Jan. 30, 1934. G. V. SUMNER 1,945,238

PNEUMATIC PICKER MOTION FOR LOOMS

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Fig. 1.

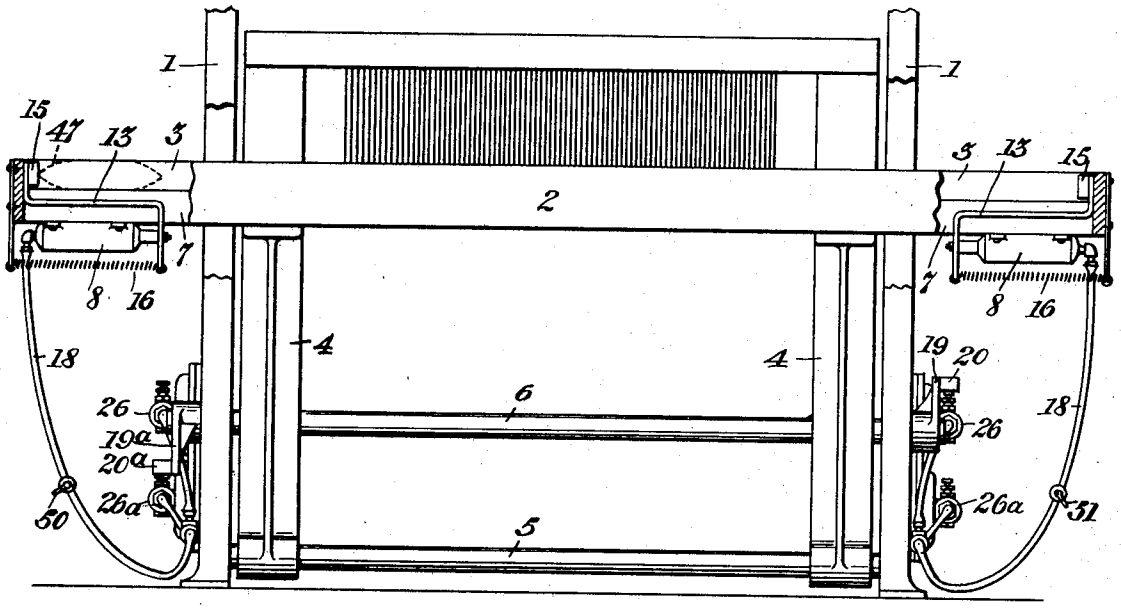
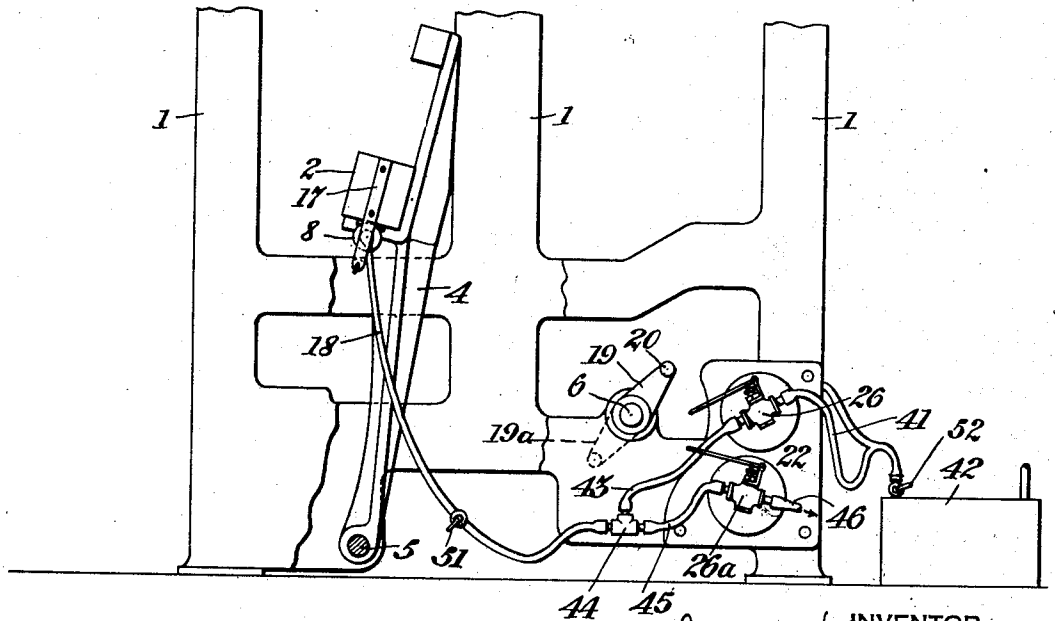


Fig. 2.



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Fig. 3.

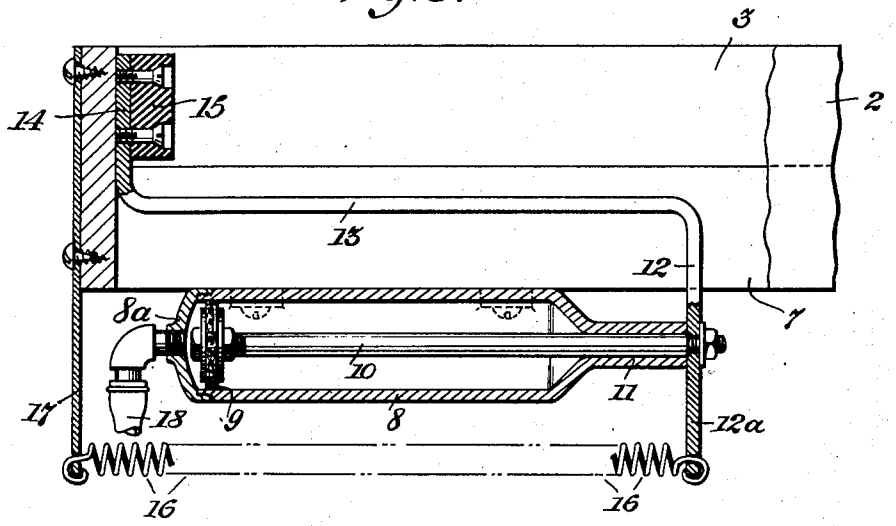


Fig. 4.

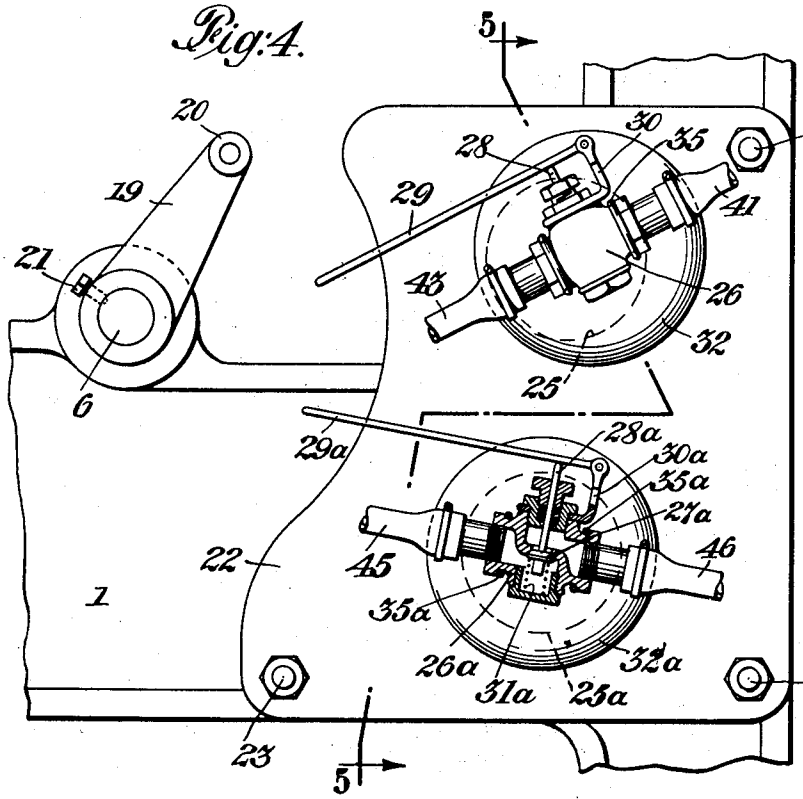
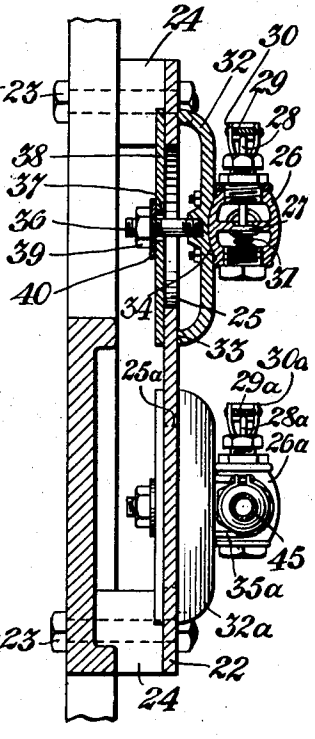


Fig. 5.



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UNITED STATES PATENT OFFICE

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PNEUMATIC PICKER MOTION FOR LOOMS

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Application July 9, 1932. Serial No. 621,575

10 Claims. (Cl. 139—144)

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawings, which show one embodiment of the invention selected by me for purposes of illustration, and said invention is fully disclosed in the following description and claims.

My invention is a pneumatic picker mechanism for looms, and comprises a pair of pneumatic cylinders and pistons for securing the reciprocation of the shuttle connected by piping, preferably flexible tubing, with controlling valve mechanism adapted to be supported in operative relation with a rotary shaft of a loom of any usual construction for securing the operation of the ordinary picker mechanism thereof, said shaft being provided with a cam or other operative rotary part for actuating said valve mechanism, to effect the desired timed operations of the shuttle, by said pneumatically operated pistons, the usual mechanical picker mechanism of the loom, intended to be operated by said rotary shaft being removed.

My invention also contemplates improved means for adjustably supporting said controlling valve mechanism so that it can be readily applied to the frame of any ordinary loom, and the positions of the individual valves, and their operating means, adjusted with respect to the operating arm, cam or device on the valve actuating shaft that the desired timing of the shuttle operating pistons can be readily effected.

It will be understood that my invention takes the place of the usual picker sticks and all intermediate parts between them and the picker operating shaft, without requiring any other changes in the construction or operation of the loom, and differences in the distance between the picker operating shaft, and the shuttle race, in different looms, can be readily accommodated by varying the lengths of the flexible piping. My invention therefore simplifies the construction of the loom, and obviates the objectionable features resulting from the use of picker sticks, and the mechanical means usually employed for their operation.

Obviously my invention may be built into a loom as originally constructed, in which case the picker operating shaft may be specially located in view of the simplification of the apparatus effected by my invention, but in such case the general construction and operation of the parts of my invention will be substantially the same as those hereinafter described except as they may be modified to suit the views of builders thereof.

My invention also comprises certain novel features of construction and combination of parts hereinafter fully described and particularly pointed out in the claims.

Referring to the said drawings, which show the best form and embodiment of my invention, selected by me for purposes of illustration,

Fig. 1 represents a front elevation, partly in section, of so much of a loom as is necessary for the understanding of my invention.

Fig. 2 is a side elevation of the parts illustrated in Fig. 1.

Fig. 3 is an enlarged detail view of one of the pneumatic shuttle actuators.

Fig. 4 is an elevation, partly in section, showing the picker operating shaft and cam or arm, and the control valves for one of the picker shuttle actuators in operative relation therewith.

Fig. 5 is a vertical sectional view on line 5—5 of Fig. 4, showing the manner of adjustably securing the valves in relation to the operating arm or cam.

Referring to the drawings, 1, represents the main frame of a loom of any usual or preferred construction. 2 represents the lay containing the shuttle race, indicated at 3, the lay being supported by vertically disposed arms, 4, pivotally mounted on a transverse shaft, 5. 6 represents a transversely disposed shaft operated in any desired way from the main driving shaft of the loom, so as to make one revolution in time with a complete reciprocation of the shuttle, from one end of the race to the other, and back again. Assuming that my invention is to be applied to an ordinary loom provided with the usual picker mechanism, operated by the shaft, 6, frequently referred to as a pick ball shaft of the loom, it will be understood that all the parts between the shaft, 6, and the shuttle, and including the picker sticks and the mechanical means for insuring the timed operation thereof by mechanical means, will be removed. Each end of the shuttle race is provided with a slot, indicated at 7—7 Fig. 1, through which the picker stick ordinarily extends.

In embodying my invention in a loom, I provide the outwardly projecting portions of the lay at each side with a pneumatic shuttle actuator, one of which is illustrated in detail in Fig. 3. Each of these devices comprises a cylinder, 8, secured to the lower side of the projecting portion of the lay, with its longitudinal axis in vertical alignment with the center of the adjacent slot, 7. Within the cylinder, 8, is a piston, 9, having a

piston rod, 10, connected therewith, and extending through a guide, 11, at the inner end of the cylinder. The piston rod is connected with a vertically disposed cross arm, 12, the upper end of which extends into the adjacent slot, 7, and has an extension, 13, extending to the outer end of the shuttle race, where it is provided with an upwardly extending portion, 14, to which is secured a block or cushion, 15, to directly engage the end of the shuttle. This block, 15, is preferably composed of hard rubber, but it may be composed of any other suitable material. The downwardly extending arm of the cross bar, 12, indicated at 12*a*, is provided with a horizontal spring, 16, the outer end of which is connected to a bracket arm, 17, secured in any desired manner to the outer end of the shuttle race, for the purpose of retracting the piston, and the block or cushion, 15, operatively connected therewith. The inner end of the cylinder, 8, is provided with an inlet aperture, 8*a*, to which is connected a flexible piping, 18, leading to the controlling valve mechanism, and having sufficient slack to accommodate the oscillations of the lay.

The construction and operation of the two pneumatic shuttle actuators shown in Fig. 1 is the same, and each of said actuators is controlled by valve mechanism, preferably supported on the side frame of the loom, adjacent to the actuator and in operative relation with the shaft, 6, and as these valve mechanisms for each shuttle actuator are identical, a description of one will suffice for both. The pick ball shall, 6, as indicated in Figs. 2 and 4, is provided adjacent to each set of valves with a suitable arm or cam, as 19 and 19*a* (Fig. 2) which may be of any desired form or shape. It is here shown as a simple arm provided at its outer end with a roller, 20, and adapted to be adjustably secured to the shaft, 6, in any suitable manner, as by set screw, 21. Adjacent to each of these arms, 19, 19*a*, I preferably provide a valve supporting plate, indicated at 22, which is bolted or otherwise secured to the frame, 1, of the loom in any usual or desired manner. Where the frame of the loom is provided with openings which would accommodate the axial supporting bolts for the valve adjusting and securing devices, hereinafter described, the plate, 22, may be directly bolted to the frame, but in some instances the apertures in the frame may not conveniently coincide with these axial bolts, and in such cases I find it convenient to secure the plate, 22, to the frame at a slight distance therefrom by means of bolts, 23, and spacing blocks, indicated at 24, in Fig. 5. The plate, 22, is provided with two apertures, indicated at 25 and 25*a*, respectively, to facilitate adjusting the valves in all directions by means of their clamping force, as hereinafter described. In connection with the plate, 22, I employ an inlet valve, indicated at 26, and an outlet or discharge valve, indicated at 26*a*.

As herein shown, the valves are identical in construction. The inlet valve, 26, for example, is provided with a vertically movable member, 27, the stem, 28, of which extends through the upper part of the valve casing, and engages an operating lever, 29, pivotally connected to a bracket, 30, secured to the valve casing, the valve being pressed upwardly into closed position by a coil spring, 31, in the bottom of the valve casing. The discharge valve, 26*a*, is constructed in exactly the same manner, and the parts are given the same reference numerals with the addition of the letter *a*. The inlet valve, 26, is rigidly secured to an adjustable clamping plate, 32, having an annular flange, 33, which engages one face of the main supporting plate, 22. The outer face of the clamping plate, 32, is preferably hollowed out or recessed, as indicated at 34, to fit the adjacent face of the valve casing, and the valve casing is conveniently and rigidly secured to the clamping plate, 32, by a pair of U-bolts, indicated at 35, or it may be secured thereto in any other desired manner. The inner face of the plate, 32, is preferably thickened in its central portion, as shown, and provided with a threaded aperture to receive an axial bolt, 36, which passes through the enlarged aperture, 25, and through a smaller aperture, 37, in a flat clamping plate, 38, on the inner face of the supporting plate, 22, and is provided with a suitable nut, 39, and washer, 40. By reference to Figs. 4 and 5, for example, it will thus be seen that by slightly loosening the nut, 39, the inlet valve, 26, can be adjusted horizontally or vertically within the limits of the aperture, 25, or rotarily, to any desired position, and secured in its adjusted position by setting up the nut, 39, which clamps the plate, 22, firmly between the flange, 33, of the clamping plate, 32, and the inner clamping plate, 38, holds the valve rigidly in its adjusted position. The outlet valve, 26*a*, is supported in exactly the same manner as that previously described, and the parts which hold the valve in position are given the same reference numerals with the addition of the letter *a*.

The inlet valve, 26, is connected by a pipe, 41, with any suitable source of pressure fluid, as for instance, a reservoir, 42, indicated in Fig. 2, for compressed air, which may be supplied from any suitable source. The inlet valve is also connected by a pipe, 43, with the cylinder of the adjacent pneumatic shuttle actuator, and in this instance I have shown the pipe, 43, connected to the central branch of a T-connector, indicated at 44, and preferably secured to a portion of the frame for convenience, one arm of the T being connected to the pipe, 18, as shown in Fig. 2, while the other arm is connected by a pipe, 45, with the exhaust valve, the opposite end of which is connected directly, or by a pipe, 46, with the atmosphere.

It will be understood by reference to Figs. 4 and 5, for example, that the inlet and outlet valves, 26 and 26*a*, are adjusted upon the plate, 22, in the manner previously described so that their respective operating arms, 29 and 29*a*, will be acted upon at the desired times in the cycle of operation of the adjacent arm or cam, 19 (or 19*a*) to effect an operation of the shuttle by the connected pneumatic shuttle actuating device. It will thus be seen that when the roller, 20, for example, comes in contact with the arm, 29, the inlet valve will be opened, admitting compressed air through pipes, 41, 43 and 18, to the adjacent cylinder, 8, and operating the piston therein to propel the shuttle, by means of the block, 15, toward the opposite end of the shuttle race, where it will strike the block, 15, of the other pneumatic shuttle actuator, and be arrested in the usual manner. As the roller, 20, passes off of the arm, 29, the inlet valve, 26, will be instantly closed by its spring, 31, and the further movement of the arm, 19, will bring the roller, 20, into engagement with the lever, 29*a*, thus opening the discharge valve, 26*a*, and permitting the trapped compressed air or other fluid pressure to escape to the atmosphere, whereupon the spring, 16, will return the piston and block, 15, to its normal position. As the shaft, 6, continues its rotation, the arm, 19*a*, will, in like manner, operate successively the inlet and outlet

valves on the opposite side of the machine, thereby effecting the return movement of the shuttle in the same manner by the pneumatic shuttle actuator, with which said valves are connected, and the restoration of the pneumatic valve actuator to its normal position. It will thus be seen that the pneumatic shuttle actuators, under the control of their respective valve mechanisms, operated in timed relation with the cam shaft or pick ball shaft, 6, will effect the reciprocations of the shuttle, 47, continuously during the operation of the loom.

If it is desired to advance or retard the movement of the shuttle by either of the pneumatic shuttle actuators, this can be readily accomplished by loosening the nut, 39, holding the inlet valve in position, and adjusting the valve, 26, bodily, in any desired direction, or rotarily, to bring the lever, 29, thereof into position to be engaged earlier or later in its cycle by the arm, 19, or roller, 20, and a similar adjustment of the discharge valve, 26*a*, may be made for the purpose of causing it to operate earlier or later with respect to the inlet valve, to expedite or retard the return movement of the piston and block, 15.

The apertures, 25 and 25*a*, are of such large diameter as compared with the diameter of the axial bolts, 36 and 36*a*, that a wide range of bodily movement of each valve in all directions in the plane of the plate, 22, is permitted, in addition to which each valve can be rotated on the axis of its axial bolt, so that in substantially all cases where the parts are applied to an existing loom the valves can readily be placed with their operating levers in the proper positions to effect the desired timed operation of the shuttle actuators. Should it be or become necessary or desirable, however, it will be understood that the arms or cams, 19 and 19*a*, may be adjusted rotarily on the pick ball shaft, 6, to aid in securing the desired timing of the actuators. Ordinarily, however, it will not be necessary to disturb these arms, or cams.

I also prefer to provide means whereby the action of the pneumatic shuttle actuators can be independently adjusted to regulate the stroke imparted to the shuttle and thus vary the speed of the shuttle in one or other, or both directions. To this end I have shown each of the pipes, 43, provided in this instance with an adjustable restricting valve, indicated at 50 and 51, respectively. These may be turn cocks, as shown, or other suitable valves, which can be set to restrict more or less the passage of compressed air to the adjacent actuator cylinder, when the controlling valve therefor is opened. By this means I can so adjust the valves, 50 and 51, that the shuttle will be thrown at one speed in one direction, and at a different speed in the opposite direction, and I can also adjust these valves to secure just the desired speed in both directions, with any given pressure at which the pressure fluid may be maintained, thus facilitating the installation and adjustment of the apparatus, in accordance with the pressure of the available fluid pressure supply, and also in accommodating it to a change of initial pressure if a change in the source or pressure of the pressure fluid is made, without altering the apparatus in any way.

I also prefer to provide the usual master cut off valve, or cock, 52, in the supply pipe supplying fluid pressure to the pipes 41, 41, so that the supply of fluid pressure to the entire apparatus, including both shuttle actuators, can be shut off for repairs or adjustment, or any other purpose. Obviously, a valve, 52, could be inserted in each pipe, 41, if desired, but ordinarily a single cut off for both pipes, as indicated in Fig. 2, will be preferred.

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

1. In a loom, the combination with a shuttle race, and a shaft provided with valve actuating parts, of pneumatic shuttle actuating devices at opposite ends of the shuttle races, valve mechanisms for controlling said shuttle actuating devices provided with movable valve operating elements, and adjustable supporting means for each of said valve mechanisms, including an apertured supporting plate, adapted to be rigidly secured to the frame of the loom, rotatable and laterally movable clamping plates rigidly connected with each of said valve mechanisms, and of greater diameter than the apertures in said supporting plate, a second clamping plate adapted to span an aperture in said supporting plate, and threaded clamping means for connecting said clamping plates, of less diameter than the aperture in said supporting plate to permit of the lateral and rotary adjustment of the valve mechanisms.

2. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with valve operating means, a supporting plate secured at each side of the loom adjacent to said pick ball shaft, and provided with enlarged apertures, clamping plates of greater diameter than said apertures engaging said supporting plate, axial clamping means of less diameter than said apertures, connecting said clamping plates, valves rigidly connected with certain of said clamping plates and provided with laterally projecting valve actuating members, for engaging the valve operating means on said pick ball shaft, and flexible pipe connections from said valves to said shuttle actuators.

3. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with valve operating means, a supporting plate secured at each side of the loom adjacent to said pick ball shaft, valve mechanism for each of said actuators, comprising an inlet valve for connecting one of said actuators to a source of fluid pressure, and a discharge valve for connecting said actuator to the atmosphere, an actuating lever for each of said valves, and means for adjustably securing each of said valves to said plate, and permitting the movement of the valve rotarily and in all directions in the plane of said plate, to bring the said valve actuating levers into timed operative relation with the valve operating means on said pick ball shaft.

4. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with valve operating means, a supporting plate secured at each side of the loom adjacent to said pick ball shaft, valve mechanism for each of said actuators, comprising an inlet valve for connecting one of said actuators to a source of fluid pressure, and a discharge valve for connecting said actuator to the atmosphere, an actuating lever for each of said valves, each of said supporting plates being provided with enlarged apertures, and an adjustable clamping means for supporting each valve, comprising a pair of plates of greater diameter than said apertures, for engaging opposite faces of said supporting plate, and an axial clamping bolt of less diameter than the said apertures connecting said

clamping plates and extending through one of said apertures, and means for rigidly connecting each valve to one of the said clamping plates, whereby each valve is adjustable rotatably and bodily in all directions in the plane of its supporting plate, to bring its valve actuating lever into operative timed relation with the adjacent valve operating means on said pick ball shaft.

5. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with valve operating means, a supporting plate secured at each side of the loom adjacent to said pick ball shaft, valve mechanism for each of said actuators, comprising an inlet valve for connecting one of said actuators to a source of fluid pressure, and a discharge valve for connecting said actuator to the atmosphere, an actuating lever for each of said valves, and means for adjustably securing each of said valves to said plate, and permitting the movement of the valve rotarily and in all directions in the plane of said plate, to bring the said valve actuating levers into timed operative relation with the valve operating means on said pick ball shaft, and an independent adjustable restricting valve interposed between each actuator and the controlling valve mechanism therefor.

6. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with valve operating means, valve mechanisms for controlling said actuators provided with movable actuating elements for engaging said valve operating means on said pick ball shaft, connections from said valve mechanisms to said actuators and to a fluid pressure source, and means for supporting said valve mechanisms for bodily adjustment universally in a plane perpendicular to said shaft.

7. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with valve operating means, valve mechanisms for controlling said actuators provided with movable actuating elements for engaging said valve operating means on said pick ball shaft, connections from said valve mechanisms to said actuators and to a fluid pressure source, and means for supporting said valve mechanisms for rotation about their own axes and for bodily adjustment universally in a plane perpendicular to said shaft.

8. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with a valve operating means, valve mechanisms for controlling said actuators provided with movable actuating elements for engaging said valve operating means on said pick ball shaft, connections from said valve mechanisms to said actuators and to a fluid pressure source, a supporting plate attached to said loom having a face perpendicular to the axis of said shaft, said valve mechanisms supported thereby for bodily adjustment universally in a plane perpendicular to said shaft.

9. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure operated shuttle actuator at each end of said race, a pick ball shaft provided with valve operating means, valve mechanisms for controlling said actuators provided with movable actuating elements for engaging said valve operating means on said pick ball shaft, connections from said valve mechanisms to said actuators and to a fluid pressure source, and a supporting plate fixed to said loom having a face perpendicular to the axis of said shaft, said valve mechanisms being supported thereby for rotation about their own axes and for bodily adjustment universally in a plane perpendicular to said shaft.

10. In a loom, the combination with a lay, provided with a shuttle race, a fluid pressure shuttle actuator at each end of said race, a pick ball shaft provided with a valve operating means, valve mechanisms for controlling said actuators provided with movable actuating elements for engaging said valve operating means on said pick ball shaft, connections from said valve mechanisms to said actuators and to a fluid pressure source, a supporting plate attached to said loom having a face perpendicular to the axis of said shaft, said valve mechanisms being supported thereby for rotary adjustment about their own axes.

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