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COOLING MEANS FOR PICKER SPINDLES

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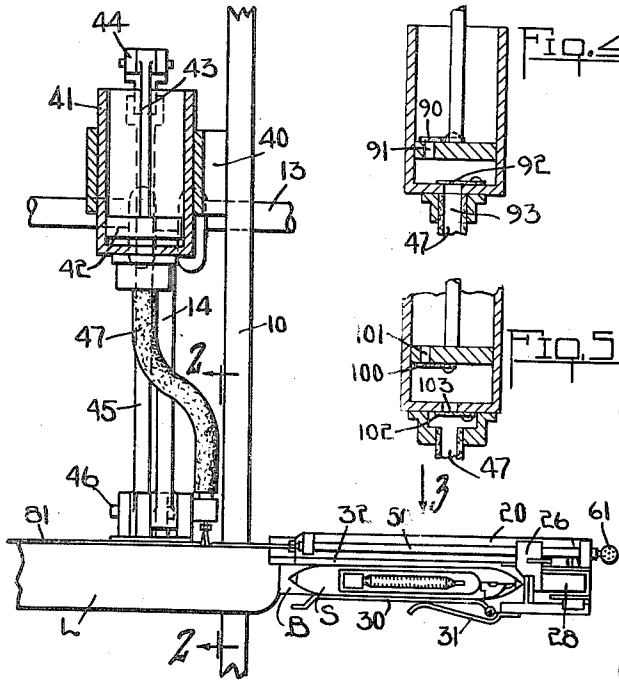


Fig. 4




Fig. 5




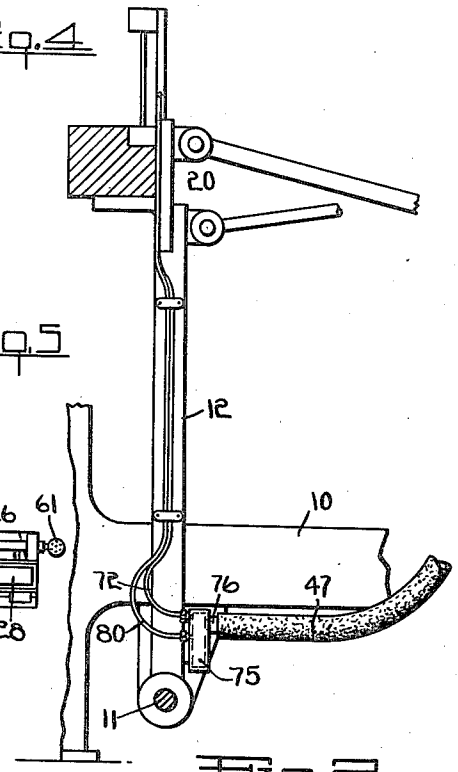


Fig. 1.

Fig. 2.

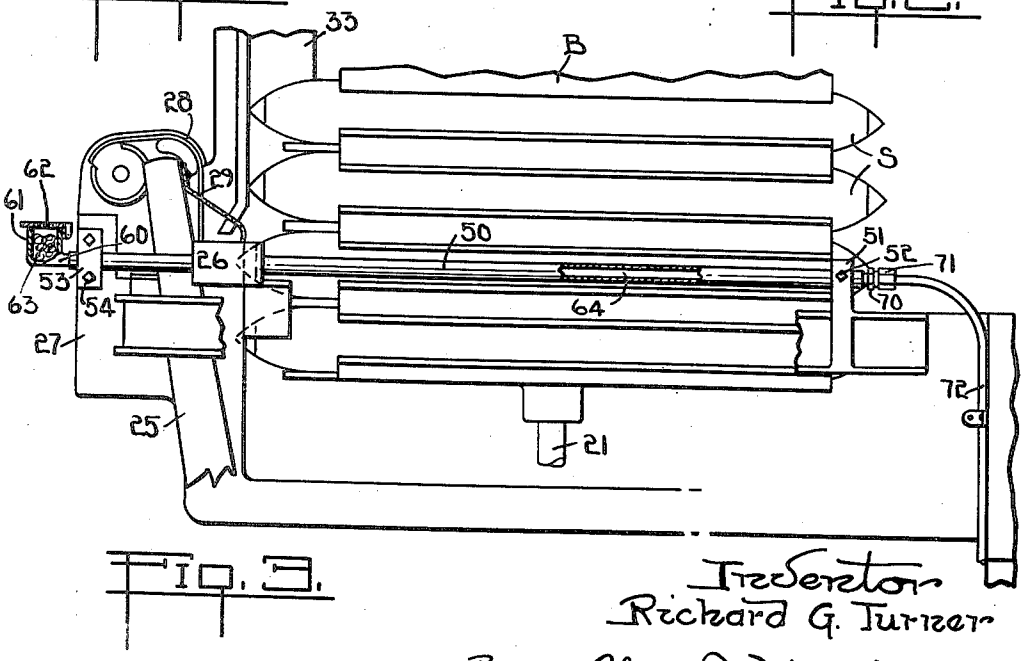


Fig. 3.

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## COOLING MEANS FOR PICKER SPINDLES

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6 Claims. (Cl. 139—158)

This invention relates to improvements in picker spindles for looms and it is the general object of the invention to provide means for dissipating the heat which develops in picker spindles during loom operation.

In certain looms the picker slides along a rod fastened to the lay. The picker is generally made of rawhide and because of the twisting of the picker incident to the resistance of the motion of the shuttle certain parts of the bore of the picker drag against the spindle. During long continued operation of the loom the friction of the picker on the spindle heats the latter to an extent which is objectionable not only because of the discomfort of accidental occasional contact on the part of the weaver, but also because of the deterioration of the picker due to the relatively high temperature and the difficulties growing out of lubrication.

As the lay swings back and forth the spindle is subjected to a slight amount of ventilation but the cooling effect of the lay motion is found insufficient to maintain the spindle at sufficiently low temperatures. The heat developed when the speed of the loom is increased exceeds the cooling action attending the more rapid motion of the lay and higher temperatures result.

It is an important object of my present invention to provide means by which the spindle may be cooled independent of the natural draft set up by lay motion. This result I may accomplish by causing a cooling fluid to move through a hollow spindle.

It is a more specific object of my present invention to provide a hollow spindle and cause a draft of air to pass through it to dissipate the heat developed by sliding action of the picker. This draft may be either in the form of compressed air or the draft may be created by a vacuum. Air is ordinarily heated somewhat when compressed and conversely its temperature drops when rarefied and for this reason I prefer to create the draft within the hollow spindle by means of vacuum so that the air in the spindle will be at a temperature slightly below the air surrounding the loom. I do not wish to be limited to a vacuum system, however, as compressed air will achieve the desired results.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawing, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a plan view of one end of a loom having my invention applied thereto, parts being in section,

Fig. 2 is an end elevation of the structure shown in Fig. 1, parts being omitted,

Fig. 3 is an enlarged rear elevation looking in the direction of arrow 3, Fig. 1, and

Figs. 4 and 5 are diagrammatic views similar to a portion of Fig. 1 showing different forms of air pumps.

Referring to the drawing, the loom frame 10 supports a lay L by means of a fixed rocker shaft 11 on which are mounted the lay swords one of which is indicated at 12. A crank shaft 13 having one revolution for each beat of the loom is attached to the lay by means of connectors one of which is shown at 14. The end of the lay is provided with a lay end 20 in which move vertically a set of shifting shuttle boxes B carrying a set of shuttles S. A box lifter rod 21 may be connected to any approved box motion not shown for shifting the boxes vertically to render any of the shuttles active for propulsion across the lay.

A picker stick 25 extends upwardly in usual manner and cooperates with a picker 26 which is mounted as will be set forth hereinafter for horizontal motion along a fixed path in line with the active shuttle. The outer end of the lay end may be provided with a casting 27 on which is mounted a picker check 28 consisting of a strap 29 to check the picker as the latter moves outwardly. Any form of picking motion not shown may be used for giving the picker stick 25 an inward motion toward the center of the loom either on every beat of the loom as in pick and pick looms or on alternate beats as in the usual automatic type of loom. Each shuttle box is provided with a binder 30 and its spring 31 to hold the shuttle against the back plate 32 of the shuttle box. The usual vertical guide 33 may be used as is common in shifting shuttle box looms for preventing undue end play of the shuttle in the idle boxes. The picker stick extends along the outer part of the picker 26 as suggested in Fig. 3 so that movement of the stick to the left as viewed in that figure will move the picker and the actively positioned shuttle to the left to propel the latter across the lay L.

The matter thus far described may be of usual construction found in drop box looms and is set forth for illustrative purposes. I do not wish to be limited to the details shown as my invention is equally applicable to looms having for instance a different type of picker check from that shown in Fig. 3.

The loom frame carries a bracket 40 on which is mounted a cylinder 41 forming part of an air pump and in which reciprocates a piston 42. The latter is driven by a piston rod 43 connected to the upper end of a lever 44 pivoted at its lower end to a fixed support not shown and attached to a connector 45. The forward end of the latter is connected as at 46 to the lay. A flexible hose 47 is attached to the forward end of the air pump and communicates with the interior of the latter.

In the operation of the air pump the piston will move rearwardly during the backward stroke of the lay to create a vacuum in front of the piston 42 and induce a draft of air in the hose 47 toward the pump. On the forward stroke of the lay the piston will move forwardly and as set forth herein will create a movement of air in the hose 47 in a direction forwardly and away from the pump. This latter factor is not essential but can be used if desired. My invention is conveniently used in connection with a pneumatic thread controller such as that set forth in my co-pending application Serial No. 166,571 and No. 190,637 to which reference may be had for further details of the operation and construction of the pump and parts connected thereto.

In carrying my invention into effect I provide a hollow picker spindle 50 and connect it pneumatically with the pump. The spindle may be mounted in a manner similar to the usual solid spindles and I do not wish to be limited to the particular mounting shown herein. For convenience I provide a bearing 51 on the rear side of the lay end and extend the inner end of the spindle through it. A set screw 52 holds the spindle in place. The outer end of the spindle is held in a bearing 53 secured to the lay end by set screws 54. The bearings 51 and 53 are so located that the axis of the spindle is substantially parallel to the lay so that as the picker 26 slides along the spindle between the bearings it will have a motion parallel to that which the shuttle should have for proper flight.

The outer end of the spindle shown at the left of Fig. 3 has threaded thereinto the stem 60 of an intake head 61 to which is pivoted a screen cover cap 62. If desired a body of filter material 63, such as steel wool, may be used to prevent lint or the like from being drawn into the bore 64 of the spindle. Air is free to pass down through the porous cover 62, and the latter may be raised for renewal of the filter mass 63 when the latter becomes clogged.

A fitting 70 is threaded into the inner end of the spindle and also receives a union 71 of a copper tube or the like 72. The interior of this tube 72 communicates pneumatically with the bore 64 through the coupling and fitting and extends downwardly along the lay sword shown in Fig. 2 to enter a closed air chamber 75 mounted on the lay sword or some other part moving with the lay. A stem 76 extending rearwardly from the chamber 75 is connected to the flexible hose 47 and in this way the condition of the air in the chamber 75 is determined by the pump. I have shown a second tube 80 extending from the chamber 75 and along the rear of the lay as at 81 in Fig. 1 to the opposite side of the loom to have connection with the spindle at that end when the loom is equipped with shifting boxes, or a spindle pick, at both ends.

In operation, normal reciprocation of the lay causes a pump to develop a vacuum in hose 47 when the lay is receding, and forces air forwardly through the hose when the lay is advancing. Because of the connections described air will flow through the bore 64 of the spindle, being drawn in through the cover 62 when a vacuum is created to travel along the bore in a direction from left to right as viewed in Fig. 3. This air, being rarefied is of a lower temperature than that of the spindle and serves to conduct a part at least of the heat of the spindle away from the latter. On the reverse stroke of the lay air is forced outwardly through the bore 64 in a direction from right to left, as viewed in Fig. 3, and out of the head 61. This circulation of air through the spindle serves also to cool it.

Air under compression is likely to have its temperature raised while rarefaction of air lowers the temperature. For this reason a greater cooling effect is experienced when the pump is creating a vacuum to draw air in through the cover 62 than is the case when the air is being forced out under compression. If it be desired to use only the greater cooling of rarefied air the pump can be modified as shown in Fig. 4 by the use of a valve 90 on the rear side of the piston remote from the hose 47. This valve cooperates with a port 91 to close the latter when a vacuum is being formed but opens the latter when the piston moves forwardly thereby relieving the tendency of the piston to force air through the hose 47. A check valve 92 in the cylinder head covering port 93 leading to hose 47 will act also to prevent compressed air from entering the hose.

Should the mechanism as set forth herein be adapted for use with compressed air only, the piston will have a valve 100 on its front side to cover a port 101 so that air will be forced forwardly through hose 47 under compression. The cylinder head in this form of the invention will have a check valve 102 to cover a port 103 opening to the tube 47 and acting to close the port when the piston moves rearwardly but opening the port 103 on the compression stroke.

In the ordinary loom picking occurs at so-called top center when the lay is moving rearwardly and is midway between its front and back positions. It is at this time that the picker 26 slides along the spindle to develop the heat already referred to, but by the drive provided for the air pump piston the rate of vacuum formation is highest at this time and the inrush of air is therefore at maximum at the time heat is being developed.

From the foregoing it will be seen that I have provided means for causing a flow of cooling fluid along a surface of the spindle to cool the latter. It will also be seen that the means shown for accomplishing this result includes a hollow picker spindle through which air is caused to flow to dissipate the heat developed by the picker. Further, the time of maximum flow of air coincides with the time of picking when the heat is developed.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a loom, a hollow spindle, a shuttle picker slidable along the spindle and tending to heat the latter, a source of pneumatic subatmospheric pressure, and means to connect said source pneumatically with the interior of the hollow spindle to induce a draft of air at subatmospheric

pressure through the spindle to cool the latter.

2. In a loom, a hollow picker spindle, a picker slidable along the spindle and tending to heat the latter, one end of the spindle being open to the atmosphere, and means connected to the other end of the spindle to subject the air in said hollow spindle to a pressure below the pressure of air of the surrounding air.

3. In a loom, a hollow picker spindle, a shuttle picker slidable along and tending to heat the spindle, and means to create a partial vacuum in the hollow part of the spindle adjacent one end thereof to induce a cooling draft of air into the hollow part of the spindle adjacent the other end.

4. In a loom, a hollow picker spindle, a shuttle picker slidable along and tending to heat the spindle, one end of the spindle being open to the atmosphere, and means to subject the air in the spindle alternately to rarefaction and compression to induce a flow of air into and out of the spindle to dissipate the heat of the latter.

5. In a loom, a hollow picker spindle, a shuttle picker slidable along and tending to heat the spindle, means to create a vacuum in the hollow part of the spindle adjacent one end thereof to induce a cooling draft of air into the other end of the spindle, and a filter interposed between the interior of the said other end of the spindle and the atmosphere to prevent the passage of foreign matter into the spindle.

6. In a loom, a lay having a hollow picker spindle thereon one end of which is open to the atmosphere, an air pump, hollow means mounted on the lay and defining an air chamber, flexible means connecting the air pump and the air chamber, and a metallic tube extending from the air chamber to the other end of the spindle, the flexible tube, the air chamber and the metallic tube constituting a pneumatic connection between the air pump and the air in the hollow spindle, the air pump causing a change of air in the hollow part of the spindle by inducing a change in the pneumatic pressure in said pneumatic connection.

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