

Aug. 8, 1933.

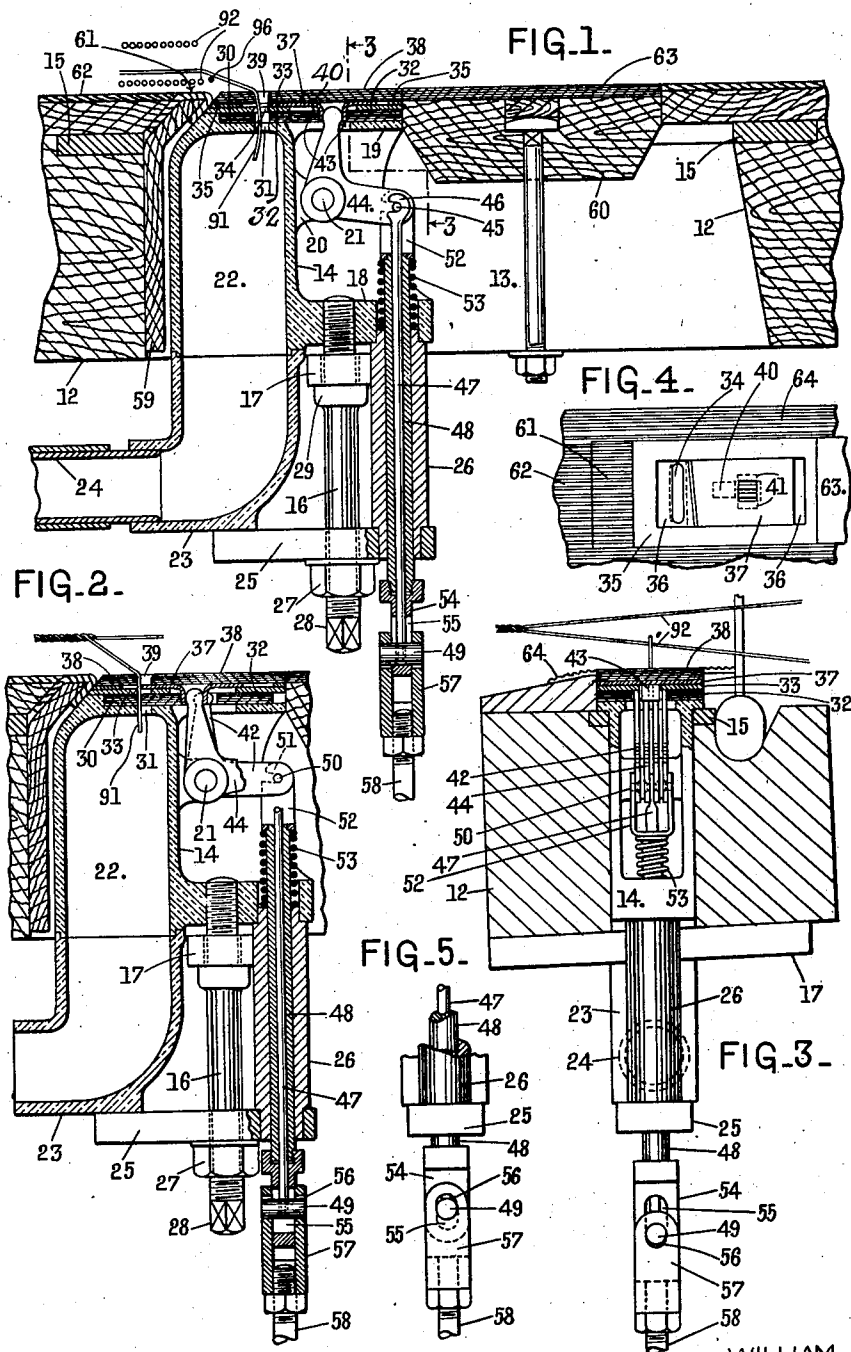
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1,921,396

LOOM HAVING A STATIONARY WEFT SUPPLY

Filed March 30, 1931

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 6.

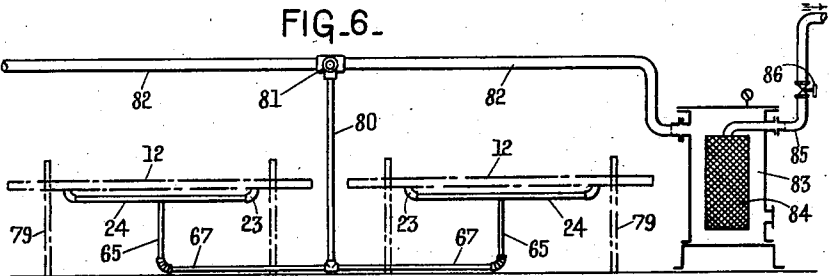


FIG. 7.

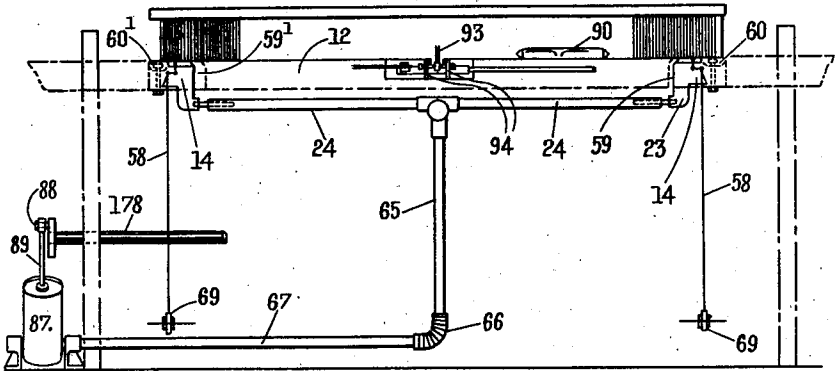
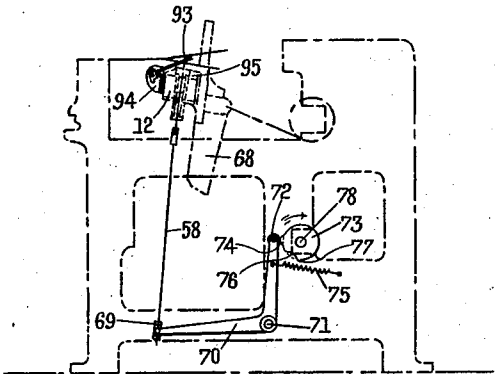


FIG. 8.



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LOOM HAVING A STATIONARY WEFT
SUPPLYWilliam Pool, Spondon, near Derby, England, as-
signor to Celanese Corporation of America, a
Corporation of DelawareApplication March 30, 1931, Serial No. 526,317,
and in Great Britain May 9, 1930

14 Claims. (Cl. 139—127)

The present invention relates to looms for the weaving of fabrics, and in particular to looms in which the weft is supplied from a stationary weft supply, and laid in lengths within the shed.

5 The object of the present invention is to enable weft picks to be laid straight within the shed until they are beaten up. A further object is to apply tension to straighten the picks and also to control the degree of tension applied.

10 A still further object of the invention is to enable a weft stop mechanism to be used to stop the loom in the event of breakage or lack of tension, or failure to insert a pick.

15 According to the invention, means are provided to hold a pick straight within the shed during beat-up. Thus, a gaseous current may be applied to the pick after it has been inserted in the shed to impart sufficient tension to the pick. For example, a suction aperture may be provided
20 near to the edge of the sheet of warps so that on release of the pick from the weft carrier, the end of the inserted pick is drawn into the aperture. Or again, a trapping device or devices may be provided to receive the end or ends of the
25 pick and maintain the pick straight during beat-up, and a gaseous current applied by suction or otherwise may be used to cause the end or ends of the pick to enter the trapping device or devices. Thus, a suction aperture may be provided
30 with a shutter or flap which traps the end of the pick against the side of the aperture, after the end has been drawn into the aperture. Pick-holding means may be provided at each side of the loom, for operation as hereafter described.

35 After the pick has been caught by a trapping device or devices, its tension may be adjusted by means which engage the thread at a point outside the width of the fabric and deflect it to a predetermined extent. For example a tensioning
40 thread or cord may be lifted into engagement with the pick by a suitably operated lever or heald mechanism; or a lever may be pivoted on the sley and actuated to lift the pick for the same purpose. The movement of the sheet of warps
45 during the closing of the shed may be arranged to maintain or even to increase the tension in the trapped pick during beat-up.

One or more weft forks may be provided to stop the loom in any known manner on breakage, slackening of the pick, or failure to insert a pick.
50 It is preferred, however, to use a single weft fork.

Provision may be made for trimming the edge of the fabric by severing the projecting weft ends, and the trimmings may be removed away from
55 the fabric by an air current, e. g. the current em-

ployed for tensioning the picks. Thus, a knife may be fitted close to each trapping device, and may conveniently be operated by the same means as those used to actuate its trapping device, or by separate means.

The suction aperture and trapping device may be comprised in an attachment adapted to be fitted to or in the shuttle race of the loom, and the cutting device may likewise be carried by the attachment.

The invention is particularly suited for use in looms in which the weft is laid from one or both sides of the loom by means of a dummy shuttle, and may be used both when the weft is laid in single pick lengths or in double pick lengths of
70 "hairpin" form, in which each limb occupies a separate shed. It may, however, be used in connection with other forms of weft-inserting devices, and also in cases where more than one pick is inserted in each shed.

The invention will now be described in greater detail, with reference to the accompanying drawings, but it is to be understood that the following description is given by way of example only and is in no way limitative.

Fig. 1 is a vertical cross-section through one end of the shuttle race of a loom, showing in detail the elements of associated trapping and cutting devices and their operating mechanism;

Fig. 2 is a view similar to Fig. 1, showing the parts in a different operative position;

Fig. 3 is a part cross-section taken on the line 3—3 of Fig. 1;

Fig. 4 is a plan view of part of Fig. 1, with a part removed;

Fig. 5 is a side elevation of a part of Fig. 2;

Fig. 6 is a diagrammatic representation showing the connection of a number of looms with a suction vessel and receiver; and

Figs. 7 and 8 are front and end elevations respectively of a loom fitted with the trapping and cutting devices show in Figs. 1 to 5.

Referring to Fig. 1, 12 is a wooden shuttle race in which a recess 13 has been cut from top to bottom in the neighborhood occupied by the edge of the fabric. This recess accommodates a casting 14 which rests on a slotted plate 15 let into the shuttle race round the upper edge of the recess 13, and is clamped thereto by means of a stud 16 passing through a bridge piece 17 into a lug 18 on the housing. The upper surface of the casting 14 is formed with a horizontal extension 19 adapted to support various parts which will be referred to later, and with bearing lugs
20 to carry a pivot pin 21. The casting is also

formed with a hollow chamber 22 extending downwardly to the base of the shuttle race.

A hollow casting 23 is mounted below the casting 14 so as to form a continuous passage from the chamber 22 leading to a pipe 24 mounted below the shuttle race and parallel thereto. A bridge piece 25 bears at one end against the underside of the casting 23, and between its other end and the end of the lug 18 is mounted a hollow sleeve 26 which is spigotted at each end to enter borings in the lug 18 and the piece 25. The piece 25 is tightened against the casting 23 and the sleeve 26 by means of a nut 27 on the stud 16, the stud also having a square end 28 to enable it to be turned to tighten the bridge piece 17 against the underside of the shuttle race, a shoulder 29 being provided on the stud for this purpose.

Mounted on the upper surface of the flange 19 of the casting 14 is a fixed pad 30 of fibre, celluloid, cellulose acetate, or like material whose free edge coincides with one edge of a slot 31 communicating between the upper side of the casting 14 and the chamber 22. A slide 32 of celluloid, cellulose acetate, or similar material is arranged on the flange 19, and is movable so as to abut against the free edge of the pad 30 to cover the slot 31. The abutting edges of the pieces 30, 32 may be serrated or roughened.

Immediately above the parts 30 and 32 is a sheet steel plate 33 having an aperture 34 immediately above the aperture 31. Above the plate 33 is a plate 35 having a rectangular opening 36 containing a slidable knife blade 37. Finally, there is a further plate 38 of celluloid or similar material having an aperture 39 above the apertures 34 and 31 and having its top surface flush with the surface of the shuttle race.

The slide 32 is adapted to be moved towards the fixed pad 30 so as to close the aperture 31. For this purpose the slide 32 is formed with a T-shaped slot 40 whose cross arms 41 are adapted to receive the upper ends respectively of a pair of bell-crank levers 42 pivoted on the pin 21.

The knife 37 is adapted to be moved across the aperture 34 in the plate 33 so as to exert a shearing action against one edge of the aperture. To actuate the knife 37 lugs 43 extend downwardly from the knife 37 into the main body of the slot 40 in the plate 32. These lugs engage each side of the upper ends of a pair of bell crank levers 44 also pivoted on the pin 21. The slot 40 permits the plate 32 and the knife 37 to be moved independently of each other in accordance with the operation of the levers 42 and 44 respectively.

A pin 45 connects the laterally extending arms of the levers 44 and is engaged by a hook 46 on a rod 47 passing through a sleeve 48 freely mounted inside the sleeve 26. The lower end of the rod 47 is secured to a horizontal pin 49 so that an upward push on the pin 49 turns the bell-crank levers 44 counter-clockwise and moves the knife 37 to the left. The laterally extending arms of the levers 42 are provided with pins 50 for engagement by hooks 51 of a stirrup 52 secured to the upper end of the sleeve 48. Between the stirrup 52 and the sleeve 26 is a compression spring 53 tending to urge the stirrup in an upward direction, so that the normal tendency of the levers 42 is to move counter-clockwise to cause the slide 32 to close the aperture 31.

The lower end of the sleeve 48 is screwed into a member 54 having a slot 55 through which the pin 49 passes, so that the rod 47 is free to move within the sleeve 48 to the extent of the freedom

of the pin 49 in the slot 55. The ends of the pin 49 engage with a small amount of freedom in an up and down direction in holes 56 in a stirrup 57 secured to the upper end of a rod 58 which serves under the control of a cam to be hereafter described to operate both the knife 37 and the plate 32.

In Fig. 1 the rod 58 is shown as depressed until the stirrup 57 has drawn the pin 49 to the bottom of the slot 55 in the member 54 so as to pull the sleeve 48 downwards against the action of the spring 53, thereby rotating the levers 42 clockwise, and moving the slide 32 to the right to expose the aperture 31 at the same time as the depression of the pin 49 has caused the rod 47 to turn the levers 44 in a clockwise direction, so as to move the knife 37 to the right. There is thus a clear passage from the upper side of the shuttle race through the apertures 39, 34 and 31 to the interior of the chamber 22. In Fig. 2 the rod 58 has been raised firstly to allow the upward movement of the sleeve 48 under the action of the spring 53, so moving the slide 32 to the left to close the aperture 31, and secondly to push the rod 47 upwardly by the pin 49 so as to move the knife 37 across the aperture 34.

The casting 14, which, together with the casting 23 and the other parts held to the casting 14 by the stud 16, forms an attachment readily applied to a shuttle race, is adjustable along the length of the recess 13 to bring the series of apertures 31, 34, 39 and the knife 37 into any desired position with respect to the edge of the fabric, thus accommodating fabrics of different widths. To enable this adjustment to be made the casting 14 is shorter than the length of the recess 13, the remaining length being made up by packing pieces 59 and 60 of a size and shape appropriate to the position occupied by the casting in the recess. The upper surface of the piece 59 is covered with Bedford cord 61 to continue the cord covering 62 of the shuttle race as far as the plate 38. The packing piece 60 is covered with celluloid or like material 63 to continue the surface of the plate 38. The surface of the shuttle race on each side of the plates 38, 63 is covered with Bedford cord 64 as shown in Figs. 3 and 4. If an independent knife is used, several suction apertures 31 may be provided at each end of the shuttle race 12, each aperture being provided with an independently operated shutter or interchangeable shutters being used which operate to open and close a selected aperture only.

Referring more particularly to Fig. 7, it will be seen that a casting 14 is mounted on each side of the loom, the castings 23 connected to the two castings 14 communicating through their pipes 24 with a common pipe 65 running downwardly from the shuttle race and connected by a flexible pipe 66 to a pipe 67 running beneath the loom. Suction is applied to the pipe 67 as will be described later.

The operating rod 58 of the trapping device at each end of the loom extends downwardly near to the level of the pivots of the sley swords 68, and is there provided with a slide member 69 to receive one end of a bell-crank lever 70 pivoted at 71 to the loom frame, and carrying on its other arm a follower 72 in engagement with a cam 73. In the position shown in Fig. 8 the follower 72 is engaged by a lift 74 of the cam 73, so that the rod 58 is pulled downwardly and the plate 32 is moved to uncover the aperture 31. In this way the chamber 22 is put into communication with the upper side of the shuttle race 12. A slight rotation of

the cam 73 allows the rod 58 to be raised under the action of a spring 75 acting on the lever 70, and a still further rotation of the cam brings the follower 72 opposite a recess 76 in the cam face to allow the rod 58 to be still further raised to bring the knife 37 across the cutting edge of the aperture 34. If desired the cam 73 may be provided with a further lift 77 following the recess 76 for a purpose which will appear hereafter.

The cams 73 are mounted on the half-time shaft 78 of the loom, and are individually adjustable to cause the operation of the slides 32 and the knives 37 of the two trapping and cutting devices respectively in the desired sequence. It has already been stated that the castings 14 are adjustable along the recesses 13, packing pieces 59, 60 being provided to make up the length of the recess. The left-hand side of Fig. 7 shows for the purpose of illustration the casting 14 moved further from the centre of the loom than the casting 14 at the right-hand side of the loom, packing pieces 59', 60' being employed which are respectively wider than and narrower than the pieces 59, 60. The cams 73 are adjustable along the length of the shaft 78 in accordance with the position of the castings 14.

In Fig. 6 pipes 67 of adjacent pairs of looms 79 are shown connected by an upright pipe 80 to an overhead main 81 running between the looms. This main is connected by a larger main 82 serving other mains 81 to a suction vessel 83 in the inside of which is a bag 84 whose interior is connected by a pipe 85 under the control of a valve 86 to a suction pump or vacuum receiver (not shown). In Fig. 7 the pipe 67 is shown as directly connected to a suction pump 87 driven directly by a crank 88 and a connecting rod 89 from a shaft 178 of the loom so as to apply suction at desired intervals.

The operation of the above described mechanism is as follows:—

Assuming a pick of weft to have been inserted by a dummy shuttle 90 from the left-hand side of the loom, the cam 73 at the right-hand side of the loom is so timed as to depress the rod 58 on that side of the loom to open the slide 32 and by the suction applied to the chamber 22 to suck the free end 91 of the pick through the apertures 39, 34 and 31 when the pick is released from the shuttle, thus drawing the pick taut. The slide 32 then closes against the pad 30 to seize the end 91, suction of course being maintained until the slide 32 has cut off completely the aperture 31. The sley then moves forward to beat up the pick in the usual manner, and the cam 73 causes the knife 37 to sever the end 91 above the slide 32 so as to free the pick.

In order to ensure that failure of the knife to cut the end will not allow the pick to be drawn away from the fell of the cloth on the return movement of the sley, the lift 77 of the cam 73 momentarily opens the aperture 31 to allow the end of the pick to be released. Normally, however, this opening of the aperture 31 permits the severed end to be sucked away through the pipe 24. On the return movement of the dummy shuttle 90, that is to the left-hand side of the loom, the trapping and cutting device at that side of the loom operates in a similar manner to impart tension to the pick and to sever the projecting end. The severed ends are carried to the vessel 83, being prevented from passing into the pipe 85 by the bag 84. In the case of the loom-operated suction pump 87 shown in Fig. 7 the pump is interiorly fitted with a bag similar to

the bag 84 for the same purpose. Accumulation of weft ends in these vessels can be removed periodically.

In the case of the installation shown in Fig. 6 a further suction vessel 83 may be provided, working from the same or a different suction pump or vacuum receiver, the two vessels being so connected by pipes and valves with the main 82 that they can be used alternately, one being put into service when the other is shut off for removal of accumulated weft ends, as will be well understood.

It is preferred that the apertures 31 be kept closed by the shutters except for the brief period during which the weft ends are being sucked firstly into, and secondly away from, the apertures, and the cams 73 are suitably timed for this purpose.

The tension imparted to the pick by the applied suction and maintained by the closing of the shutters 32 during beat-up not only enables the pick to be laid straight in the warps 92, but permits satisfactory operation of a weft fork stop motion adapted to stop the loom on failure of the weft supply or of the dummy shuttle to lay the pick correctly. Conveniently a centre weft fork 93 is used, this serving to stop the loom in the event of failure in any pick. The fork is pivotally mounted between plates 94 on the front of the shuttle race 12, one of these plates being shown cut away in Fig. 8 to show the position of the fork more clearly. The fork rests in a recess 95 in the shuttle race during beat-up and is projected in the well known manner through the warps so as to bear against the last inserted pick until just before beat-up. Failure of the pick to maintain the fork in its raised position serves to stop the loom in known manner.

After the weft has been seized by the shutters in the manner described above, the tension imparted by the suction and maintained by the shutters may be sufficient for it to be laid evenly and uniformly in the shed. The closing of the warps may also be arranged to increase the weft tension somewhat during beat-up by the lower sheet of warps drawing the weft upwardly away from the shuttle race.

In order to control the tension of the weft accurately, or to increase it beyond the amount imparted by the applied suction, there may be provided a cord 96 along the selvedge of the fabric, which cord is separately actuated by a lever or heald mechanism in a manner similar to the warp threads 92 and moved sufficiently to engage the weft thread and deflect upwardly the portion between the aperture 31 and the edge of the warps. The cord, which is not woven into the fabric, may be fixed in position or may run from a supply bobbin to the take-up roller or to a bobbin driven at the same speed as the take-up roller, as will be well understood. Instead of the cord, a lever pivoted on the sley may be operated by the motion of the sley or otherwise to engage the weft thread and impart the required tension in similar manner.

The operation of the loom will now be described with reference to two methods of laying the weft, with which, per se, the invention is not, however, concerned.

When the weft is to be laid in "hairpin" form with each limb in a separate shed, as described in U. S. application S. No. 484,785 filed 27th September, 1930, only one aperture 31 is in operation at any one time, for only one end 91 of each pick is required to be trapped since its other end is

either secured to the yarn supply or to a preceding pick at the side of the loom from which it is laid. The other aperture operates in turn to seize the ends 91 of weft laid from the opposite side of the loom. When alternate picks are laid from each side of the loom in turn, the shutters 32 are operated alternately to permit firstly the sucking and secondly the trapping of their respective weft ends. With other sequences of weft laying, appropriate timing of the shutter movements is employed. By reason of the fact that each pick of weft is held after its release from the dummy shuttle (one end, of course, always being connected to the supply or to a preceding pick, and the free end caught by the trapping device) the weft fork operates to stop the loom on failure of either pick of the "hair-pin" to be laid correctly.

When the weft is laid as single cut lengths, both apertures 31 are used for each length of weft inserted. On the release of the weft from the dummy shuttle at the side of the loom from which the shuttle emerges from the shed, the aperture 31 on that side of the loom is opened to suck down the weft end 91 and the shutter 32 then seizes the end. The weft is severed from the supply at the other side of the loom, a length of weft being left protruding from the shed to form an end 91 which is drawn into the aperture 31 at that side of the loom and seized by the corresponding shutter 32. On the insertion of weft from the other side of the loom, the shutters operate in similar manner, the operating cams 73 being suitably timed for the purpose.

The weft may be drawn directly from the yarn supply by the dummy shuttle or other inserting device or it may be drawn from the supply into measured lengths sufficient for one or more picks before it is presented to the inserting device.

What I claim and desire to secure by Letters Patent is:—

1. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture to which suction can be applied to seize the end of a pick after insertion of said pick through the shed and means adapted to trap the end of said pick and hold it under tension during beat-up.

2. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture to which suction can be applied to seize the end of a pick after insertion of said pick through the shed, means adapted to trap the end of said pick and hold it under tension during beat-up, and further means adapted to increase the tension on the pick during beat-up.

3. A loom in which weft is inserted from a stationary supply, comprising means adapted to insert weft into the shed and to release said weft so as to leave an end thereof free after insertion through the shed and an aperture to which suction can be applied to seize the end of said weft after its release from the inserting means and means adapted to trap the end of said weft and hold it under tension during beat-up.

4. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture at each side of the loom to which suction can be applied to seize the end of a pick of weft inserted from the other side of the loom, and means in connection with each aperture adapted to trap the end of said pick and hold the weft under tension during beat-up of the loom.

5. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture

to which suction can be applied to seize the end of a pick, means adapted to trap the end of said pick after insertion of said pick through the shed, and a tension operated weft-feeler mechanism adapted to stop the loom on incorrect laying of the weft picks.

6. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture to which suction can be applied to seize the end of a pick after insertion of said pick through the shed, means adapted to trap the end of said pick and hold it under tension during beat-up and means for cutting the pick short of the trapping means after beat-up.

7. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture to which suction can be applied to seize the end of a pick after insertion of said pick through the shed and a shutter adapted to close said aperture and constituting a trapping device to hold the pick under tension during beat-up.

8. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture to which suction can be applied to seize the end of a pick after insertion of said pick through the shed and a shutter adapted to close said aperture and to trap the end of the pick so as to hold the pick under tension during beat-up, means for cutting the pick short of the trapping means after beat-up and means to uncover said aperture after operation of the cutting means to release the length severed from the pick.

9. A loom in which picks of weft are inserted from a stationary supply, comprising an aperture, suction means driven by the loom itself adapted to apply suction to said aperture so as to seize the end of a pick after insertion of said pick through the shed and a trapping device into engagement with which the weft is brought by means of the applied suction, the trapping device serving to hold said pick under tension during beat-up.

10. An attachment for a loom in which picks of weft are inserted from a stationary supply, said attachment comprising a member having an aperture to which suction can be applied so as to seize the end of a pick after insertion of said pick through the shed and a trapping device carried by said member and adapted to trap the end of said pick and hold it under tension during beat-up.

11. An attachment for a loom in which picks of weft are inserted from a stationary supply by means adapted to leave an end thereof free, said attachment comprising a member having an aperture to which suction can be applied so as to seize the end of a pick after insertion of said pick through the shed and a shutter adapted to close said aperture and constituting a trapping device to hold the pick under tension during beat-up.

12. An attachment for a loom in which weft is inserted from a stationary supply, said attachment comprising a member having an aperture to which suction can be applied to seize the end of a pick after insertion of said pick through the shed and a shutter adapted to close said aperture and to trap the end of the pick so as to hold the pick under tension during beat-up and means for cutting the pick short of the trapping means after beat-up.

13. An attachment for a loom in which weft is inserted from a stationary supply, said attachment comprising a member having an aperture to which suction can be applied to seize the end of a pick after insertion of said pick through the

shed and a shutter adapted to close said aperture and to trap the end of the pick so as to hold the pick under tension during beat-up, means for cutting the pick short of the trapping means after beat-up and means to uncover said aperture after operation of the cutting means to release the length severed from the pick, and common operating means for the trapping and cutting devices.

14. A loom in which picks of weft are inserted from a stationary supply comprising a shuttle-race, a slot in said race and means for adjustably securing along the length of said slot an attachment as claimed in claim 10.

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