

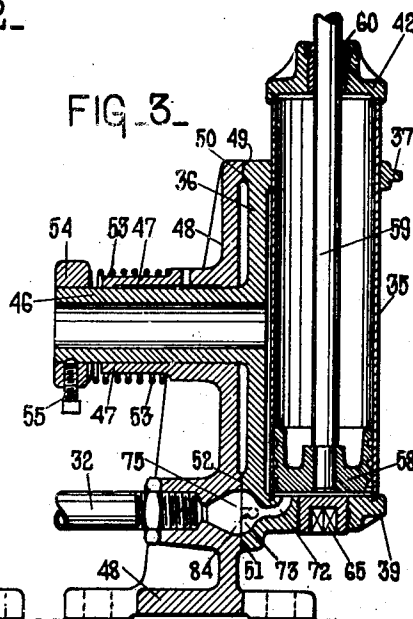
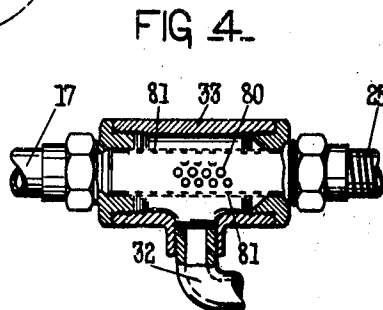
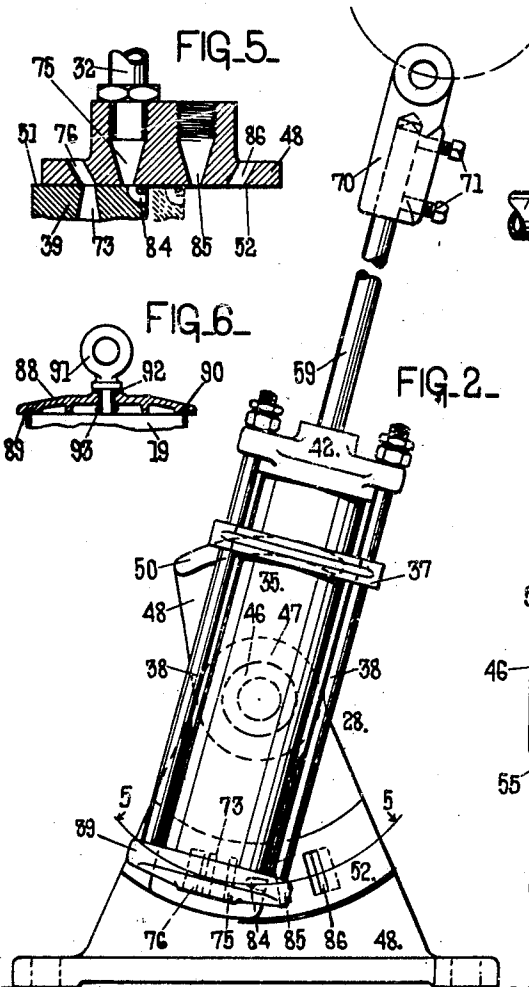
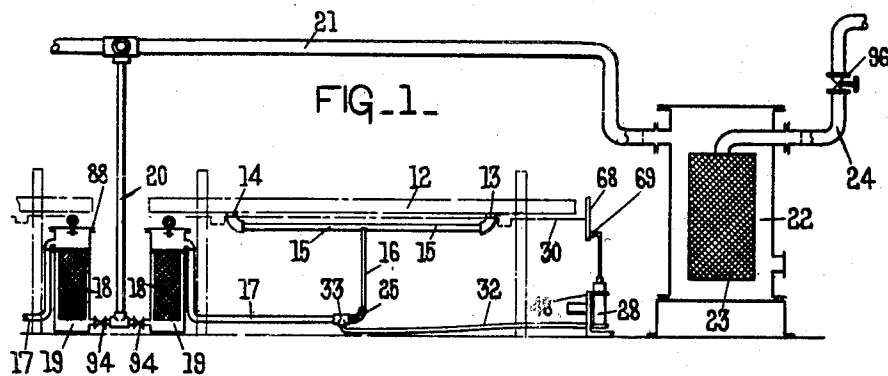
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SHUTTLELESS LOOM

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SHUTTLELESS LOOM

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10 Claims. (Cl. 139—194)

This invention relates to shuttleless looms, that is, looms in which weft is provided from a supply package which does not pass through the warp shed during weaving.

5 U. S. Patent No. 1,921,396 filed 30th March, 1931 describes a shuttleless loom in which suction is applied to the free end of the weft thread to enable it to be gripped so as to maintain the pick under tension during beat-up. The end of the weft projecting from the edge of the fabric may be cut off and conveyed to a suitable receptacle by the action of the suction lately operating to bring the weft under tension.

10 It has now been found that the weft end can be very forcibly seized by employing an auxiliary suction device situated near to the point at which the suction is to be applied to the weft and operating to provide a relatively high amount of suction at the instant when the weft is to be seized. For example, a suction pump can be driven by the loom and at the same speed as the crank-shaft of the loom, and timed to apply suction at each side of the fabric alternately just as the weft is released from the inserting means, so that the weft is seized with certainty and correctly tensioned. The auxiliary device having served to enable the weft to be tensioned, the cut ends of the weft are conveyed away from the loom for collection by means of the other suction plant, which conveniently serves a number of looms.

15 Accordingly, the invention broadly comprises the use of two suction systems, the one maintaining suction at the loom, and the other for applying additional suction suddenly at the instant when a weft end is to be seized. The maintained suction, which incidentally can be used to convey the cut ends away to a receiver, is thus implemented by the suddenly applied suction. 20 A loom-driven pump can be used to apply a sufficient degree of additional suction, while having a relatively low volumetric capacity.

25 The two suction systems are conveniently connected to a single orifice, so that the end of weft is sucked into the orifice immediately after picking by the tensioning system, and conveyed therefrom after cutting through the conduit of the main suction system.

30 By the employment of separate suction systems as described above, the two operations of tensioning and conveying may be carried out in the optimum conditions for each. Thus the tension may be imparted by a rapid rush of air through the orifice into which the weft end is sucked, 35 said rapid rush being induced by a relatively

high degree of vacuum within the orifice produced by the sudden application of suction by the auxiliary device, while the conveying of the cut end is effected by means of the main suction system which need not operate under such a high degree of suction. Further, a sufficiently high degree of suction is applied at the time a weft end is to be seized and trapped notwithstanding any fall in the degree of suction in the main system as might be occasioned, for example, by several looms on the same suction pipe working in synchronism, or by the suction orifice of an adjacent loom remaining open or being frequently opened while the loom is being adjusted. At the same time, there is always a certain amount of suction available to render the loom independent of the loom-driven auxiliary pump during the slower running of the loom at the first pick or two on starting up. When the loom has picked up speed, the powerful suction of the auxiliary pump minimizes the possibility of the weft ends not being properly seized.

By way of example a form of apparatus according to the invention will now be described with reference to the accompanying drawing, in which

Figure 1 is a diagrammatic elevation showing the connection of an auxiliary suction pump with the main suction layout of a loom of the type described in U. S. Patent No. 1,921,396;

Figures 2 and 3 show in full and cross-sectional elevation respectively a form of suction pump with its associated bracket; while

Figure 4 is a sectional view of a connecting member;

Figure 5 a sectional view taken on line 5—5 of Figure 2; and

Figure 6 a section of a detail of Figure 1.

As shown in Figure 1, a loom shuttle race 12 is provided with devices 13 and 14 of the type described in U. S. Patent No. 1,921,396 and S. No. 636,305 filed 5th October, 1932 having suction orifices arranged substantially beneath the selvages of the fabric being woven (not shown). The prior specifications explain in detail the sucking and trapping within the orifices of pick extremities which, shortly after trapping, are severed from the body of the pick either at the point of trapping in the shuttle race or near to the selvage of the fabric.

The short lengths of weft cut are conveyed by suction from the shuttle race along conduits 15, 16 and 17 away from the loom. The conduits 15 and 16 oscillate with the shuttle race 12 and are connected to the stationary conduit 17 by a flex-

ible joint 25. In the particular embodiment shown in Figure 1, the conveyed threads are trapped by a filter bag 18 contained within a suction vessel 19, one of which is associated with each loom. Suction is transmitted to the vessel 19 by a pipe 20 leading to a suction main 21, which may serve a number of looms. In this manner the threads from each loom are confined to the suction vessel in association with that loom and no mixing of the threads occurs. This system is particularly advantageous when different wefts are being used in looms in the same suction circuit, as waste classification is greatly simplified.

When all the looms of the same suction circuit are using the same type or quality of weft, however, the separate vessels 19 may be dispensed with, and the threads allowed to pass directly from the conduit 17 to the pipe 20, when they are conveyed along the main 21 to a large common suction vessel 22. A filter bag 23 prevents the threads being carried to the main suction pump or fan (not shown) via the suction delivery pipe 24.

In order to provide an air inrush of the desired magnitude through the orifices 13 and 14 when the pick extremities are to be secured, each loom is provided with an auxiliary oscillating air pump indicated generally at 28 in Figure 1, which is adapted to assist intermittently the ordinary suction of the system. By providing each loom with a separate pump, the length of conduit connecting the pump to the suction layout can be kept at a minimum, and the efficiency of the apparatus correspondingly high.

The pump 28 is driven from the crank shaft 30 of the loom so as to make one complete oscillation for each pick or weft, and is connected directly to the nearest stationary point of the suction layout by a conduit 32 which terminates in a T-piece 33 inserted in the conduit 17. The auxiliary pump comprises a cylinder 35 securely mounted in an oscillating cradle 36 bored at its upper end to form a strap 37 surrounding the cylinder barrel. Tension rods 38, 38 clamp the barrel between a circular projection 39 of the cradle 36 and a cap 42 into both of which the ends of the cylinder 35 fit.

The cradle 36 is formed with a horizontal cylindrical axle 46 projecting at right angles to the axis of the cylinder to fit into a bearing 47 in a supporting bracket 48. Machined faces 49, 50 and 51, 52 on the cradle 36 and bracket 48 are kept in close contact by a powerful coil spring 53 (Figure 3), which surrounds the bearing 47 and presses between the bracket 48 and a collar 54 secured on the end of the axle 46 of the cradle 36 by a set screw 55.

A suitably ringed piston 58 is attached to a connecting rod 59 which passes through a bush 60 in the cap 42 of the cylinder shaft of the loom. The crank shaft 30 of the loom is furnished at one extremity with a disc 68 from one side of which projects a crank pin 69. A connecting member 70 adjustably attached to the upper extremity of the connecting rod 59 by set screws 71, 71 surrounds the pin 69 so that on rotation of the crank shaft 30 and the disc 68 the piston 58 is caused to reciprocate within the cylinder 35 and the cylinder 35 is caused to oscillate about its pivot in the bracket 48.

The cylinder head 39 contains a conduit 72 leading from the inside of the cylinder to a port 73 in the face 51, and on oscillation of the cylinder the port 73 is swept across the face 52 of the

bracket 48 and across ports 75, 76 formed therein. The port 75 is in direct connection with the conduit 32 while the other port 76 merely penetrates the bracket 48 and leads to atmosphere (see Figure 5).

The timing of the pump is such that at the commencement of the upward (suction) stroke of the piston the port 73 has just passed the port 76. An increasing amount of suction is thus produced in the cylinder by the upwardly travelling piston until the port 73 reaches the inlet port 75 when the suction is suddenly applied to the conduit 32, and so via the conduit 16 and one of the conduits to one of the orifices 13 or 14, the setting of the crank disc 68 timing this application of suction in accordance with the opening of the orifices. During the downward stroke of the piston, the cylinder is exhausted to atmosphere through the wider port 76.

In order to prevent cut weft ends from passing into the cylinder 35, the T-piece 33 at which the conduit 32 connects with the conduit 17 is provided with a filter in the "through portion" of the T-piece. This filter comprises a perforated tube 80 (Figure 4) around which is wrapped a porous filter cloth 81, the mesh being such that substantially no resistance is offered to the communication of suction from the conduit 32. Thus the ends can only pass straight through the T-piece. If, however, any thread ends tend to cling inside the filter by the suction applied by the conduit 32, these are lifted by a small influx of air introduced from the atmosphere into the conduit 32 at about the middle of the exhaust stroke of the pump. This is effected by an L-shaped passage 84 formed in the cylinder head 39 registering for a brief interval with the inlet port 75, as shown in Figure 5. At other times, the passage 84 is inoperative, being in contact with the plain part of the face 52. Figure 5 shows the extent of movement of the head 39 to the right in dotted lines, this bringing the port 73 into register with the inlet port 75.

It will be observed from Figures 2 and 5 that the pump bracket 48 is off-set with respect to a vertical line through the centre of rotation of the crank pin 69. This setting is effected with the object of allowing the ports 75 and 76 to be formed in the bracket to one side of a vertical line through the centre of the bracket, thereby leaving room in the same bracket for similar inlet and exhaust ports 85, 86 in corresponding positions on the opposite side of the vertical line through the bracket. In this way, the pump can be used at either end of a loom, the bracket 48 in either case being turned so that the conduit 32 proceeds as directly as possible to the T-piece 33, and the port 73 in the cylinder head 39 working in conjunction with either the ports 75, 76 or the ports 85, 86. The conduit 32 is connected to whichever of the inlet ports 75, 85 happens to be in operation, and the L-shaped passage 84 is formed in the appropriate side of the cylinder head 39. Thus, the arrangement admits of the opposite directions of rotation being effected without change of the pump design.

Figure 6 shows a form of lid for the suction vessel 19 which can immediately be removed for waste clearance or filter bag inspection in spite of the relatively strong suction tending to hold the lid to the walls of the vessel. The underside of the lid 88 is provided with a circular channel 89 containing packing 90 fitting on the upper end of the suction vessel 19. Such a joint would normally be very difficult to open by hand and

in order to relieve the suction within the vessel 19 prior to lifting the lid, a shouldered ring bolt 91 penetrating the lid 88 and sitting on a packing ring 92 is provided, this bolt being easily lifted 5 by hand to break the suction, upon which the lid 88 may be lifted without undue exertion. A split pin 93 extending transversely through the shank of the ring bolt 91 limits the movement of the bolt and enables it to lift the lid.

ing a suction system adapted to maintain a degree of suction at all the looms, and means adapted to apply additional suction at each loom at the instant a weft end is to be seized at that loom.

5. A weaving installation including a plurality of shuttleless looms each having suction means adapted to seize weft ends so as to tension the weft during beat-up and means adapted to sever projecting weft ends, said installation comprising a suction system adapted to maintain a degree of suction at all the looms, a collector for each loom inserted in said suction system to receive cut weft ends conveyed by the suction, means adapted to apply additional suction at each loom at the instant a weft end is to be seized at that loom, and filter means adapted to prevent cut weft ends passing to the means for applying the additional suction.

6. In a shuttleless loom provided with suction means adapted to seize weft ends so as to tension the weft during beat-up, means to maintain a degree of suction at the loom, and a suction pump driven by the loom and connected to the suction means, said pump being timed to apply additional suction suddenly at the instant a weft end is to be seized.

7. In a loom as claimed in claim 6, an oscillating pump driven by the loom, and ports controlled by the oscillation of the pump to apply the suction created by the pump suddenly to the suction means.

8. In a shuttleless loom provided with suction means adapted to seize weft ends so as to tension the weft during beat-up, conduits connected to the suction means, a stationary conduit connected to said conduits for the application of suction thereto, and additional suction means connected to said stationary conduit, said means being adapted to apply additional suction suddenly at the instant a weft end is to be seized.

9. In a shuttleless loom provided with suction means adapted to seize weft ends so as to tension the weft during beat-up, conduits connected to the suction means, a stationary conduit connected to said conduits for the application of suction thereto, and a loom-driven pump connected to said stationary conduit, said pump being timed to apply additional suction suddenly at the instant a weft end is to be seized.

10. In a shuttleless loom provided with suction means adapted to seize weft ends so as to tension the weft during beat-up and with means adapted to sever projecting weft ends, conduits connected to the suction means, a stationary conduit connected to said conduits for the application of suction thereto, a loom-driven pump connected to said stationary conduit, said pump being timed to apply additional suction suddenly at the instant a weft end is to be seized, a collector in said stationary conduit adapted to receive cut weft ends conveyed by the suction in said conduit, and filter means adapted to prevent cut weft ends from the conduit to the loom-driven pump.

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10 When any loom of a series in circuit is to stand for any length of time, or if the waste thread from any vessel 19 is to be removed, the loom can be isolated from the rest of the suction circuit by a valve 94 situated between each suction vessel and the pipe 20. In case of all the looms in circuit standing, or if the main vessel 23 is used to collect waste thread and has to be relieved thereof, a main valve 96 in the pipe 24 can be closed so as to shut off the whole circuit from the main suction fan or air pump. A plug 65 in the bottom of each pump cylinder permits the extraction of waste from the cylinder in the event of a breakdown of the filter in the T-piece 33.

The auxiliary pump 28 rotating at crank speed, the extra suction is provided at each pick, and this suction is available at either of the orifices in the devices 13, 14, shutters in these orifices being opened to suck and closed to grip the weft ends in the desired order, as described in U. S. Patent No. 1,921,396, to which reference may be had for a full description of the construction and operation of this mechanism.

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

1. In a shuttleless loom provided with suction means adapted to seize weft ends so as to tension the weft during beat-up, means to maintain a degree of suction at the loom and further means to apply additional suction suddenly at the instant a weft end is to be seized.

2. In a shuttleless loom provided with suction means adapted to seize weft ends so as to tension the weft during beat-up and with means adapted to sever projecting weft ends, a conduit connected to said suction means for the purpose of maintaining a degree of suction at the loom and for conveying cut weft ends, and further means to apply additional suction suddenly at the instant a weft end is to be seized.

3. In a shuttleless loom provided with suction means adapted to seize weft ends so as to tension the weft during beat-up and with means adapted to sever projecting weft ends, a conduit connected to said suction means for the purpose of maintaining a degree of suction at the loom, a collector in the conduit adapted to receive cut weft ends conveyed through the conduit by the suction therein, means connected in said conduit between the collector and the suction means to apply additional suction suddenly at the instant a weft end is to be seized, and filter means adapted to prevent cut weft ends passing to the means for applying the additional suction.

4. A weaving installation including a plurality of shuttleless looms each having suction means adapted to seize weft ends so as to tension the weft during beat-up, said installation comprising

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