Oct. 14, 1958 V. SVATY ET AL 2,855,959

PUMP AND NOZZLE SYSTEM FOR NOZZLE OPERATED WEAVING LOOMS

Original Filed May 18, 1954 2 Sheets-Sheet 1

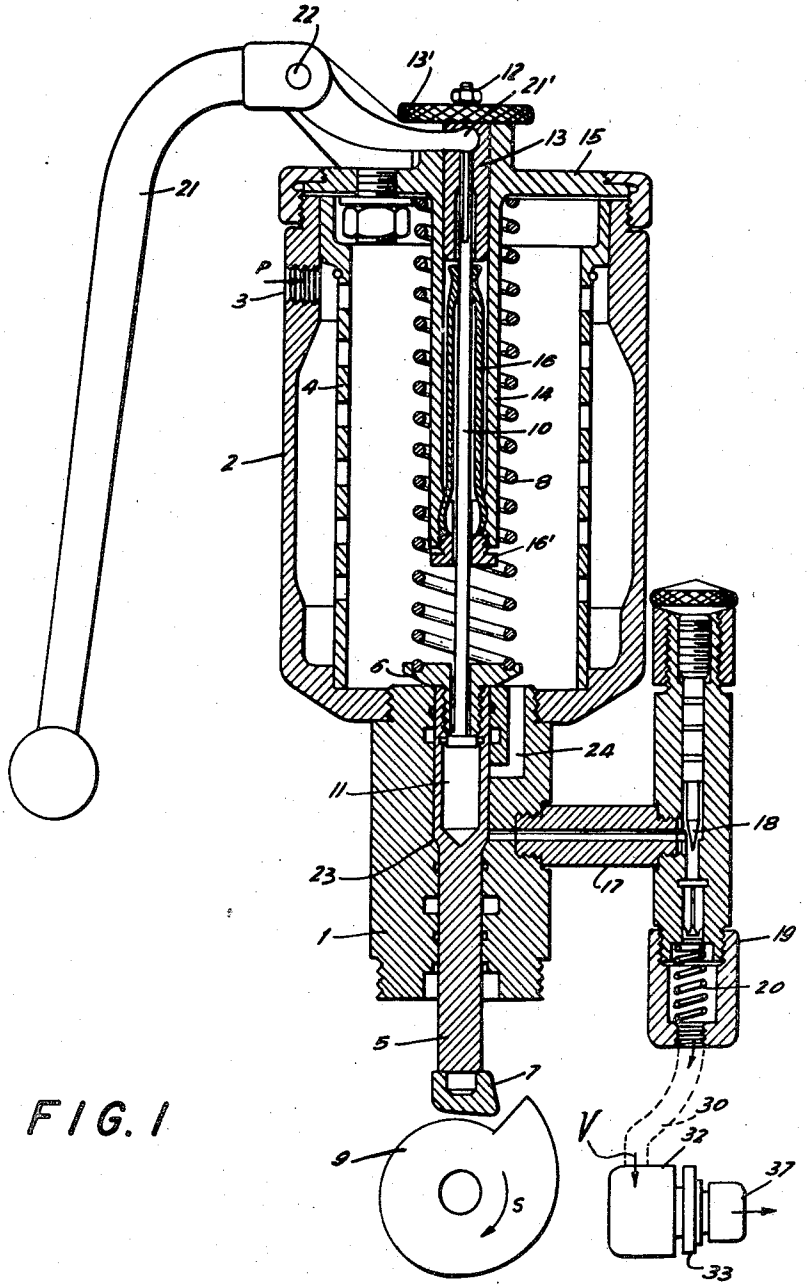


FIG. 1

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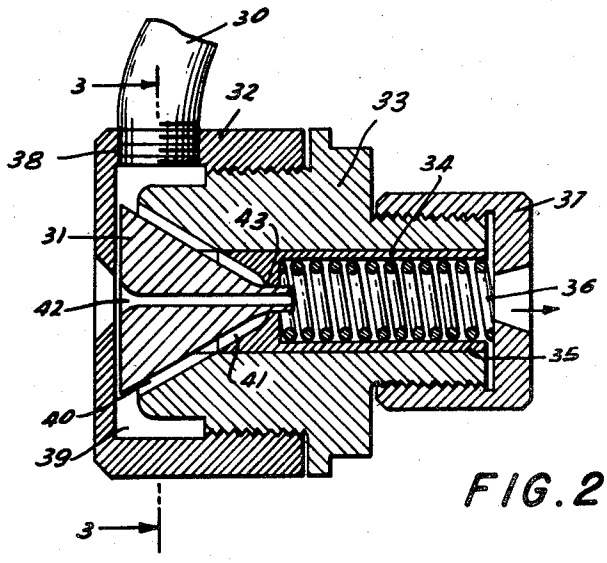


FIG. 2

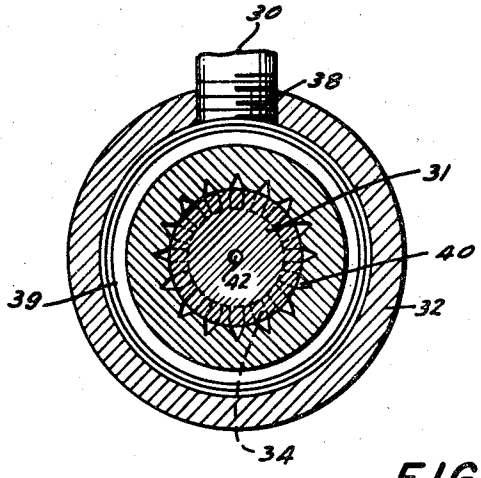


FIG. 3

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PUMP AND NOZZLE SYSTEM FOR NOZZLE OPERATED WEAVING LOOMS

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Original application May 18, 1954, Serial No. 430,689, now Patent No. 2,796,085, dated June 18, 1957. Divided and this application February 27, 1957, Serial No. 642,880

1 Claim. (Cl. 139—127)

The present invention relates to a pump and nozzle system for nozzle operated weaving looms. This is a division of Patent No. 2,796,085, issued June 18, 1957.

In nozzle operated weaving looms in which the weft thread is entrained through the shed by means of a small column of liquid discharged with a high velocity from a nozzle, it is imperative that for each picking operation the volume of liquid which must be exactly determined, receives a pressure corresponding to the required velocity of discharge of the pressure medium from the nozzle.

This problem has been solved by the piston pump according to the present invention, in combination with a suitable nozzle, the said pump being provided with a pressure spring which controls the movement of a piston in the direction of discharge of the liquid. This arrangement offers certain advantages over pumps in which both the suction stroke and the discharge stroke are controlled by a cam. The course of pressure of the liquid in the discharge channel, subject to the influence of a spring, the characteristic of which has a decreasing tendency, is advantageous in particular insofar as the column of liquid, projected from the nozzle has at its leading end a higher velocity than at its rear end. A part of the energy of the leading portion of the column is utilised for accelerating the thread, and in the course of its movement along the trajectory the velocity of the leading portion is diminished by air friction, so that the velocities of the leading and back portions of the liquid column become partially equalized. An advantage of the pump according to the invention resides further in the fact that the course of pressure of the liquid in the discharge portion remains practically unchanged upon a change of revolutions of the weaving loom.

The pump for nozzle operated weaving looms is, according to the invention, further combined with a liquid nozzle, which in the course of the picking operation allows the weft to be passed through the shed by means of a small column of liquid travelling with a high velocity, the arrangement being such, that the speed and degree of opening and closing the nozzle mouth, which determines the shape of the liquid jet, may be controlled by a change in the pressure of the liquid in the space of the nozzle body in front of its mouth.

The accompanying drawings represent by way of example one embodiment of the present invention.

Fig. 1 shows in a longitudinal axial section a piston pump for a nozzle operated weaving loom.

Fig. 2 is a similar section of the nozzle, and

Fig. 3 is a cross sectional view of the nozzle along the line III—III of Fig. 2.

Referring to the example of the pump represented in Fig. 1, a container 2 with an inlet port 3 for the liquid and filter 4 is mounted above the pump cylinder 1. A plunger-like piston 5 is arranged for reciprocal movement in the cylinder 1, said piston carrying at its open

upper end a plate 6 and at its bottom rod-like end a shoe 7, biased by means of a helical spring 8 by the intermediary of the plate 6 and piston 5 against a cam 9, revolving in the direction of the arrow S. The position of the shoe 7 with respect to the cam 9 is adjustable by changing the length of the link 10, projecting with its bottom end into a cavity 11 in the piston 5 and provided at its upper end with a thread and nut 12, bearing against a disc washer 13' mounted at the end of a hollow pin 13.

To prevent the liquid from escaping from the container 2 through the bore of the hollow pin 13, surrounding the link 10, a hose 16 of resilient material, e. g. rubber, is mounted in sealing engagement with the link 10 and with a tubular extension 14 of the lid 15 of the container 2. The tubular extension 14 is closed at its open lower end by a plug 16', to which is secured the lower end of the hose 16 so as to assure perfect sealing.

A tube 17 connects the pump cylinder 1 with the body of a throttling valve 18 and a check valve 19, controlled by a spring 20. The arrow V shows the direction of flow of the liquid, discharged by the pump through a connecting pipe 30 to the body 32 of a picking nozzle, and the arrow P indicates the direction of supply of liquid into the container from a main or other suitable pipeline.

A fork 21' of a hand lever, 21, mounted for rocking movement around a fixed pivot 22 engages the underside of the disc washer 13' of the nut 12.

The pump described above operates as follows:

The cam 9, resolving in the direction of the arrow S lifts periodically the piston 5 to its extreme upper position. Vacuum is thus produced in the space which forms incident to such lifting at 23 under the plunger-like portion of the differential piston 5, said vacuum causing the liquid to be sucked in from the container 2 through the connecting channel 24 into such space. During further rotation of the cam 9 the shoe 7 slips off the highest portion of the cam ramp in a position shown in Fig. 1, causing the piston 5 with the plate 6 to be displaced under the pressure of the spring 8 into its lowermost position, shown in the drawing. The liquid which has been sucked in is thus discharged from the aforementioned space through the tube 17 and throttling valve 18 against the pressure of the spring 20, through the pipe 30 into the body 33 of the nozzle.

The volume of liquid, measured off for each picking operation, is continuously adjustable by changing the stroke of the piston 5. The movement of the piston to its extreme upper position is constant and is determined by the height of the cam 9, whereas the stroke of the piston to its lower end position is adjustable by rotating the nut 12 so as to alter the length of the link 10.

The pump may be actuated by hand, if required, (without the cam 9 being driven) by means of the hand lever 21, the fork end 21' of which is adapted to lift the hollow pin 13, link 10 and piston 5.

The picking nozzle according to Figs. 2 and 3 consists of two members inserted one into the other, namely of an inner conical member 31 and an outer cylindrical member or body 33, the two members being connected together into one unit by a cap 32. The body 33 of the nozzle has a conical recess, the wall of which is provided with longitudinal grooves 40 between the corresponding tooth-like ribs. The apex of the cone 31, having a longitudinal axial channel 42, is positioned exactly in the axis of the body 33 and of a cylinder 34, inserted into the body 33 and mounted for sliding movement in a guide 35 in the body 33. The cylindrical member 34 is carried out as a hollow piston, biassed against the inner conical member 31 by a helical spring 36 of adjustable pressure, said spring bearing against a cap nut 37, adapted to be screwed to any desired position on the

screw thread on the body 33. The cylindrical member 34 rests with its seat 43 against a conical tapered inner portion of the member 31 in a way similar to a valve, i. e. is seated on any axial protruding apex portion of the conical member 31. Upon displacement of the cylindrical member 34 of the nozzle in the direction of the arrow, shown in the drawing, i. e. in a direction from the conical member 31, a gap is formed between the said two parts, the gap having the shape of a conical ring or annulus 41, the dimensions of which increase with the further movement of the cylindrical body. A port 38 is provided in the cap 32 of the nozzle for the entry of liquid from the pump into the circular space 39, communicating through a series of channels 40 described above, with an annular space 41. The axial channel 42 serves to guide the weft thread.

The nozzle just described operates as follows:

Liquid from the pump is supplied through the pipe 30 and through the port 38 into the circular space 39 and further through the channels 40 into the annular space 41. When the pressure of liquid in this space exceeds the pressure of the spring 36, the cylindrical member 34 of the nozzle is moved in the guide 35 in a way similar to a piston, in the direction of the arrow, against the pressure of the spring 36 and the pressure liquid flows through the now free annular gap 41 in the seat 43, in the shape of a jet, into the center of which the weft thread (not shown) is fed through the channel 42, said weft being then entrained by the jet of liquid and passed through the shed.

The arrangement of the nozzle as described above is

advantageous for the operation of a weaving loom in particular since it facilitates the threading of the weft into the nozzle, considering the path along which the weft is fed to the mouth of the nozzle being very short. It is further advantageous that the remaining portion of the weft, protruding from the nozzle after completion of the picking, weaving in and cutting operations, is guided by the edge of the discharge orifice in the cap nut 37 in a position near the axis of the jet, projected from the nozzle, which facilitates the engagement of the weft by the liquid.

We claim:

A nozzle for nozzle operated weaving looms wherein the weft thread is propelled through the shed by a jet of liquid, comprising a stationary inner member provided with a guiding channel for the passage of the weft thread and with conically arranged channels for the discharged liquid; a movable member constituting the mouth of the nozzle and having the shape of a hollow piston with a conical recess; a conical projection on said inner member, adapted to be engaged by said conical recess in said movable member; and a spring of adjustable pressure urging said movable member into engagement with said inner member.

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