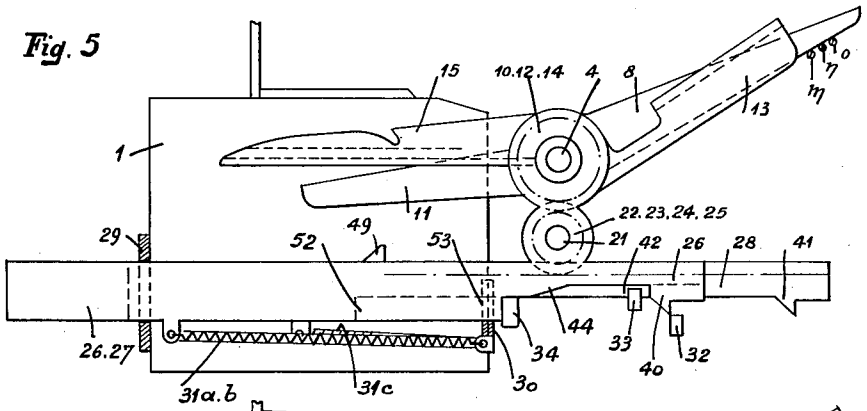


Fig. 6

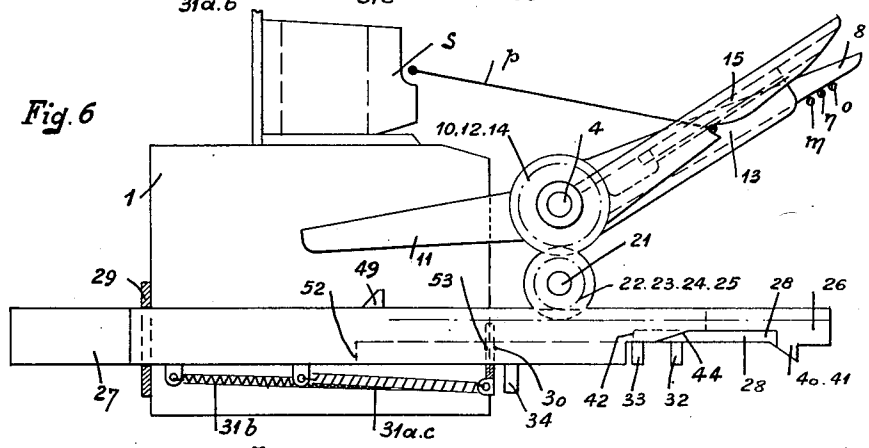
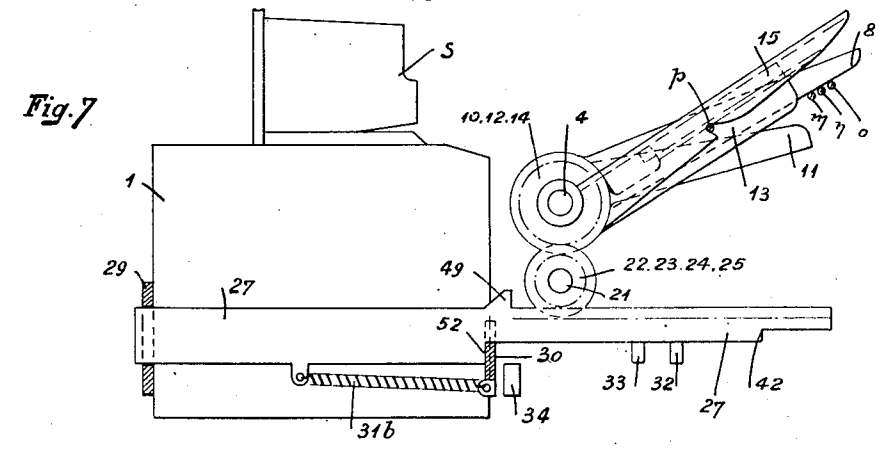


Fig. 7



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Fig. 8

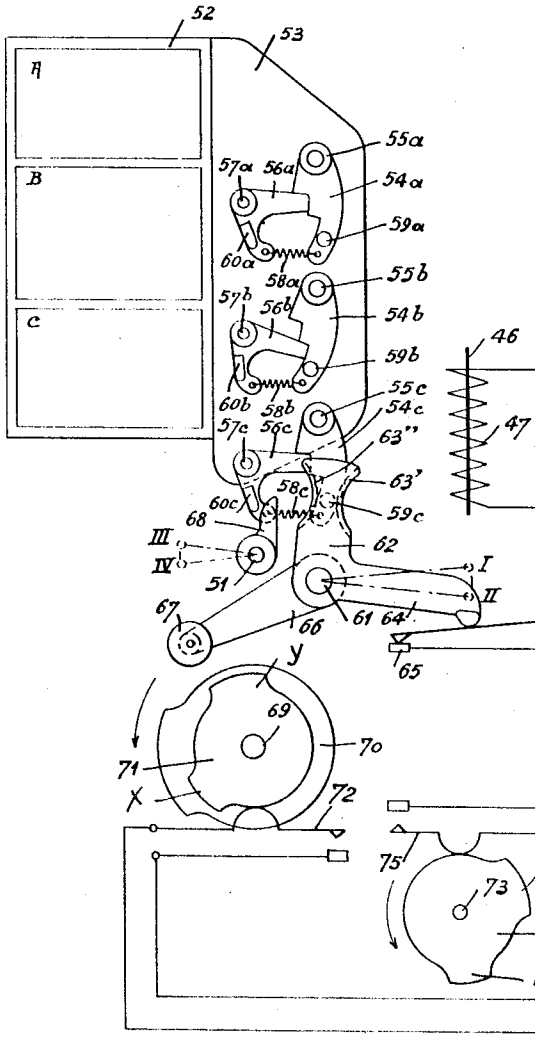
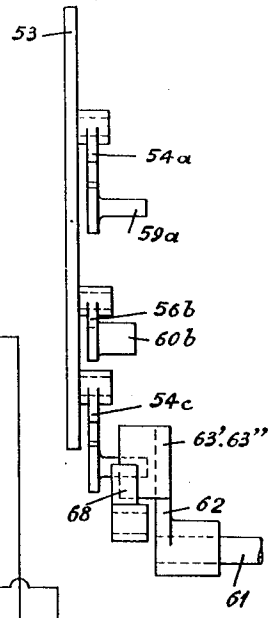


Fig. 9



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WEFT CUTTER FOR LOOMS

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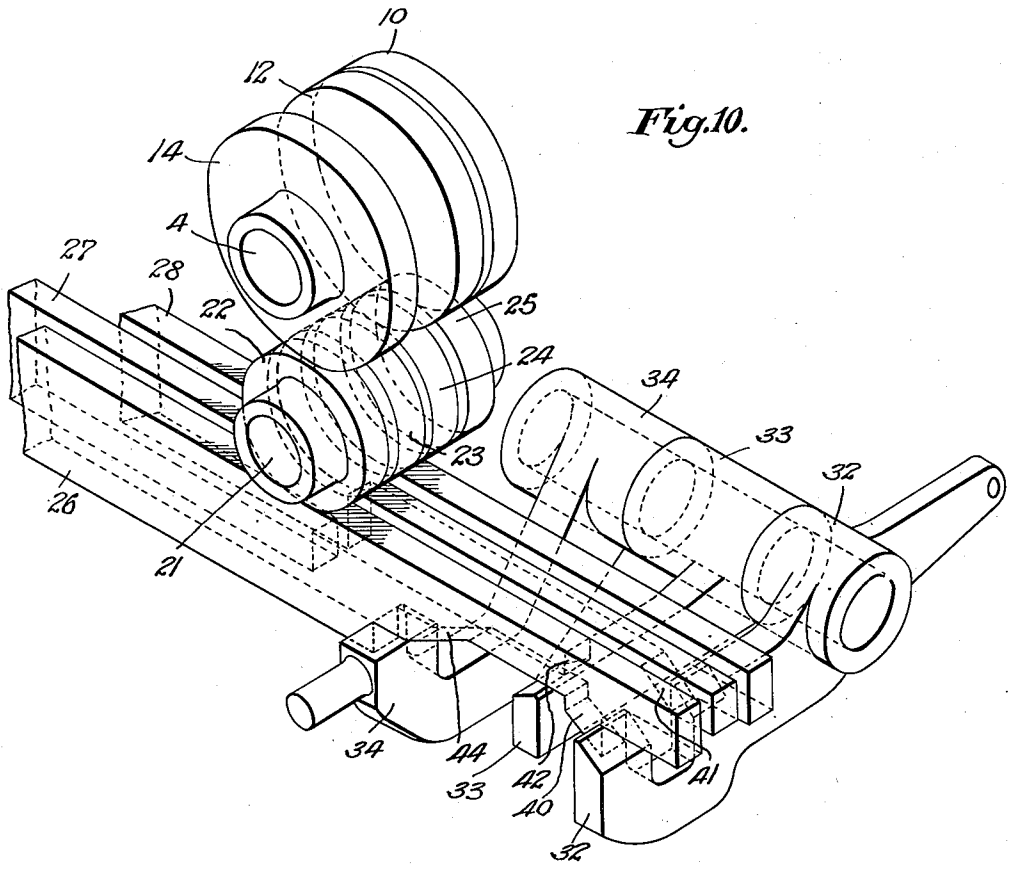


Fig.10.

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WEFT CUTTER FOR LOOMS

Kurt Schwabe, Bielitz-Bielsko, Poland

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In Germany August 12, 1936

2 Claims. (Cl. 139—263)

This invention relates to thread cutters for automatic weft-replenishing looms both of the plain or single-shuttle type and of the drop-box or multi-shuttle type. In the case of a plain or single-shuttle loom the process of cutting the old weft extending from the selvage to an exhausted shuttle and the new weft extending from the selvage to the usual weft end holder is comparatively simple since the two operations are effected on consecutive picks. In the case of a multi-shuttle loom having a series of drop-boxes on the replenishing side the process is more complicated because a newly replenished shuttle may not come into action immediately after replenishment but may remain, for an indefinite number of picks, on the replenishing side.

It is an object of the present invention to provide a cutter for mechanical looms having self-actuating bobbin or shuttle exchange, particularly for weaving looms provided with a bilateral shuttle exchange, characterized by that the cutter release is controlled by two shafts, one of which rotates at the speed of the crankshaft for the loom and the other of which is put into rotation during the bobbin or shuttle exchange, the respective times or periods of release being regulated by connecting instrumentalities (such as, for example, excentrics, cam discs and contact breakers) and eventually determined by positions of the shuttle box on the exchange side.

It is a further object of the present invention to provide a cutter for mechanical looms, wherein the said two shafts rotate independently of one another for controlling movements of the cutter.

A still further object of the invention is to provide improved thread-cutting means for an automatic weft-replenishing loom, especially one provided with a series of drop-boxes at the replenishing end.

Thread-cutting means according to the invention are characterized in that the cutter operation is controlled by two shafts one of which rotates at the speed of the loom crankshaft and the other of which is set in motion during weft-replenishment, the actual release of the cutter being determined through the medium of stepped latch devices carried by the drop-boxes at the replenishing end of the loom.

The cutter comprises three parts or groups of parts, rotatable independently of one another, one part or group acting as a thread lifter and raising the inactive weft or wefts clear of the cutter blade, the second part or group forming a thread holder and the third a cutter.

A still further object of the invention is a cutter for mechanical looms with self-actuating bobbin or shuttle exchange, in which the control of the cutter takes place at first from the cam shaft which initiates the bobbin or shuttle exchange or completes it, and then from the gear pawl which is attached to the shuttle box. By means of the bobbin or shuttle exchange, the gear pawl, which is arranged at the shuttle box compartment which is of the same height as the slay beam, is reversed. The release of the cutter is suitably effected by means of an electro-magnet which is connected, first through a contact breaker on the cam shaft and then through a contact breaker on the crankshaft or on a shaft driven from the latter. Preferably the cutter consists of three parts which are rotatable independently of each other about a common axis on the slay, or of groups of parts of which one acts as thread lifter and raises the threads which run through the other shuttle box compartment and removes them from the reach of the cutter blade, while a second forms a thread holder and a third acts as cutter.

The accompanying drawings show by way of example one embodiment of the invention:

Fig. 1 shows a vertical section of the cutter;

Fig. 2 a lateral section;

Fig. 3 a base plan of the device;

Figs. 4, 4*a*, 4*b*, 4*c*, 4*d*, 4*e*, and 4*f* indicate the separate parts of the thread cutter and holder device;

Fig. 5 illustrates the position of the cutter parts after actuation of the thread lifter;

Fig. 6 shows the position of the cutter parts after closing the thread holder device, while

Fig. 7 shows the cutter during the cutting operation;

Fig. 8 shows in lateral section the arrangement of the shuttle boxes and the gear appliance for actuating the cutter,

Fig. 9 shows a lateral view of the structure of Fig. 8, viewed from the left in Fig. 8.

Fig. 10 is an isometric view of structure shown in Fig. 5.

Referring to the drawings, a shaft 4 rests rotatably on the slay 1 in bearings 2 and 3. This shaft is shown detached in Fig. 4*f*. It has a squared part 5, a collar 6 and on the opposite side of the collar to the part 5 a key 7. One of the cutter blades 8 is slipped on to the squared part 5 and is pressed against the collar 6 by means of a pressure spring 9. On the collar 6 there is loosely mounted another or counter cutter blade 11 on the boss of which is a toothed wheel 10, whilst the key 7 holds a clamp finger

13 tightly on the shaft 4. Adjacent the finger 13 there is provided a counter finger 15 which is rotatable loosely on the shaft. The finger 15 has a projection 16 of triangular section which fits into a groove 17 of similar section in the finger 13. Its purpose is to hold the thread during pressing of counter finger 15 against clamp finger 13. The counter finger 15 has also a notch 18 for the purpose of preventing slipping down of the thread, and its boss carries a toothed segment 14. The boss of finger 13 has also a toothed segment 12.

A shaft 21 mounted in bearings 19 and 20 on the slay carries the toothed wheels 23 and 25, whilst toothed wheels 22 and 24 are loosely rotatable on shaft 21. The toothed segment 14 of finger 15 meshes with toothed wheel 22, whilst toothed wheel 24 engages with the toothed segment 12 of the finger 13 and the toothed wheel 25 meshes with segment 10 of part 11. The toothed wheels 22, 23 and 24 are connected respectively with three rack bars 26, 27 and 28 which are conducted in guides 29 and 30. These rack bars are drawn toward the right (Fig. 2) by springs 31 *a*, *b*, *c*; when at rest they are located respectively by three locking levers 32, 33, 34. The locking levers 32, 33, 34 are carried by a common axle or spindle 37 rotatable in bearings 35 and 36 on slay 1. The lever 32 is adapted to lie in the path of a nose 41 of rack bar 28, while an arm 45 associated with the lever is connected with the armature 46 of an electro-magnet 47 and is rotated clockwise by a spring 38. The locking lever 33 is adapted to lie in the path of a nose 42 on the rack bar 27 and secures the latter in its position of rest whilst said lever 33 is drawn upwards by a spring 39. The locking lever 34 is adapted to lie in the path of a shoulder 43 of the rack bar 26 and is controlled, by way of example, by means of a draw hook 48 by the movement of the slay in such a manner that at the appropriate point in the movement it removes the lever from engagement with the shoulder 43. The rack bar 27 has also a nose 49 which can engage with a short lever 50 on a shaft 51 resting rotatably on slay 1. The rack bar 26 has an inclined part 44 by means of which the locking lever 33 can be pressed down. The rack bars 27 and 28 have respective shoulders 52, 53 which are adapted to contact with the guide 30.

The shuttle box 52 (Fig. 8) has a vertical wall 53. Bolts 55 *a*, *b*, *c* extending through this wall 53 carry respective stepped latches 54*a*, 54*b*, 54*c* and bolts 57 *a*, *b*, *c* which cooperate with the latches. The stepped latches are connected with their respective locking pawls by springs 58*a*, 58*b* and 58*c* which tend to turn the locking pawls in an anti-clockwise direction and the stepped latches in a clockwise direction. The stepped latches have projecting pins 59*a*, 59*b*, 59*c* and the locking pawls have projections 60*a*, 60*b* and 60*c*. A three-armed lever 62 is carried by a stud 61 on the slay. One arm of which has guides 63' and 63'' into which pins 59*a*, 59*b*, 59*c* can fit. A second arm 64 of the lever is adapted to actuate a switch 65 and its third arm 66 a roller 67. The shaft 51 has a lever 68 adapted to engage the projections 60*a*, 60*b*, 60*c* of the locking pawls.

The gear shaft 69 by which weft replenishment is initiated or effected, rotates, by way of example, in an anti-clockwise direction, when the feeler mechanism of the loom indicates weft exhaustion. A cam 70 rests upon the shaft 69 and can engage with lever 66 through its roller piece 67, and also a second cam 71 with two cam portions *x* and *y*, which actuate a switch 72. The cam 74 with two cams *t* and *u* rests upon a shaft 73 which is coupled positively with a crankshaft of the loom for the purpose of actuating the switch 75.

The operation of the device is as follows: when the slay 1 comes forward, the three rack bars 26, 27, 28 are pressed rearwardly against the action of their respective springs 31*a*, 31*b* and 31*c* by means of the abutment 76 (Fig. 2) on the breast beam 77. The locking levers 32, 33, 34 engage behind the noses 40, 41, 42, 43, and the parts 8, 11, 13 and 15 enter a recess (not indicated) in the slay 1 so that the shuttle may pass over them. If now the slay moves away from the breast beam 77 and the loom continues to operate normally, the rack bars 26, 27, 28 are held by the locking levers 32, 33, 34 and the cutter remains at rest during one full revolution of the crank.

If however the feeler mechanism, not illustrated, indicates weft exhaustion, the gear shaft 69 is made to rotate by means of devices not here described and which are known in the art. The cam 71 closes the switch 72 by means of the cam portion *x* and causes the armature 46 of the electro-magnet 47 to be raised. The current source is indicated by RT. The raising of the armature causes the lever 32 to be turned and the two noses 40 and 41 to be released. At this moment the slay has already moved to some extent from the breast beam, so that the rack bar 28 can move frontwardly and the cutter blade 8 fixed on shaft 4 thus to be swung in a clockwise direction until the nose 53 comes into contact with guide 30. This position is shown in Fig. 5. During its swinging movement, the cutter blade 8 raises and carries frontwardly the weft threads *n* and *o* which extend from the edge of the fabric to the shuttle box compartments not in alignment with the race way, for instance compartments A and B (Fig. 8).

As above mentioned the nose 40 of the rack bar 26 was released simultaneously with the nose 41 of rack bar 28. The bar 26 could not move frontwardly by reason of the locking lever 34 which, in this position of the slay, lies against shoulder 43 (Fig. 5).

The cam portion *x* of cam 71 now permits the switch 72 to open, thus cutting off the current. The electro-magnet armature 46 falls back and at the same time the locking lever 32 comes to lie once again in the path of the nose 40 of the rack bar 26. During the next stage, by way of example, the locking lever 34 is withdrawn from engagement with shoulder 43 of the rack bar 26 through the movement of the slay, by means of the draw hook 48. At the same time the shuttle S passes into compartment or cell C and the weft *p* is laid between the opened parts 15 and 13 and 11 and 8 of the cutter mechanism. Thereafter, as soon as the cam 71, by its cam portion *y*, closes the switch 72 for a second time, the locking lever 32 releases the nose 40 of the rack bar 26, which can now swing out to the front since it is no longer impeded by the locking lever 34. The frontward movement of bar 26 causes a clockwise swinging movement of the finger 15, the weft *p* lying in the notch 18, being thereby raised and carried up to the clamp finger 13 where it is pressed, by means of the three-edged rib 16, into the corresponding groove 17 of said finger, the movement of the parts continuing until the Fig. 6 position is reached.

While the rack bar 26 is swinging forward, its incline 44 presses down the locking lever 33 which is thereby withdrawn from the reach of the nose or shoulder 42 of the rack bar 27. The bar 27 can therefore also swing out frontwardly until its shoulder 52 comes into contact with the guide 30. The frontward movement of the bar 26 causes a clockwise swinging movement of the cutter blade 11 and the latter cooperates with the blade 8 to cut the weft *p* held by the fingers 13 and 15 (Fig. 7). The weft thread remaining in the shed was, by movement of the fingers 13 and 15 drawn so far to the front as to be clear of the usual weft fork.

Weft-replenishment is now effected by known means not shown and at the same time shaft 69 continues to rotate and turns, by means of the cam 70, the lever 62 clockwise from the position I (Fig. 8) to position II against the action of a spring which is not shown. By this movement of lever 62 the stepped latch 54*c*, the pin 59*c* of which is at this moment between the guides 63' and 63'', is turned anti-clockwise, so that the cooperating locking pawl 56*c* can, as shown, engage in the upper step of the latch.

Should it now occur that the replenished shuttle is not immediately picked back to the other side of the loom but remains for a longer time on the replenishing or exchange side, the pin 59*c* of the stepped latch 54*c* is removed, as the shuttle boxes fall from between the guides 63' and 63'' and the pin of another latch, for instance, that of latch 54*b* is brought into engagement.

Position II of the lever 62 corresponds, for each shuttle box compartment, to a raised position of the respective stepped latch 54*a*, 54*b* or 54*c*, whilst the position I of the lever 62 corresponds to a dropped stepped latch. In the position II of the lever 62, the switch 65 is closed, while in the position I it remains open. If now, by means of cam 74 on crankshaft 73, the switch 75 and thus the entire current circuit is closed, the same operation takes place as was previously initiated through the cam 71 by the closing of the switch 72, while the gear shaft 69 is rotating, with the difference however that in this case the shuttle does not come from the feeler side, but from the replenishing side, and that it is not the exhausted weft end which is cut, but the new weft end. It is therefore quite immaterial after how many picks the replenished shuttle comes into action because the switch 65 is only closed when the pin of the raised stepped latch 54*a*, 54*b* or 54*c* corresponding to the shuttle box compartment, containing the replenished shuttle engages in the guides 63' and 63''. The usual temple cutters, which serve the purpose of cutting the incoming weft, are, by means of the invention rendered unnecessary.

When the rack bar 27 swings out to the right (forwardly), the nose 49 engages the short lever 50, causes the shaft 51 to partially rotate and turns the lever 68 anti-clockwise out of position III (Fig. 8) into position IV. The lever 68 therefore presses against the projection 60*a*, 60*b* or 60*c* of the corresponding locking pawl 56*a*, 56*b*, or 56*c* concerned and turns said pawl clockwise so that it engages in the lower step of the cooperating stepped latch 54*a*, 54*b* or 54*c*.

I claim:

1. Thread-cutting mechanism for automatic weft replenishing looms having a lay, comprising cutting mechanism supporting means on said lay, a shaft rockably mounted in said supporting means, a cutter, a pair of fingers coaxially mounted for lifting inactive weft and shifting said weft out of reach of said cutter, a member cooperable with one of said fingers for clamping the weft to be cut, the other of said fingers being cooperable with said cutter for cutting said clamped weft, said fingers being fixed to said shaft to rotate therewith, said member and said cutter being independently rotatable about said shaft, and means for rotating said fingers, cutter and member for first lifting and shifting said inactive weft, then clamping the weft to be cut, and finally cutting the last-mentioned weft.

2. Thread-cutting mechanism for automatic weft replenishing looms having a lay, comprising cutting mechanism supporting means on said lay, a shaft rockably mounted in said supporting means, a cutter, a pair of fingers coaxially mounted for lifting inactive weft and shifting said weft out of reach of said cutter, a member cooperable with one of said fingers for clamping the weft to be cut, the other of said fingers being cooperable with said cutter for cutting said clamped weft, said fingers being fixed to said shaft to rotate therewith, said member and said cutter being independently rotatable about said shaft, means for rotating said fingers, cutter and member for first lifting and shifting said inactive weft, then clamping the weft to be cut, and finally cutting the last-mentioned weft, and cam means for synchronously operating said rotating means.

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