

United States Patent

Meierhofer

[15] 3,681,825

[45] Aug. 8, 1972

[54] **MACHINE FOR THE AUTOMATIC
DRAWING IN OF THE THREADS OF A
WARP**

[72] Inventor: **Hugo Albert Meierhofer**, Uster,
Switzerland

[73] Assignee: **Zellweger, Ltd.**, Uster, Switzerland

[22] Filed: **May 11, 1970**

[21] Appl. No.: **36,052**

[52] U.S. Cl.28/46

[51] Int. Cl.D03j 1/14

[58] Field of Search.....28/44, 45, 46, 41, 42

[56] **References Cited**

UNITED STATES PATENTS

3,103,056 9/1963 Wieneke.....28/46

2,447,274	8/1948	Peterson.....	28/46
3,293,722	12/1966	Huffman et al.....	28/46
R16,206	11/1925	Bearden	28/41

FOREIGN PATENTS OR APPLICATIONS

709,424	5/1954	Great Britain.....	28/46
---------	--------	--------------------	-------

Primary Examiner—James Kee Chi

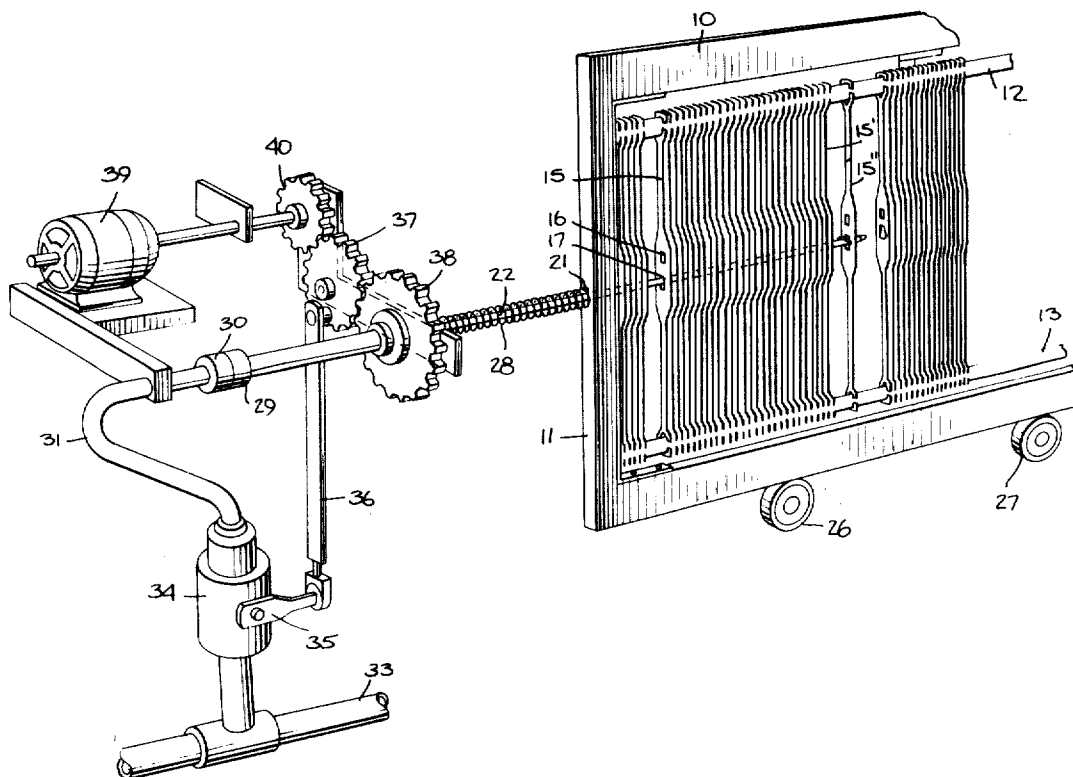
Attorney—Kenyon & Kenyon Reilly Carr & Chapin

[57]

ABSTRACT

The healds are arranged to slide along a shaft so as to be pressed together during the drawing-in operation. Thereafter, the healds are individually selected for drawing-in of the warp. After selection, the healds are moved across the width of the frame. A blast of air is used to facilitate the movement of the healds across the frame.

10 Claims, 4 Drawing Figures



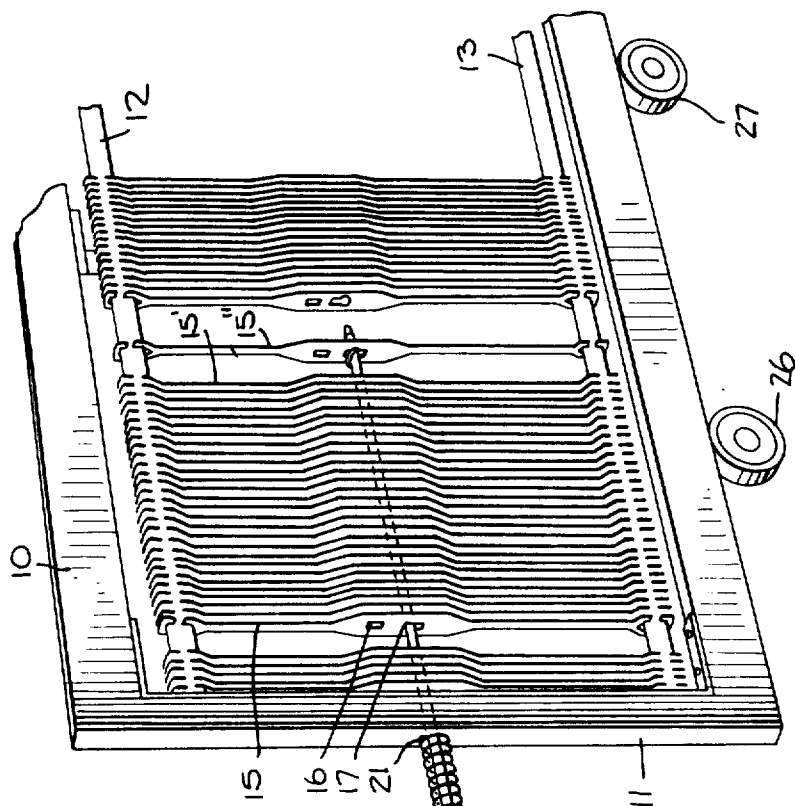
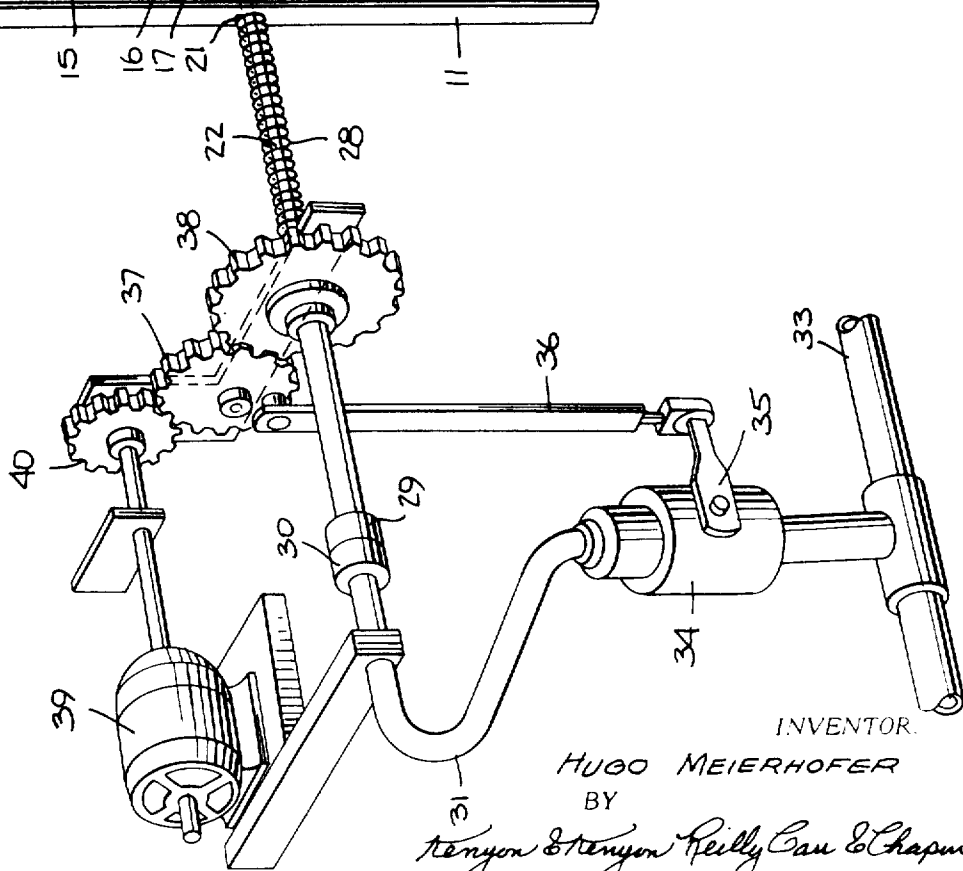


Fig. 1.

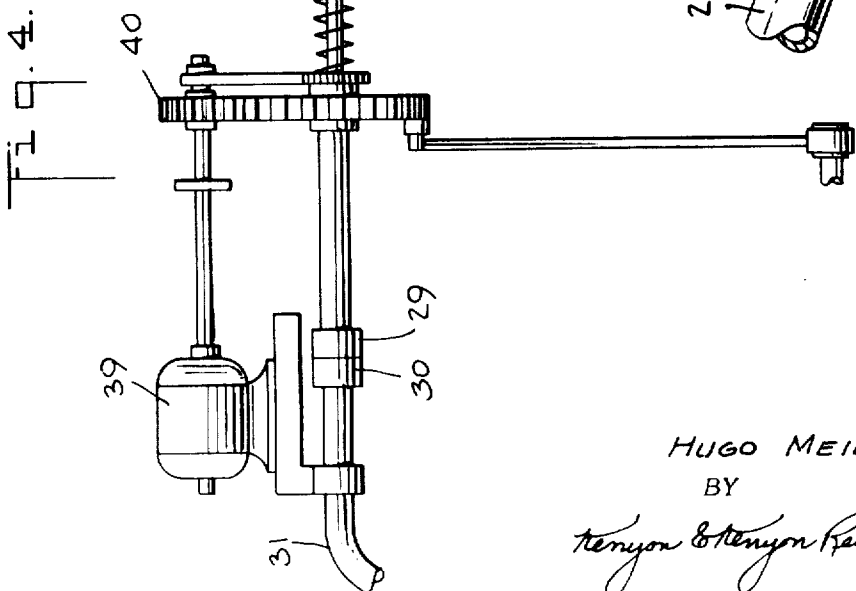
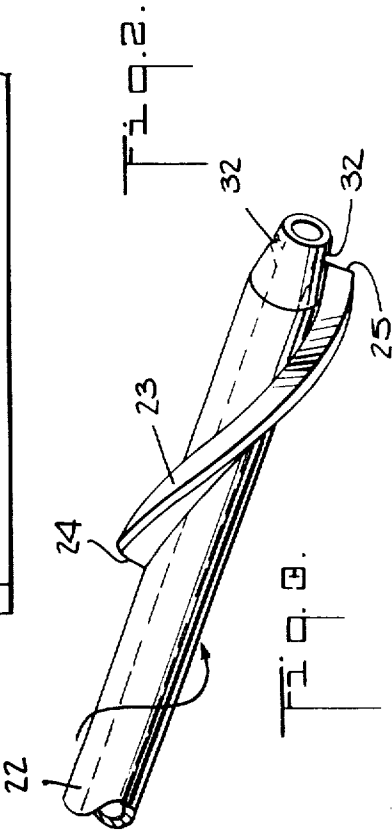
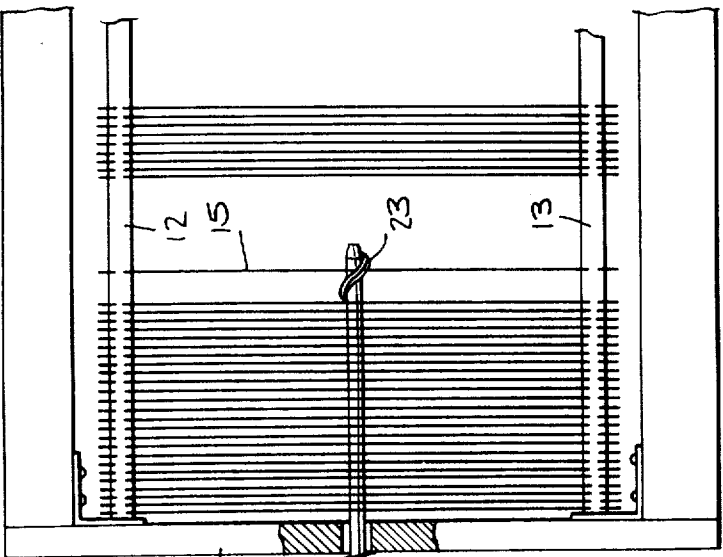
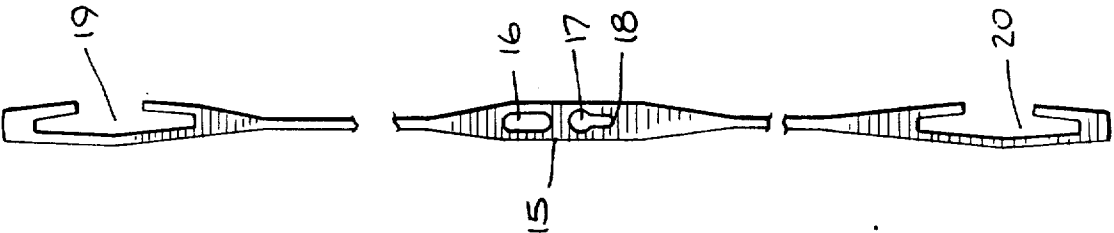


INVENTOR.

HUGO MEIERHOFER

BY

Kenyon & Kenyon Reilly Can & Chapin
ATTORNEYS



INVENTOR.
HUGO MEIERHOFER
BY
Kenyon & Kenyon Rully Case & Chapin
ATTORNEYS

MACHINE FOR THE AUTOMATIC DRAWING IN OF THE THREADS OF A WARP

This invention relates to an apparatus for drawing warp threads into healds on a weaving machine. More particularly, this invention relates to an apparatus for distributing healds across a weaving machine.

It has been known to construct weaving machines in such a way that the warp to be drawn in is prepared and clamped on a stationary machine bed while a weaving harness, drop wires and a reed are supported in a suitable position. Also, a heald and selection and drawing-in elements have been arranged on a longitudinally displaceable carriage in such a way as to move reciprocally through suitable apertures in the weaving frames as the drawing-in operation progresses, starting with the last heald. The carriage has thus moved over a corresponding distance over the machine bed. As a result, the selection and drawing-in elements are arranged at the ends of relatively thin rods which are of a length approximately equivalent to the width of the weaving harness. On the other hand, the machine bed must be of such a length that the carriage can move sideways over the whole width of the warp.

However, since the width of the warp for modern weaving machines is continually being increased, or, alternatively, multi-width warps are being utilized, the distance between the selection and drawing-in elements and the driving devices therefor on the carriage become so great that a trouble free operation is no longer guaranteed. Further, the machine bed to move the carriage would be so wide that its installation would meet with difficulties.

It has also been proposed to push the healds on a weaving frame against a side support of the weaving frame so that the selection of the various healds for warp draw-in can be carried out at the free end of the pressed together healds. In this way, a situation would be created in which the rod carrying the selection device need only have a length equal to the length of the pressed together row of healds and need not stretch over the entire width of the weaving frame.

Selection devices have been known for systems using keyhole healds, for example, a device such as described in U.S. Pat. No. 1,188,070, and in particular FIGS. 23, 24 and 27 thereof. While this patent relates to a drop wire selection device, such a device in principle, operates in exactly the same way as a heald selection device. The healds contain apertures, each of which has an extension pointing upwards or downwards, and each of which is placed on heald carrying rods in such an order that the extension points alternately upwards and then downwards and so on. A key rod which is fitted through these apertures has a spiral shaped shoulder which extends half way around the circumference of the rod and is of a height equal to the size of the extension of the aperture. When the key rod turns, the furthestmost heald falls onto this shoulder, as soon as its direction corresponds with the direction in which the extension of the aperture is pointing. This heald is then moved towards the other end of the key rod through the screw-like action of the shoulder. The rest of the healds are held back against the fixed end of the key rod until a further half turn of the key rod brings the shoulder into such a position to correspond with the extension of the aperture in the next heald. As a result, this next heald will be moved over the shoulder. Upon

arriving at the end of the shoulder, the heald is seized by an element of known construction and the thread to be drawn-in is drawn-in through the thread eyelet of the heald.

While these various systems have been known for pressing healds together so as to limit the length of the heald selection shaft, there has been some difficulty in distributing the healds across the weaving machine frame.

Accordingly, it is an object of the invention to distribute selected healds across a weaving frame in a simple efficient manner.

It is another object of the invention to distribute selected healds in a controlled manner across a weaving frame.

It is another object of the invention to distribute a bunched group of healds across the entire width of a weaving frame in a sequential order.

Briefly, the invention provides an apparatus for distributing healds with drawn-in thread therein over the entire width of a weaving frame after selection of each heald from a bunched group of healds. The apparatus utilizes a rotatable key rod of a selection device which serves to select and segregate the outermost heald of a group of healds by means of a spiral shoulder projecting from the key rod. In addition, the apparatus causes a jet of air to be expelled from the key rod as a heald leaves the key rod in order to push the heald longitudinally along the heald carrying rods of the weaving frame.

In order to achieve this, the key rod is constructed, for example, in the form of a hollow tube which is connected at the rear or drive end to a controlled compressed air supply. In addition, the key rod has apertures on the front end which direct a jet of air against the selected heald.

In one embodiment, the compressed air supply is switched on by means of a valve, controlled by the actual turning movement of the key rod, the valve being momentarily opened when the apertures in the key rod are pointing towards the selected heald.

The weaving frame itself is supported in such a way so as to be moved to one side and a spring, mounted on a fixed part of the machine, is disposed against the frame to impart necessary movement to the weaving frame. The biasing force of the spring is arrested by the heald which abuts the shoulder of the key rod as the outermost heald is being segregated. Instead of a spring, a weight, acting on the weaving frame, or any other suitable means, could also be used for the longitudinal movement of the weaving frame.

These and other objects and advantages of the invention will become more apparent from the following detailed description and appended claims taken in conjunction with the accompanying drawings in which:

FIG. 1 illustrates a perspective view of a weaving frame with a selection device and a distributing apparatus according to the invention;

FIG. 2 illustrates a view of a heald with a "keyhole;"

FIG. 3 illustrates a fragmentary view of the leading end of a key rod according to the invention; and

FIG. 4 illustrates a side elevation of the weaving frame of FIG. 1.

Referring to FIG. 1, a weaving frame 10 includes a pair of side supports 11 (only one of which is shown for

clarity) into which a pair of heald carrying rods 12, 13 are fitted for supporting a plurality of healds 15. It is noted that while only one weaving frame 10 is shown, a conventional weaving machine would utilize a number of such frames, e.g. up to 28. In addition, a reed (not shown) of known construction having suitable reed dents therein is mounted on suitable support rollers to the cloth side of the frame 10 and a row of drop wires is arranged behind the weaving frame (e.g. a total of eight such rows of drop wires can be used). The weaving frame 10 is located in the machine so that a warp sheet can be pulled off a warp beam (not shown) which is supported on a transportation frame and is prepared and clamped, as is known, between a pair of clamping rails. In order to move the transportation frame during the progress of a drawing-in operation, an advance motion of suitable structure is used.

Referring to FIG. 2, each heald 15, as known, consists of end eyelets 19, 20 and a center portion in which a thread eyelet 16 and a keyhole 17 with an extension 18 are situated. In the row of pressed together healds 15, the healds are so arranged that the extension 18 of the respective keyholes 17 alternately points upwards and downwards.

Referring to FIGS. 1 and 3, the side supports 11 of the weaving frame 10 also contain a keyhole 21 through which a key rod 22 of a selection device is inserted. The keyholes 17 of healds 15 and the keyhole 21 of the side supports are arranged along the same axis so that the key rod 22 can be inserted through all the keyholes 17. The length of the key rod 22 is chosen in such a way that the pressed together row of healds only extend over the length of the selection device.

Referring to FIG. 1, the key rod 22 carries projecting shoulder 23 at the free end which is in the form of a spiral and extends approximately half way around the circumference of the key rod 22 (FIG. 3). In addition, the key rod 22 is mounted for rotation and is driven by a motor 39 via a drive 40, 37, 38. In operation, as the key rod 22 turns, the foremost heald 15 will lie against the fixed end 24 of shoulder 23 (FIG. 3) until the shoulder 23 falls into the extension 18 of the keyhole 17 in the heald. The second heald will however be held back, since the extension 18 of the keyhole 17 therein is pointing in the opposite direction. The first heald however will be transported to the right, along the shoulder 23, by the further turning action of the key rod 22, until the heald leaves the shoulder at point 25 (FIG. 3). In the meantime, the fixed end 24 of the shoulder 23 will have reached the same position as that of the keyhole 18 in the next heald and this next heald will now be transported to the right by the further turning action of the shoulder 23.

In order to position the bunched group of healds 15 so that a heald will always be available for selection during every half turn of the key rod 22, a force is exerted on the weaving frame 10 to bias the frame 10 and pressed together healds 15 against the fixed end 24 of the shoulder 23. To this end, the frame is supported on rollers 26, 27 so as to be laterally displaced. The required force is, for example, exerted on frame 10 by means of a spring 28, which is fitted between a fixed part of the machine frame and a frame support 11.

As soon as a heald reaches the end 25 of the shoulder 23 of the key rod 22, the heald is seized by a drawing-in

device, which draws-in a thread through the thread eyelet 16. Such drawing-in elements are already known and need not be further described. An example thereof is described in U.S. Pat. No. 2,828,527.

After the actual drawing-in operation has been carried out, the healds are ready to be loosely distributed over the entire width of the frame 10. To this end, a pneumatic apparatus is provided. Referring to FIG. 1, the pneumatic apparatus utilizes the key rod 22 so as to blow a jet of air through the key rod 22 against a segregated heald. In order to facilitate the flow of air, the key rod 22 is hollow and has a revolving gasket 30 on the driving end, which in turn is connected by a flexible pressure line 31 to a pressure supply system 33, over a valve 34. In addition, the free end of the key rod 22 is suitably shaped and provided with apertures 32 preferably cut at an angle and pointing along the axis of the key rod 22 (FIG. 3). These apertures 32 are provided on the heald side end of the key rod 22 to direct a jet of air against the selected and drawn-in heald. As a result of this air jet, the selected heald is pushed to the right, as viewed, along the heald carrying rods 12, 13.

In order to transmit a blast of air through the pressure line 31 and key rod 22, the valve 34 is activated by means of a lever 35 which is pivoted by means of a rod 36 depending from and eccentrically mounted on the gear wheel 37 of the drive for the key rod 22. As the gear wheel 37 rotates, the rod 36 changes the position of the lever 35, with a swinging movement, whereby the valve 34 is opened and closed. The periods of time during which the valve 34 is opened are chosen so that the air jet extrudes from the apertures 32 when these are aimed at the heald 15. As a result, the selected heald will be pushed further along the frame after the thread has been drawn-in.

It is noted that in the example described, only one weaving frame 10, with the relevant elements is shown for the purpose of clarity. A complete installed drawing-in machine contains a multiplicity of weaving frames, which are arranged one behind the other in the machine, all of which are provided with the same means for selection, drawing-in and further transportation.

What is claimed is:

1. In combination with a weaving frame having a plurality of healds slidably mounted therein for alignment with each other in a pressed together bunch;

a selection device including a rotatable key rod having means thereon for selecting and segregating the foremost heald of said bunch of healds from the remaining healds of said bunch to draw-in a warp thread therein, said rod being of a length whereby said bunch of healds only extend over the length of the selection device; and

means for distributing a segregated heald with a warp thread therein along and across the width of said weaving frame.

2. The combination as set forth in claim 1 wherein said distributing means includes means on one end of said key rod for directing a jet of air against a segregated heald thereat.

3. The combination as set forth in claim 1 wherein said key rod is hollow and includes apertures at one end thereof directed axially of said key rod, and said distributing means includes means for directing air

5

through said key rod and through said apertures against a heald positioned adjacent said end for moving said heald across said weaving frame.

4. The combination as set forth in claim 10 wherein said means for directing air includes a valve connected to an opposite end of said key rod and to a pressure supply system, and means for opening and closing said valve to discharge air into said key rod in sequence with the positioning of a heald at said one end.

5. The combination as set forth in claim 4 wherein said means for directing air includes a flexible pressure line between said valve and said key rod and a revolvable gasket between said pressure line and said key rod.

6. The combination as set forth in claim 10 wherein said apertures are disposed in angular relation to the axis of said key rod.

7. The combination as set forth in claim 10 which further includes means for synchronizing the operation of said valve with rotation of said key rod.

8. The combination as set forth in claim 1 wherein said key rod is fixedly mounted, said frame is movably mounted relative to said key rod, said means on said key rod is a projecting spiral shaped shoulder at one end thereof, and which further includes means biasing said frame and said bunch of healds against said shoulder.

9. In combination with a weaving frame having a plurality of healds slidably mounted therein for alignment

6

with each other in a pressed together bunch;

a rotatable key rod having means thereon for selecting and segregating the foremost heald of said bunch of healds from the remaining healds of said bunch to draw-in a warp thread therein; and

means for distributing a segregated heald with a warp thread therein along the width of said weaving frame, said distributing means including means on one end of said key rod for directing a jet of air against a segregated heald thereat.

10. In combination with a weaving frame having a plurality of healds slidably mounted therein for alignment with each other in a pressed together bunch;

a rotatable key rod having means thereon for selecting and segregating the foremost heald of said bunch of healds from the remaining healds of said bunch to draw-in a warp thread therein, said key rod being hollow and including apertures at one end thereof directed axially of said key rod; and

means for distributing a segregated heald with a warp thread therein along the width of said weaving frame, said distributing means including means for directing air through said key rod and through said apertures against a heald positioned adjacent said end for moving said heald across said weaving frame.

* * * * *

30

35

40

45

50

55

60

65