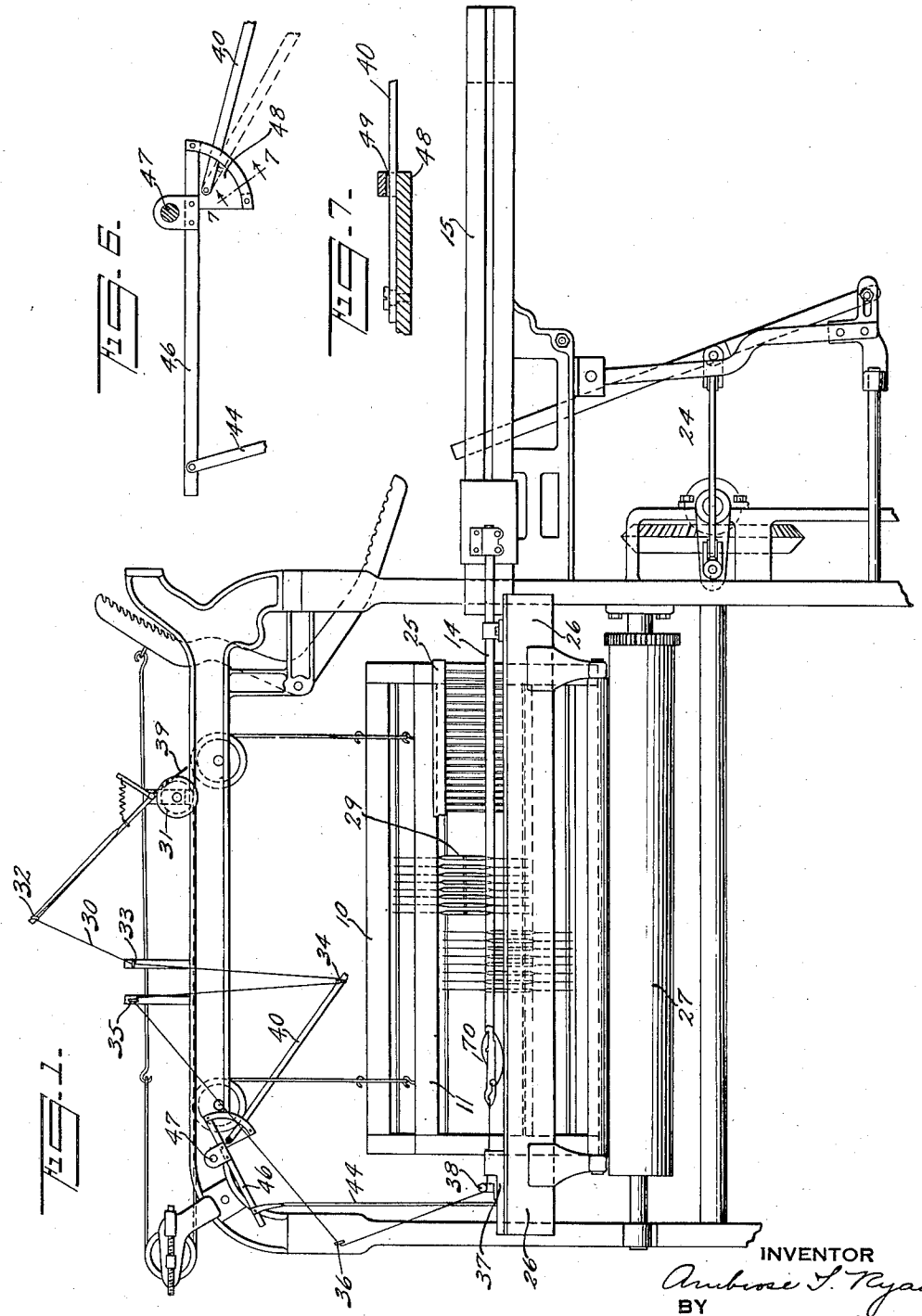
Dec. 3, 1935. A. T. RYAN 2,022,741

METHOD OF AND APPARATUS FOR WEAVING FABRIC WITH FLAT FILLING STRIPS

Filed Oct. 8, 1930 4 Sheets-Sheet 1



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FIG. 2.

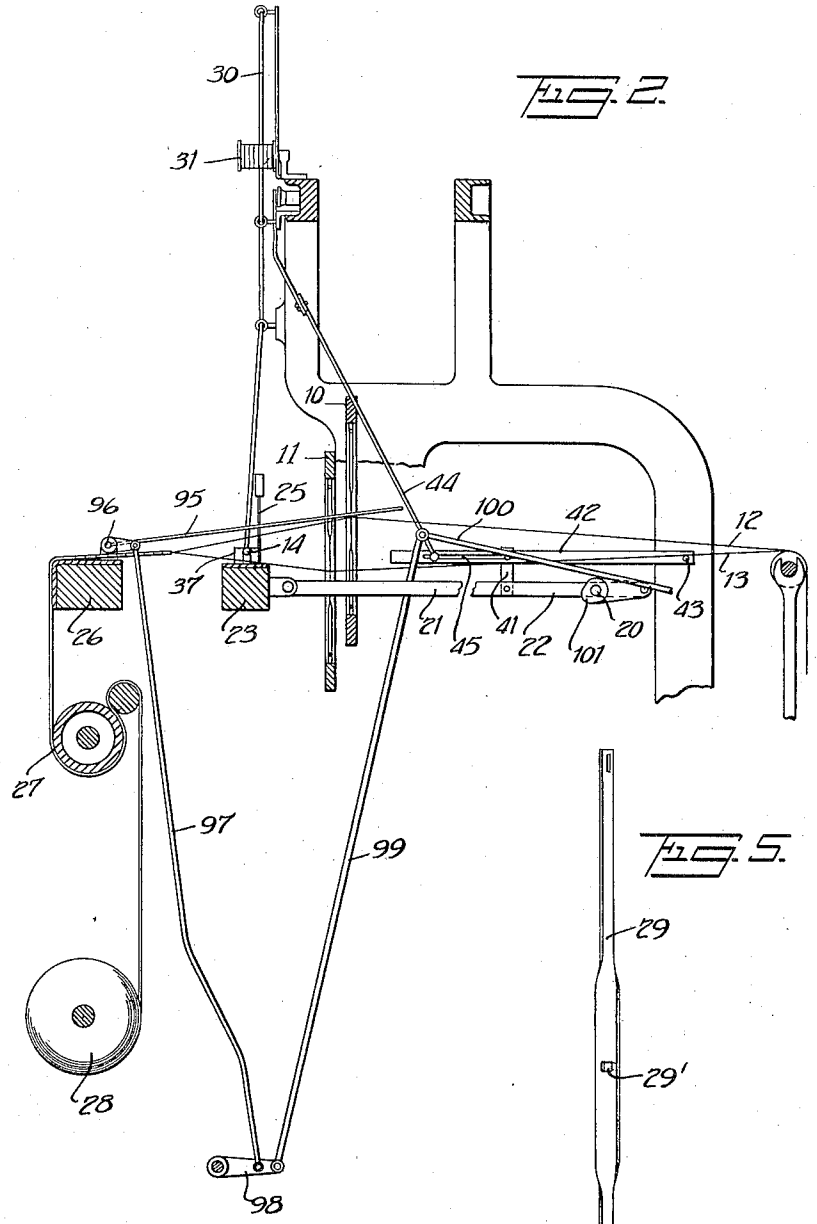


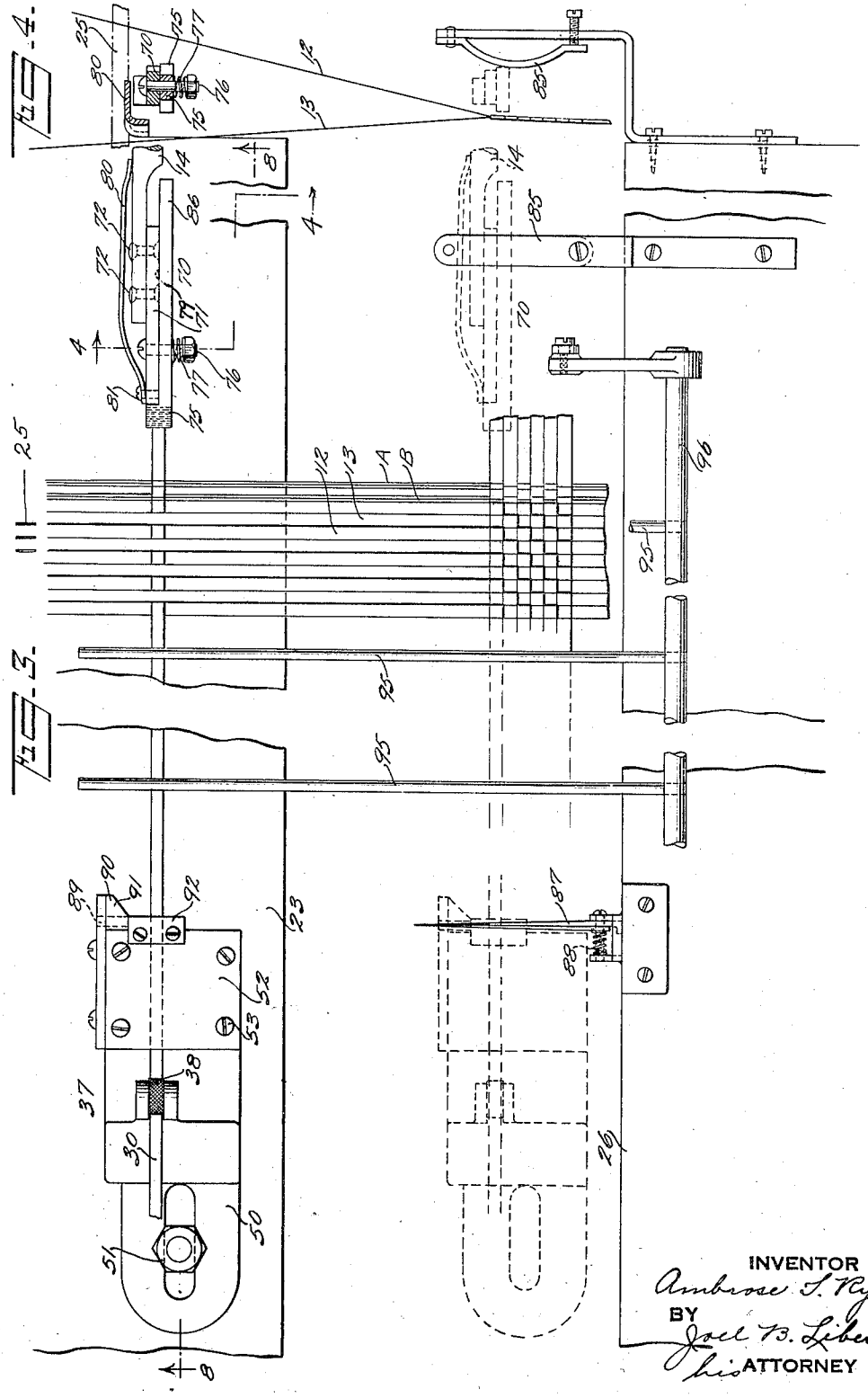
FIG. 5.

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METHOD OF AND APPARATUS FOR WEAVING FABRIC WITH FLAT FILLING STRIPS

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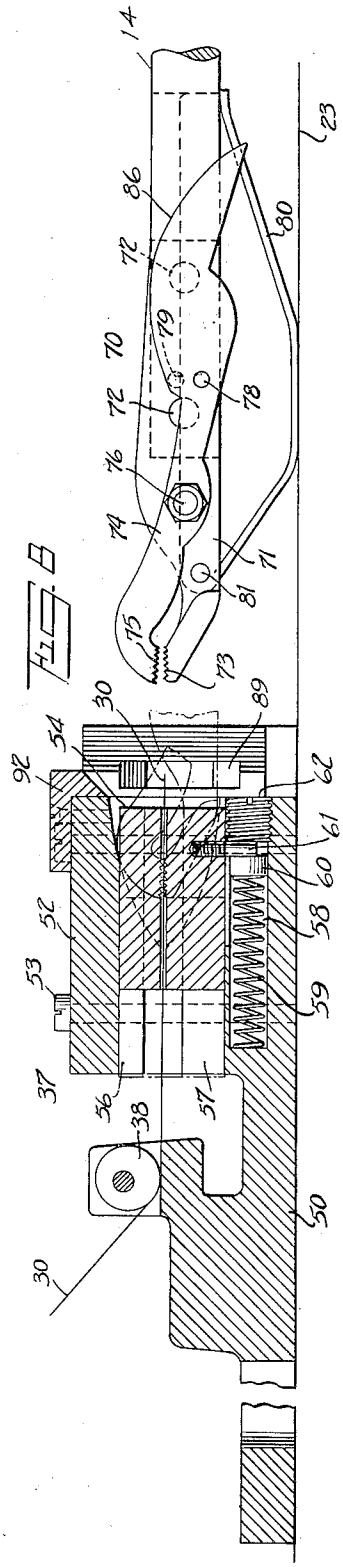


FIG. 8

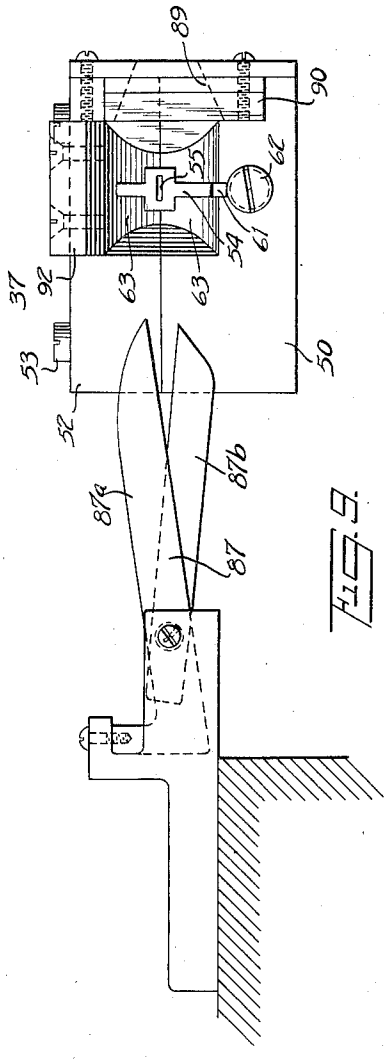


FIG. 9

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METHOD OF AND APPARATUS FOR WEAVING FABRIC WITH FLAT FILLING STRIPS

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Application October 8, 1930, Serial No. 487,160

15 Claims. (Cl. 139—127)

The present invention relates to methods of and apparatus for weaving fabric with flat filling strips, and is more particularly directed toward the weaving of fabric out of non-rigid filling material, such as, ribbon, leather strips, strips of artificial leather, and the like.

According to the present invention, these filling strips are interwoven with the warps but remain absolutely flat. They are not crushed or distorted sideways and are therefore visible for the full width without distortion except when they are covered by the warp threads. These warp threads may be similar strips of flat material of the same or contrasting color, so that the finished fabric may have a checker board appearance. Fabrics, such as these, are suitable for manufacturing a wide variety of articles, such as belts, hand bags, shoe uppers, hats, trimming and the like.

It is impossible to weave a fabric with a flat, untwisted filling in the usual loom employing a shuttle, for the movement of the shuttle back and forth produces twists in the filling as it is carried through the shed. It has, therefore, been the general practice, when flat fabric was desired, to weave it by hand, taking great care to keep the filling strips flat and to beat them up without crushing the same.

The present invention contemplates the adaptation of a loom for weaving fabric out of flat filling material, maintaining the material absolutely flat during the operation and beating it up in such a manner that it is not crushed or distorted, thereby producing a fabric having a smooth even appearance and presenting the desired checker board effect.

The accompanying drawings show one form of apparatus for carrying out the process and illustrate the weaving of the fabric, it being understood that these drawings are merely illustrative of the invention rather than limiting the same.

In these drawings:

Figure 1 is a front elevational view of a loom adapted for weaving flat fabric, the shed being open and the pick of filling about to be drawn through the shed;

Figure 2 is a diagrammatic sectional view taken lengthwise of the loom;

Figure 3 is a top plan view of the lay, breast beam, and associated parts;

Figure 4 is a sectional view taken on the broken line 4—4 of Figure 3;

Figure 5 illustrates the heddle;

Figure 6 is an enlarged detail view showing part of the pull-off and tension mechanism;

Figure 7 is a fragmentary sectional view on the line 7—7 of Figure 6;

Figure 8 is a section along the line 8—8 of Figure 3; and

Figure 9 is an elevational view taken in the direction of the arrow 9 of Figure 3.

As shown in the drawings, the loom may be of a conventional type, adapted for carpet weaving and having the usual mechanism for actuating the harnesses, indicated at 10 and 11, to shed the warp, indicated at 12 and 13, and actuate the lay rod 14, guided in the usual race way 15. The crank shaft of the loom is indicated at 20, and through the usual pitmen 21 and 22 it is adapted to actuate the lay 23. The lay is connected with the race way 15 and with the operating mechanism for the lay bar, indicated generally at 24, so that the lay and operating mechanism for the lay bar 14 may be moved backward and forward as the crank shaft rotates. The lay 23 carries the usual reed 25 provided for beating up the filling. The breast beam is indicated at 26, the sand roll at 27, the cloth roll at 28. The sand roll is operated by the usual take up mechanism of the loom, not shown, to advance it an amount equalling the width of one pick of filling. This take up mechanism will operate comparatively rapidly, for the filling material may have very substantial width. The warps 12 and 13 are carried over the warp beam and through the harnesses and reed and carried about the sand roll in the usual manner.

The heddles 29, as shown in Figure 5, have a rectangular, preferably square, eye 29', adapted to hold the flat warp flat and prevent its distortion out of the desired plane. These heddles may be made by taking a flat strip of metal, twisting it so that the mid-portion is at right angles to the ends, the mid-portion being provided with a square opening, as indicated.

The filling material 30, such as, ribbon, artificial leather, or other flaccid flat material, is carried in a suitable source of supply, such as a spool 31, shown for convenience as being supported on the front upper part of the loom frame. The filling strip 30 is passed through stationary eyes 32 and 33, a movable eye 34, and stationary eyes 35 and 36, and through checking and sustaining mechanism indicated at 37 and shown in detail in Figure 8. This mechanism includes an eccentrically mounted roller 38 under which the filling 30 passes, this roller acting as a check to prevent backward movement of the filling, and a device through which the filling strip extends so

that a free exposed tip is available, as will be described.

A spring actuated brake 39 applies friction or drag to the spool and prevents over run of the spool when the material is suddenly drawn off the spool by the actuation of the pull off lever 40 which carries the movable eye 34. The mechanism which actuates the lever 40 to pull a length of filling material off the spool carrying the supply mass is under the control of the rear or left pitman 22 and is shown in Figures 1 and 2. As here shown, this rear pitman 22 has an upwardly extending strip 41 (which may be adjustable along its length, if desired), and is connected to a lever 42, pivoted at 43. The lever 42 is connected to a two part link 44, adjustable along the slot 45. The upper end of the link 44 is connected with a lever arm 46, pivoted at 47 to the frame of the loom. The arm 46 carries a sector indicated at 48, and this sector pivotally supports the arm 40, the arm passing through a slot 49, as indicated in Figures 6 and 7.

The operation of this pull-off and tension mechanism is such that a fresh supply of filling material is drawn off the spool when the pitman returns the reed from the cloth line to the rear position. During this time the link 44 has moved up, thereby raising the arm 46 from the position shown in Figure 1 to an elevated position, such that the upper part of the slot 49 engages the arm 40 to swing it down to the position indicated in Figure 1. As the end of the strip 30 is held under the check roller 38, this mechanism acts to draw material off the spool 31. The lay arm 22 then moves to the open shed position, pulling the arm 44 and lever 46 downwardly without lifting the arm 40, so that the arm 40 acts to hold the material taught, but is free to be raised when the filling material is drawn into the shed, as will now be described.

The check and filling sustaining mechanism 37 is shown more in detail in Figures 3, 8 and 9. This device has a base 50, adapted to be secured to the lay by a bolt 51. A cover block 52 is secured to the base by screws 53. A slider 54 is mounted between the base and cover plate. This slider appears more clearly in Figure 9 and has a central hole or slot 55 to accommodate the filling material 30. The upper part of the slider 54 is carried in a guide way 56, cut in the upper block, while the lower part of the slider 54 is carried in a guide way 57, cut in the upper face of the base 50.

The base 50 is drilled, as indicated at 58, to accommodate a spring 59 and follower 60, while the slider 54 has a downwardly extending pin 61, carried between the follower 60 and an adjustable screw 62. The spring 59 urges the slider forward to the full line position indicated in Figure 8, and its exact position may be adjusted by the screw 62. The outer or right hand face of the block 50 and cover plate 52 are provided with a tapering recess or mouth indicated at 63 which may be made by milling away the material from the upper face of the base and the lower face of the cover plate.

The filling material projecting from the slider, as indicated in Figure 8, is drawn through the open shed of the loom by a nipper mechanism 70, carried on the inner or left end of the lay bar 14. The inner end of this bar carries a stationary jaw member 71 which may be secured to it by two rivets 72. This jaw member has a stationary serrated edge 73, as shown. The movable jaw member of the nipper mechanism is indicated at 74. It has a serrated jaw 75 arranged above the lower stationary jaw 73. The movable jaw is pivoted on a bolt 76 carried by the stationary jaw 71 and is pressed toward it by a coiled spring 77. The movable jaw member carries a pin 78 projecting toward the jaw member 71, adapted to enter into one of two shallow recesses 79 in the stationary jaw so that the jaws will be held either open or closed by the spring 77. The spring 77 permits the movable jaw to move along the bolt 76 so that the pin may be moved out of one recess and brought opposite the other into which it then enters.

The nipper mechanism carries a stationary guard 80 secured to the stationary jaw by a screw 81. This guard is adapted to traverse the upper surface of the lower shed and holds the stationary jaw 73 at a predetermined elevation.

When the jaws 75 and 73 enter into the mouth provided by the cut out portion 63, the open jaws pass by the exposed end, or tip, of the filler strip 30, engage the slider 54 and push it back against the pressure of the spring. Soon, however, the jaws engage with the top and bottom walls of the mouth 63, which causes the upper jaw to move down and close onto the material. During this movement of the jaw, the pin 78 will have moved out of the lower recess, tensioned the spring 77, and moved on over and into the recess 79 where it is held under tension by the spring 77, so that there can be no tendency for the jaws to spring open. The nipper may then continue its leftward movement, the parts being adjusted so that they do not interfere and the check roller being so close that the filling strip does not kink.

On the return movement of the lay bar, the nipper will be drawn rapidly to the right, drawing the strip of filling material through the open shed. It will be guided by the sliding block 54 and the nipper will be held taught against the tension of the tensioning mechanism and take up. This sudden movement will cause the tension arm 40 to swing upwardly to permit the free movement of the filling material. At the end of the stroke of the lay rod 14, the loom functions to beat up the pick of filling which has been inserted. The lay moves toward the breast beam, bringing the reed and pick of filling up to make cloth at the cloth line.

The filling material is held by the nipper mechanism during the beating up movement so that the filling is not wrinkled or twisted. The nipper releasing mechanism is actuated just as the end of the stroke of the lay is reached. The nipper release mechanism employs an adjustable stationary cam 85 (see Fig. 4) which engages with the upper surface 86 of the movable nipper jaw mechanism. The adjustment is made so that the goods are held between the nippers until just prior to the completion of the beat up movement of the lay. The goods are therefore beaten up while under tension. There is sufficient give to the cloth and to the unwoven end of the filling adjacent the nipper to allow the lay to move the small amount required to effect the release of the nipper mechanism. At the same time the other end of the strip has been carried between a pair of shears indicated at 87. These shears have one stationary blade 87*a* and a movable blade 87*b* normally held open by a spring 88. The shears are placed so as to clear the front face of the block 52 and enter into an opening 89 cut through a striker plate 90. This tapered opening causes the shears to close, cutting off the pick of filling material just prior to the completion of

the beating up movement of the lay, thereby leaving a tip for the next operation and permitting the lay to return without destroying the cloth made.

The striker plate has a bevelled surface, indicated at 91, to engage the jaws of the nipper mechanism, should they swing too far to the rear and guide the nipper mechanism into the mouth 63. Likewise, a guide plate 92 is secured to the cover plate 52, and it acts to guide the nippers down into the mouth 63. By thus guiding the nippers into place, the parts become properly aligned so that the nipper will grasp the free end of the filling material, thereby taking care of any bending of the rod 14 which is supported solely from its rear end.

In order to prevent twisting or crushing of the pick of filling while it is being beaten up, the loom is provided with auxiliary pressure applying mechanism adapted to act on the filling during the beating up operation. This mechanism, as here shown, takes the form of a number of small rigid wires 95, carried on a long shaft 96, supported from the breast beam and under which the finished cloth is adapted to pass. These wires extend out through the reed and are held in an elevated position, as shown in Figure 2, when the shed is open. During the beating up operation, however, these wires are swung down against the top of the lay so as to press the cloth being formed against the lay. The shaft 96 is operated by a link 97 which extends down to a suitable crank arm 98, carried near the bottom of the machine. This arm is connected by a rod 99 with a lever 100 pivoted to the frame and actuated by a cam 101, carried by the crank shaft 20.

While the drawings show only two harness frames, it will, of course, be understood that the loom may be provided with the desired number of harness frames with suitable pattern forming mechanism. At the right hand of Figure 3, a number of threads are indicated at A and B. These threads may form an edge for the strip of fabric, binding it more tightly than it would be bound between the flat warps. Similar warps may be spaced across the width of the loom, if it is desired to make long strips of flat woven fabric which can be slitted or separated to form belts, hat bands or the like.

I claim:

1. In a loom for weaving cloth with flat filling and having the usual warp shedding mechanism, lay, beat up mechanism, and cloth take up mechanism, a reciprocatory bar mounted to one side of the loom and adapted to traverse the shed while it is open, a nipper carried by the bar, filling supplying mechanism including a retaining device mounted opposite the bar and adapted to present the end of the filling strip in position to be seized by the nipper, means for closing the nipper onto the end of the strip so that the nipper may draw in a pick of filling from the supply mechanism through the shed, a breast beam, a shaft carried by the breast beam above the cloth, and pressure applying devices carried by the shaft and acting on the upper surface of the filling during the beating up operation.

2. In a loom for weaving cloth with flat filling and having the usual warp shedding mechanism, lay, beat up mechanism and cloth take up mechanism, a filling supply mechanism adapted to hold a supply mass of flat filling and having pull-off means to withdraw filling from the supply mass, tension means to hold the pulled off material taut, and checking means to prevent backward movement of the filling thread by the tension means, means acting, while the shed is open, for pulling the filling strip through the shed against the pull of the tension means and without imparting twist to it, means to disengage the pulling means from the strip, and means to sever the strip in front of the checking means during the beat up operation.

3. In a loom for weaving cloth with flat filling and having the usual warp shedding mechanism, lay, beat up mechanism and cloth take up mechanism, a filling supply mechanism adapted to hold a supply mass of flat filling and having pull-off means to withdraw filling from the supply mass, tension means to hold the pulled off material taut, and checking means to prevent backward movement of the filling thread by the tension means, a reciprocatory lay bar carrying a nipper acting, while the shed is open, for pulling the filling strip through the shed against the pull of the tension means and without imparting twist to it, means to disengage the nipper from the strip, and means to sever the strip in front of the checking means during the beat up operation.

4. In a loom for weaving cloth with flat filling and having the usual warp shedding mechanism, lay, beat up mechanism and cloth take up mechanism, a filling supply mechanism adapted to hold a supply mass of flat filling and having pull-off means to withdraw filling from the supply mass, tension means to hold the pulled off material taut, and checking means to prevent backward movement of the filling thread by the tension means, means acting, while the shed is open, for pulling the filling strip through the shed against the pull of the tension means and without imparting twist to it, means to disengage the pulling means from the strip, and means to sever the strip in front of the checking means during the beat up operation, and pressure applying mechanism acting on the filling strip during the beat up operation for pressing it against the upper surface of the lay.

5. In a loom, a lay, a lay bar carrying a nipper and adapted to be reciprocated through the shed, a filling supply mass comprising a strip of flat filling material of indefinite length and without twists, a filling guide carried by the lay and through which the end of the filling strip projects in a position to be seized by the nipper, tension mechanism to apply tension to the filling being drawn in, a check to prevent backward movement after cut-off, pull-off mechanism to draw a supply of filling material from the mass, means to close the nipper onto the strip to permit its being drawn through the shed to form a pick of filling, beat up mechanism for beating the pick to form cloth, and nipper release and strip cut-off mechanism operating just before the beat up mechanism completes its beat up movement.

6. In a loom for weaving fabric with flat filling taken from a supply mass in which it is free of twists, a lay, a filling end sustaining device carried by the lay and adapted to support the end of the filling strip with the tip projecting therefrom toward the shed of the loom, tensioning means between the supply mass and the sustaining device for maintaining the filling under tension, a nipper reciprocating through the open shed, means to close the nipper onto the tip of the filling to permit the nipper to draw the same through the shed and form a pick of filling, cut-off means to cut the filling strip in front of the sustaining device to leave a projecting tip, and a

check to prevent return movement of the filling after cut-off.

7. In a loom for weaving fabric with flat filling taken from a supply mass in which it is free of twists, a lay, a filling end sustaining device carried by the lay and adapted to support the end of the filling strip with the tip projecting therefrom toward the shed of the loom, a nipper reciprocating through the open shed, means to close the nipper onto the tip of the filling to permit the nipper to draw the same through the shed and form a pick of filling, cut-off means to cut the filling strip in front of the sustaining device to leave a projecting tip, a check to prevent return movement of the filling after cut-off, and pull-off and tension mechanism to draw a length of filling material from the supply mass and hold it under tension while it is being drawn into the shed.

8. In a loom for weaving fabric with flat filling taken from a supply mass in which it is free of twists, a lay, a filling end sustaining device carried by the lay and adapted to support the end of the filling strip with the tip projecting therefrom toward the shed of the loom, a nipper reciprocating through the open shed, the sustaining device including a movable guide engageable by the nipper and having a tapering mouth adapted to close the nipper onto the tip of the filling to permit the nipper to draw the same through the shed and form a pick of filling, cut-off means to cut the filling strip in front of the sustaining device to leave a projecting tip, and a check to prevent return movement of the filling after cut-off.

9. In a loom for weaving fabric with flat filling, a filling pull-off mechanism comprising a plurality of fixed and movable guides through which a strip of flat filling material is threaded, a check device carried by the lay of the loom and through which the filling material is also threaded, a pitman, and pitman operated means for actuating the movable guide to pull the material off the supply, the movable guide being driven through a lost motion connection so that it acts to tension the material drawn off.

10. In a loom for weaving fabric with flat filling, a filling sustaining device including a fixed body member carried by the lay near one end thereof and having a guiding member through which the filling strip freely passes, the guiding member being slidable in the body in a direction lengthwise of the lay, the body having a tapering mouth on the front side thereof and into which the tip of the filling strip projects from the guide.

11. In a loom for weaving fabric with flat filling, a filling sustaining device including a fixed body member carried by the lay near one end thereof and having a guiding member through which the filling strip freely passes, the guiding member being slidable in the body in a direction lengthwise of the lay, the body having a tapering mouth on the front side thereof and into which the tip of the filling strip projects from the guide, and a reciprocatory nipper having jaws to engage the guiding member and push it backward and engaging the tapered mouth to cause the jaws to close onto the tip.

12. In a loom for weaving fabric with flat filling, a filling sustaining device including a fixed body member carried by the lay near one end thereof and having a spring protractable guiding member through which the filling strip freely passes, the guiding member being slidable in the body in a direction lengthwise of the lay and held against a stop, the body having a tapering mouth on the front side thereof and into which the tip of the filling strip projects from the guide, and a reciprocatory nipper having jaws to engage the guiding member and push it backward and engaging the tapered mouth to cause the jaws to close onto the tip.

13. In a loom for weaving fabric with flat filling, a filling sustaining device including a fixed body member carried by the lay near one end thereof and having a guiding member through which the filling strip freely passes, the guiding member being slidable in the body in a direction lengthwise of the lay, the body having a tapering mouth on the front side thereof and into which the tip of the filling strip projects from the guide, a reciprocatory nipper having jaws to engage the guiding member and push it backward and engaging the tapered mouth to cause the jaws to close onto the tip, and a check adjacent the guiding member and preventing backward movement of the strip as the guiding member is pushed backward.

14. In a loom for weaving fabric with flat filling, a filling sustaining device including a fixed body member carried by the lay near one end thereof and having a guiding member through which the filling strip freely passes, the guiding member being slidable in the body in a direction lengthwise of the lay, the body having a tapering mouth on the front side thereof and into which the tip of the filling strip projects from the guide, a stationarily supported shear, and shear operating means for cutting a strip of filling drawn from the sustaining device to provide the projecting tip.

15. In a loom for weaving fabric with flat filling, a device for holding the filling flat during beating up, comprising pressure applying members supported on a shaft carried by the breast beam of the loom and projecting through the reed of the loom, and means operating during beating up for actuating the shaft to bring the pressure applying members down against the cloth being formed to press it against the lay, the shaft being moved to raise the members above the upper part of the shed to permit the insertion of the next pick of filling.

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