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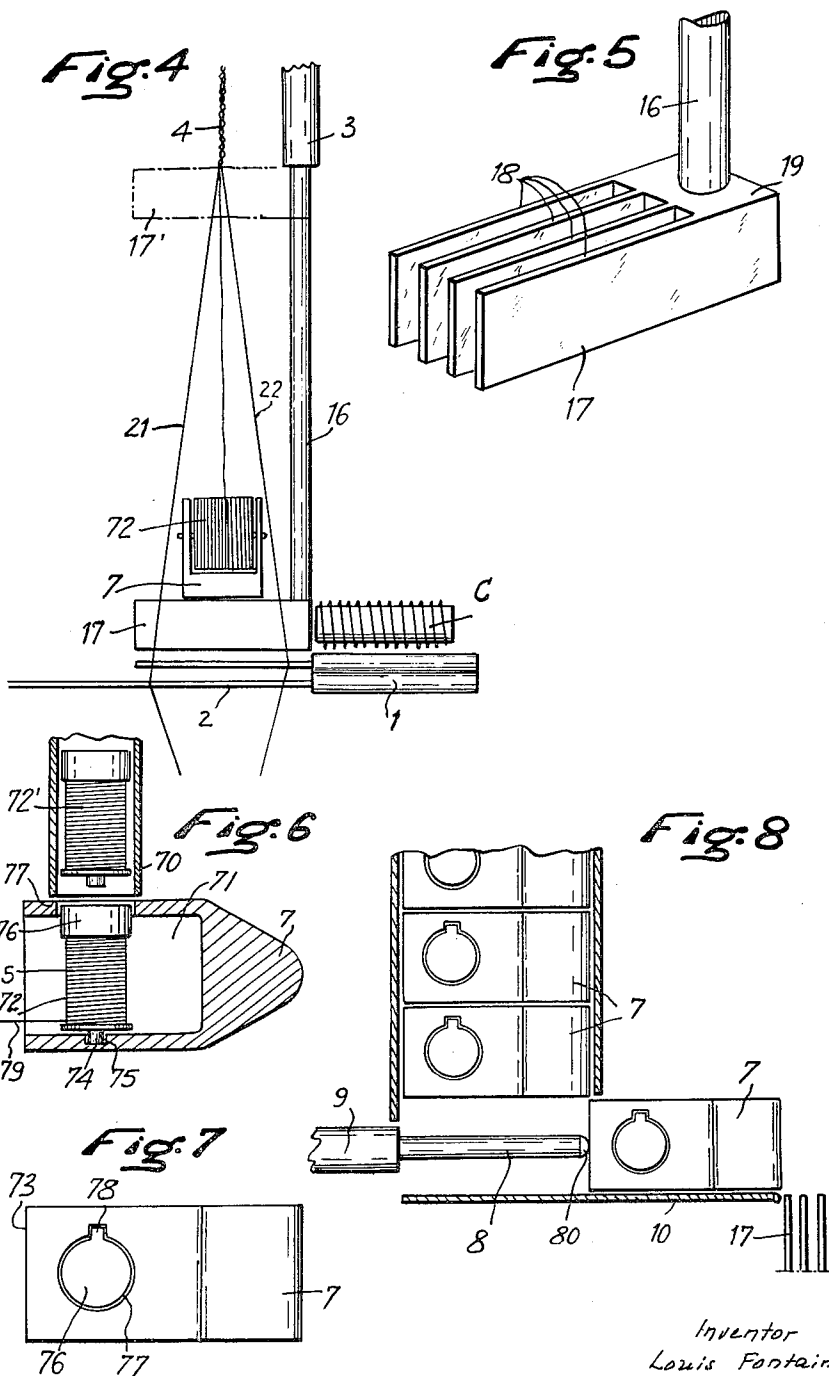
L. FONTAINE

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CONTINUOUS WEAVING LOOM

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Inventor
Louis Fontaine
by Michael S. Striker
Attorney

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CONTINUOUS WEAVING LOOM

Louis Fontaine, 22 Ave. de Grammont, Tours, France

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Weaving looms in which the weft yarn is laid between the warp yarns by a member which moves in one direction only, thereby differing from conventional methods of weaving are known.

The present invention relates to a loom of this kind having a number of improvements.

The loom in accordance with the present invention is one in which the warp shed is traversed simultaneously by a number of movable devices, hereinafter called "runners," each of which lays a pick in the course of its movement characterised by the fact that each runner, instead of seizing a weft yarn disposed in its path, carries a small bobbin of yarn on which is wound a length of weft which it is to lay during its movement, the said bobbin unwinding itself as the runner moves through the shed and being completely unwound when the desired length of weft has been laid between the warps by the said runner during its travel; each warp yarn is individually controlled by a heald, the displacement of the heald being controlled individually; the weft yarns laid between the warp yarns are beaten up by means of a number of reeds, the displacement of each reed being separately controlled and the reeds in the neutral position lying in one and the same plane so as to form a grid over which the runners are displaced; the runners are projected through the warp shed by any appropriate projecting device; the means for moving the healds and the means for moving the reeds are controlled by a programming member in dependence on the speed of travel of the runners through the shed.

By way of example and to facilitate understanding of the specification there have been shown in the accompanying drawing:

FIGURE 1 is a general arrangement showing the loom in accordance with the invention in front elevation.

FIGURE 2 is a side elevation of FIGURE 1.

FIGURE 3 is a detailed view of the heald control.

FIGURE 4 is a view to a larger scale of a detail of FIGURE 2.

FIGURE 5 is a detailed perspective view of one of the parts of FIGURE 4.

FIGURE 6 is a sectional plan of a runner.

FIGURE 7 is a side view of FIGURE 6.

FIGURE 8 is a diagrammatic view of the means for propelling the runner.

It will be seen from FIGURES 1 and 2 that the loom in accordance with the present invention has a frame 11 which supports the warp beam 12 (or a group of warp bobbins), a guide roller 13, a heald assembly 2, operated by pistons 1, reed members 17 carried by rods 16 and pistons 3' reciprocable in cylinder, a guide roller 14, and a cloth take-up beam 15.

The warp which is shed by the healds provides a path for the runner 7 which slides on the grid A formed by the reed 17 when they are in the neutral position in which the upper faces of the reeds are located in a common plane.

It will be seen from FIGURE 3 that the warp threads 21 and 22 pass through healds 2 and that each heald 2 is fixed to a piston 11 moving in a cylinder 1'. The cylinders 1' are placed side by side and, in accordance with the desired density of the warp, the cylinders 1' can be arranged in several rows. In the example shown in FIGURE 3 two rows of cylinders 1' have been shown.

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Each piston is connectable by a conduit 25 to a source of compressed air for its outward movement and to a source of suction for its return movement and connection of the conduits 25 to the source of compressed air or to the source of suction, both of which are not shown in the drawing, is controlled through a programming device as indicated in FIG. 2 but which is not described as it does not form part of the present invention.

It will thus be seen that each heald 2 is individually controlled without necessarily being connected to a mechanism repeating the same movement at a particular frequency so that an infinite number of different wefts can be obtained.

It will be seen in FIGURE 4 that the healds 2 with their cylinders 1' are surmounted by the grid A formed by the reeds 17 placed side by side with the upper surfaces thereof in one and the same plane.

FIGURE 5 is a detailed view of a reed 17, each reed 17 having a series of blades 18, four in the example shown here, connected to a body part 19 which is fixed to the rod 16 of a piston moving in a cylinder 3. Each cylinder 3 is connected by a conduit 26 to a source of compressed air not shown in the drawing. When the compressed air is admitted to the cylinder 3 the reed 17 takes up the position 17' shown dotted in FIG. 4. The passage of the compressed air conduit 26 is controlled by the programming device through which the healds 2 are controlled. A spring 3a or other return device disposed within the cylinder 3 returns the reed 17 to the lower position.

When the reeds 17 reach their lifted position they come into contact with the fell of the fabric and beat up the weft yarn which runs off the bobbin 72 of the runner 7 as will be described further on. The runner 7 moves over the grid A formed by the reeds 17 when they are in their lowered or neutral positions.

It will be seen from FIGURES 6 and 7 that the runner or shuttle 7 profiled has a housing in which is disposed a small bobbin 72 and said housing has preferably a tapered end.

On this bobbin 72 there is a weft yarn 5. The length of this weft 5 is slightly greater than the width of the shed through which the runner has to pass.

The lower end 74 of the bobbin engages in a recess 75 in the wall of the runner 7. It is clear that the recess 75 can be replaced by any other means forming a bearing for receiving the part 74 of the bobbin 72.

At the upper end of the bobbin there is a brake 76 of known kind which engages in the bore 77 in the wall of the runner. This device is not shown in detail as it is not claimed in itself. It can in particular be of the friction disc type and comprise a tongue 78 engaging in a notch formed in the wall of the runner so as to immobilise the brake 76 when the bobbin 72 is unwinding.

The yarn 5 wound on the bobbin 72 has a free end 79 which is retained by any suitable gripping member at the beginning of the movement of the runner 7 so that the bobbin 72 unwinds as and when the runner moves across the shed.

At the end of the transverse movement of the runner 7 the bobbin 72 is discharged from it and the empty runner is brought back by any suitable means to the starting position so as to receive a new bobbin 72 and lay a new pick during its next transverse movement.

The device for supplying the runner 7 with new bobbins can be in the form of a cylindrical loading device 70 in which a number of bobbins 72, 72' . . . are disposed like cartridges in a rifle magazine.

Furthermore the runners can be loaded with several bobbins each containing the length of weft yarn to be laid during one movement of the runner through the shed. These bobbins can be situated either coaxially or with

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their axes out of line. When these bobbins are arranged coaxially either the length of the bobbins or the height of the runners is varied in order that they may be housed within the runner; when they are not coaxial the width of the runners is varied and as many automatic loading devices are provided as there are bobbins to be lodged in one and the same runner.

FIGURE 8 shows the device for projecting the runners 7. A rod 8 fixed to a piston which moves in a cylinder 9 supplied with compressed air carries at its end an engaging member 80, preferably elastic, and under the effect of the compressed air is caused to strike the rear wall 73 of the runner 7, projecting the latter forward along a ramp 10 situated at the same level as the upper face of the grid A formed by the reeds 17.

After a runner 7 is projected the rod 8 moves back within the cylinder 9 and the next runner is presented in front of the rod 8.

The means by which the runners 7 are presented to the rod 8 can advantageously be similar to those usually used for presentation of shells to the firing pin in automatic guns, the weft yarn 5 from the bobbin 72 being gripped by known means when a bobbin leaves the loader 70.

The speed at which each runner 7 passes through the shed whilst sliding on the grid A should be constant. For this purpose there are disposed along the grid A a series of electro-magnetic coils C which create in the grid A a magnetic field which maintains the movement of each runner through the shed. Obviously in this case the reeds 17 and the runners 7 must be of materials having good magnetic characteristics.

As the principle of regulation of the speed of a movable member in a magnetic field is known it is not claimed in itself here and is not described in detail.

The manner of operation of a weaving loom of this kind is as follows:

The warp yarns having been separated at 21 and 22 by the healds 2 operated by the pistons 1 and cylinders 1', a first runner 7a is projected by the pneumatic hammer 8, 9. The runner 7a slides over the ramp 10 and then over the grid A formed by the reeds 17 and its speed is maintained constant by the variations in the magnetic field induced in the reeds 17 by the magnets C, the weft yarn 5 unwinding from the bobbin 72 as and when the runner 7a advances.

As the programming device is regulated on a time basis corresponding to the speed at which the runners 7 pass through the warp shed, the cylinders 1' are subjected one after the other to pressure or to suction immediately after the passage of the runner 7a which causes the relative positions of the healds 2 to be changed during the passage of the runner and immediately thereafter; the cylinders 3 are also supplied with pressure one after the other immediately after the cylinders 1' to which they correspond so that as the shed is changed the reeds 17 are lifted one after the other and beat up the weft yarn 5 in the fell of the cloth 4 before returning to their original position.

The supply of compressed air to the cylinder 9 is then controlled by the programming device and another runner 7b is then projected by the pneumatic hammer 8, 9. This second runner 7b passes through the warp shed laying a second pick and as it passes through the warp shed the warps take up a new position and the weft 5 is beaten up into the fell of the cloth 4.

That is shown specially in FIGURE 1 in which the runner 7a is shown in mid-stroke. Its weft yarn 5 is beaten up into the fell of the cloth 4 by the blades 18 which then return to the lower position in order to allow the runner 7b to pass which is shown at one quarter of its stroke, its weft being gripped by a suitable gripping member, as mentioned before.

The empty runners 7a, 7b, 7c, etc. . . . are recovered by a device in accordance with any known method.

In the example described the healds 2, the reeds 17 and the hammer 8 are actuated by pneumatic pistons but

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it is obvious that the invention is not limited to such an arrangement and that these pneumatic pistons can be replaced by any other mechanical, electrical, or electro-magnetic means for performing the same operation, such for example as solenoids which are displaced under the effect of an electro-magnetic field.

It is also to be noted that as each heald 2 is individually controlled the loom can be used for producing an infinite variety of weaves, the loom not being limited to any repetition of the shed changing at any particular frequency.

Furthermore this loom makes it possible to project a number of runners before the first has reached the end of its stroke. A number of runners can be at the same time in the warp shed in staggered positions so that a very high weaving speed can be obtained which depends only on the response characteristics of the programming device and the rate at which the runners are presented to the pneumatic hammer.

I claim:

1. In a weaving loom, in combination, frame means adapted to support a warp composed of a plurality of warp threads extending parallel to each other substantially in a plane; a plurality of healds, one for each warp thread, mounted on said frame means movable in a direction transverse to said plane between a forward and a rearward position, said healds being respectively adapted to engage the warp threads for moving the engaged portions thereof in a direction transverse to said plane so as to form a shed; a heald operating means connected to each heald for moving when actuated the respective heald independently of the other healds between said positions thereof; a plurality of reed members extending transverse to said plane between the warp threads and being movable from a neutral position in which upper surfaces of said reed members extend in a second plane transverse to that of the warp threads and a raised position; a plurality of reed supporting and operating means mounted on said frame means, one for each reed member, for moving, when actuated, the respective reed member individually from said neutral to said raised position and back; a plurality of shuttles each having a bobbin with a weft thread wound thereon of a length equal at least to the width of the warp, said shuttles adapted to ride on said upper surfaces of said reed members when the same are in the neutral position for placing during the passage thereof across the warp shed a weft thread into said shed; means for projecting said shuttles one by one in succession along said surfaces in one direction through said warp shed; speed regulating means for maintaining the speed of each shuttle during its passage across the shed substantially constant; and programming means for successively actuating each of said heald operating means and each of said reed supporting and operating means independent of each other and in dependence on the speed of the shuttle across the shed.

2. In a weaving loom, in combination, frame means adapted to support a warp composed of a plurality of warp threads extending parallel to each other substantially in a plane; a plurality of healds, one for each warp thread, mounted on said frame means movable in a direction transverse to said plane between a forward and a rearward position, said healds being respectively adapted to engage the warp threads for moving the engaged portions thereof in a direction transverse to said plane so as to form a shed; a heald operating means connected to each heald for moving when actuated the respective heald independently of the other healds between said positions thereof; a plurality of reed members extending transverse to said plane between the warp threads and being movable from a neutral position in which upper surfaces of said reed members extend in a second plane transverse to that of the warp threads and a raised position; a plurality of reed supporting and operating means mounted on said frame means, one for each reed member, for moving, when actuated, the respective reed member individually

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from said neutral to said raised position and back; a plurality of shuttles each having a bobbin with a weft thread wound thereon of a length equal at least to the width of the warp, said shuttles adapted to ride on said upper surfaces of said reed members when the same are in the neutral position for placing during the passage thereof across the warp shed a weft thread into said shed; means for projecting said shuttles in succession along said surfaces in one direction through said warp shed; speed regulating means for maintaining the speed of each shuttle during its passage across the shed substantially constant; and programming means for successively actuating each of said heald operating means and each of said reed supporting and operating means independent of each other and in dependence on the speed of the shuttle across the shed and as soon as one of said shuttles has passed the respective heald and reed member so that the next shuttle may be projected through the shed across the warp before the preceding shuttle has finished its passage across the warp while the position of the warp threads forming the shed may be changed for each shuttle passage.

3. A weaving loom as set forth in claim 1 in which said heald operating means and said reed supporting and operating means are pneumatically operated cylinder and piston means.

4. A weaving loom as set forth in claim 1 in which each heald operating means includes a cylinder and a piston connected to the respective heald and reciprocable in said cylinder.

5. A weaving loom as set forth in claim 1 in which each of said reed supporting and operating means includes a cylinder mounted on said frame means, a piston reciprocable in said cylinder and a piston rod connected at opposite ends to said piston and the respective reed member.

6. A weaving loom as set forth in claim 1 in which said reed members and said shuttles are at least in part

made from magnetizable material and in which said speed regulating means include a plurality of stationary induction coils arranged along said reeds and cooperating therewith for creating therein a variable magnetic field for maintaining the speed of the shuttles moving over the reeds substantially constant.

7. A weaving loom as set forth in claim 1 in which said means for projecting said shuttles in one direction through said warp shed include a pneumatic hammer.

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35 DONALD W. PARKER, *Primary Examiner*.

RUSSELL C. MADER, *Examiner*.