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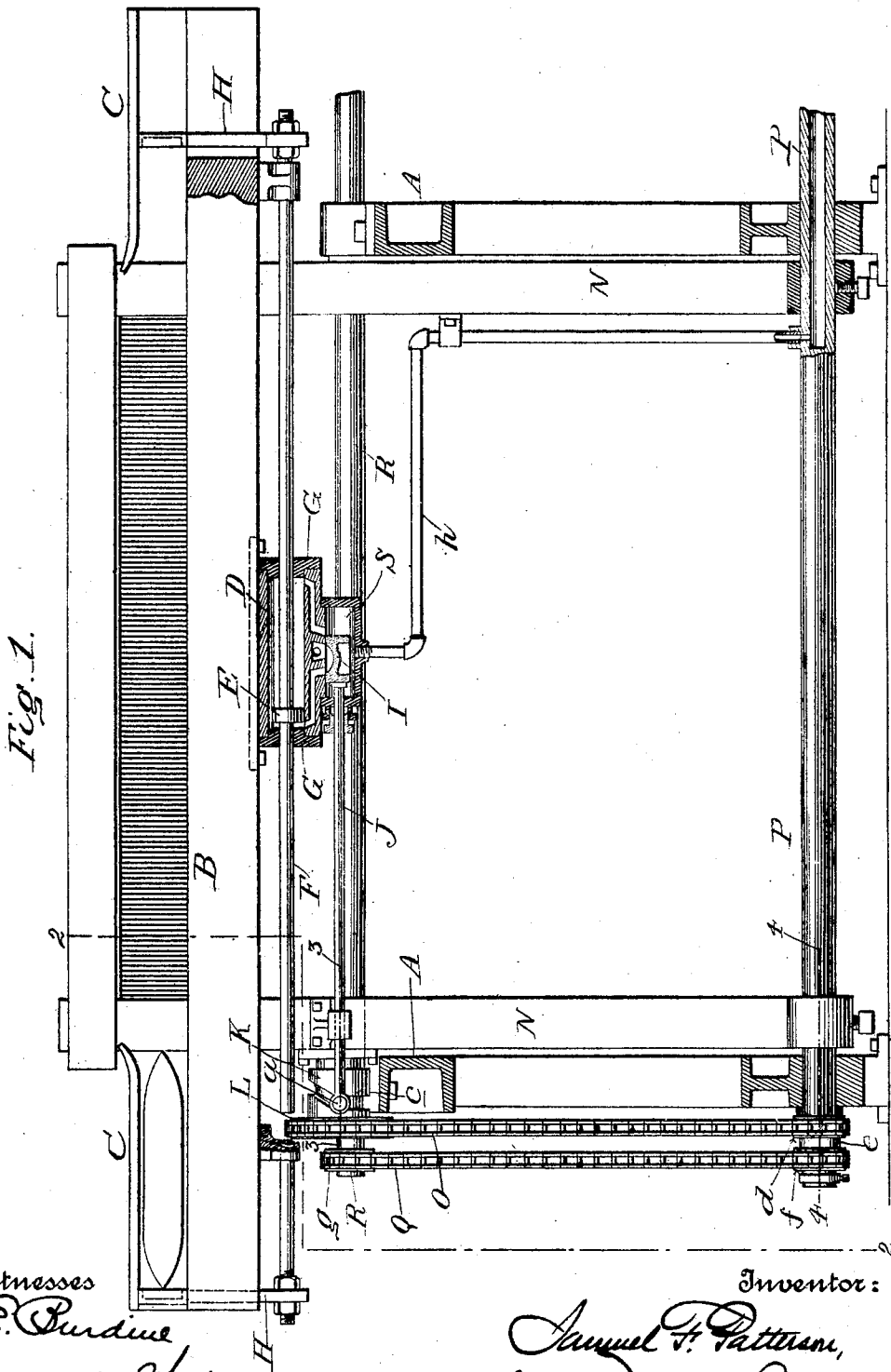
PATENTED JULY 25, 1905.

S. F. PATTERSON.

FLUID PRESSURE SHUTTLE ACTUATING MECHANISM FOR LOOMS.

APPLICATION FILED AUG. 11, 1903.

2 SHEETS--SHEET 1.



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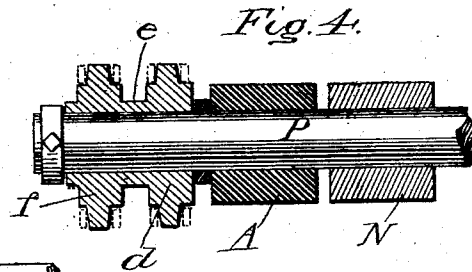
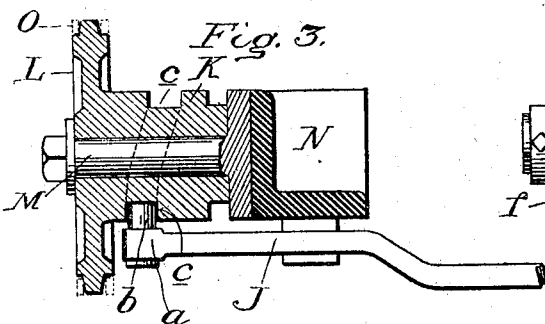
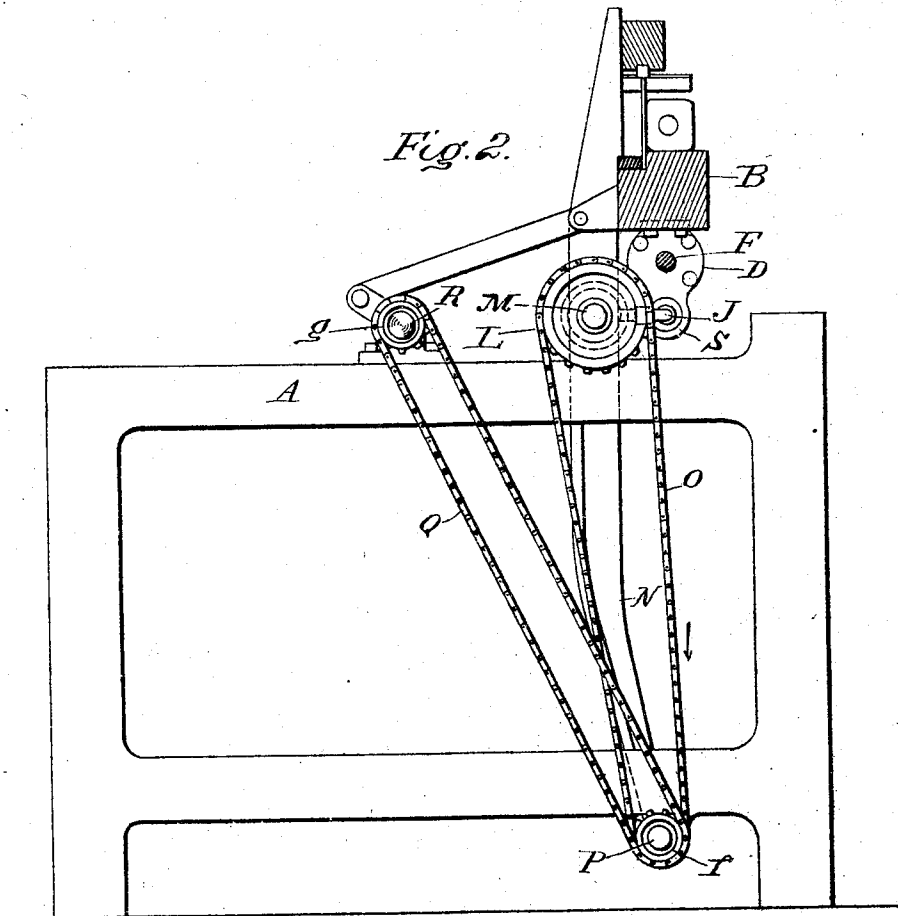
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UNITED STATES PATENT OFFICE.

SAMUEL F. PATTERSON, OF BALTIMORE, MARYLAND.

FLUID-PRESSURE SHUTTLE-ACTUATING MECHANISM FOR LOOMS.

No. 795,731.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed August 11, 1903. Serial No. 169,139.

To all whom it may concern:

Be it known that I, SAMUEL F. PATTERSON, a citizen of the United States, and a resident of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Fluid-Pressure Shuttle-Actuating Mechanism for Looms, of which the following is a specification.

My invention pertains to power-loom; and it consists in novel mechanism actuated by fluid-pressure for effecting the pick or throw of the shuttle.

The details of the invention admit of more or less variation as to their embodiment; but a prominent feature is the employment of a single power-cylinder for actuating both picker sticks or arms, the purpose being to produce mechanism capable of application to looms already in use or constructed, and this without lengthening materially, if at all, the space occupied.

One embodiment of the invention is illustrated in the accompanying drawings; but it is to be clearly understood that this is merely for purposes of explanation and represents only one of many possible forms.

In the drawings, Figure 1 is a front elevation, partly in section, of so much of a loom as is necessary to a clear understanding of the present invention; Fig. 2, a transverse vertical section on the line 2 2 of Fig. 1; Fig. 3, a sectional view on the line 3 3 of Fig. 1 through the sprocket-wheel and cam by which the valve of the power-cylinder is actuated and controlled, and Fig. 4 a section on the line 4 4 of Fig. 1 through the double sprocket employed in transmitting motion from one shaft to another.

As a result of long practice and experience certain general dimensions and proportions have come to be adopted and recognized as desirable in the construction of looms of given class, and these dimensions being established the floor-space of mills is estimated upon such basis. For this reason, among others, and because of the great number of looms already in operation and others constructed and ready for sale and use it is important that any mechanism designed for use in or as a part of such looms be adapted for application within established or existing limits of space. It is also desirable that such mechanism be capable of ready application to existing looms without change or disturbance

of retained portions thereof. With these conditions and objects in view I employ a single cylinder and piston the rod of which extends outward from both ends of the cylinder and carries at each end a picker-arm, such arrangement permitting the cylinder to be located and secured beneath the lathe or lay and wholly within its length, with the picker-arms occupying substantially the same position now occupied by the upper ends of the ordinary picker-arms. The pressure fluid is admitted alternately to opposite ends of the cylinder or to opposite sides of the piston, one end being vented or exhausted, while the other receives the actuating fluid. The opening and closing of the ports will preferably be so controlled as to cause a greater or less cushioning of the piston, as is common in engines, and consequently a cushioning of the picker-arms, to prevent undue racking of the mechanism. Other details will be provided looking to the more perfect control of the shuttle in the shuttle-boxes, the prevention of rebound of the shuttle, relief from friction or restraint at the moment of throw, and the like; but these matters are not involved in the present invention, and hence are not illustrated or described. In other words, the present application is designedly limited to the picker mechanism itself.

While a single cylinder is proposed and is deemed materially superior to a plurality of separate cylinders, good results are attainable with such separate cylinders provided they be located between instead of outside of the picker-arms, so as not to occupy space beyond the same.

The terms "cylinder" and "piston" are here used in a comprehensive sense and as including the well-known fluid-pressure chamber and flexible diaphragm or equivalent construction commonly used in fluid-pressure motors for various purposes, such comprehensive use of the terms being now generally recognized in the arts.

Referring again to the drawings, A indicates the main frame of a loom of any approved type, and B the lathe or lay, containing, as usual, a shuttle-race at the ends of which are the customary shuttle-boxes C C. These and, in fact, all parts of the loom, including the heddles, harness, beams, &c., may be of usual construction, except the picker mechanism herein described, and for

this reason no further description or illustration of such parts is given or deemed necessary.

D indicates a hollow cylinder of a length slightly greater than the travel of the picker-arms. It is bolted or otherwise made fast to the lathe or lay, preferably to the under side thereof, and contains a close-fitting piston E, the rod F of which passes out through the heads G of the cylinder, as shown in Fig. 1. These heads G are preferably made of or bushed with horn, which material can be closely fitted to make and preserve a tight joint, and as it wears very smooth a nearly frictionless bearing-surface for the piston is produced even without lubricant. I do not, however, restrict myself arbitrarily to the use of such material, but may employ the customary stuffing-glands.

The piston-rod F is made of a length slightly less than that of the lathe or lay and carries at each end a picker-arm of suitable form and dimensions. For convenience in adjusting the picker-arms H the rod F, which is advisably carried in guides additional to the cylinder-heads, is preferably threaded at each end and provided with nuts between which the arms H are clamped, as shown in Fig. 1. Additional binding or locking mechanism may be employed, if desired. The picker-arms H extend up through slots in the ends of the lathe or lay, and their upper ends are in proper position to engage the ends of the shuttles when the arms are moved to throw the shuttles through the race, as is now done by the common picker-staffs.

To cause an alternating action of the picker-arms H and to bring about this action at the precise times required, the cylinder D is furnished with a suitable valve adapted to admit pressure fluid to one end or at one side of the piston and to exhaust or permit escapement of the same from the other side. In the drawings a common D-valve I is represented, the rod J of which passes through the usual stuffing-gland and carries at its outer end a lateral arm or projection *a*, provided with a bowl or roller *b*, which latter may, however, be omitted, if deemed best. The projection *a* or bowl *b* enters the cam-groove *c* of a cam-wheel or hub K, formed with or made fast to a sprocket-wheel L, which turns upon a stud-axle M, bolted or otherwise made fast to one of the swords or carrying-arms N of the lay.

By mounting the sprocket and cam-wheel axle upon the sword or carrying arm N a fixed relation is maintained between the cam, the valve I, which it operates, and the rod of said valve, notwithstanding the oscillations or movements of the lathe or lay and its swords.

To give proper motion to the cam K, which will be fashioned to give any desired

movement to the valve I, a chain or driving-band O is passed about the wheel L to and about the wheel *d*, loosely encircling and turning upon the shaft or rod P, which supports and carries the swords N. The wheel D is under the arrangement shown formed with a sleeve *e*, carrying a second wheel *f*, as shown in Figs. 1 and 4. Motion is given to sleeve *e*, and consequently to wheel *d*, through the medium of a chain or driving-band Q, passing about the wheel *f* and about a similar wheel *g*, keyed or otherwise made fast upon the crank-shaft R, which vibrates the lay.

Under the construction illustrated the cam K is adapted to move the valve I once in each direction for every rotation of the cam, and as each movement of the valve produces one movement of the piston E, and consequently one throw or pick of the shuttle, it will be seen that the cam K should make but one revolution to each two revolutions of the crank-shaft R. This result is readily attained by making one of the driven wheels of the transmitting system of twice the diameter of the wheel which delivers motion to it. In the present instance the wheel L is represented as thus enlarged relatively to the wheel *d* from which it receives motion.

The pressure fluid is conveyed to the valve-chest S by a pipe *h*, one end of which communicates with the bored or tubular end portion of shaft P, as shown in Fig. 1. Pipe *h* is carried upward near and is made fast to one of the swords or carrying-arms N, so as to prevent strain upon the connection or coupling between it, the shaft P, and the fluid-chest S. Pressure fluid will be brought to the tubular shaft P through a conduit or pipe connected by any suitable coupling therewith.

The operation is obvious. The cam K being properly set with reference to the vibrations of the lathe or lay, pressure fluid will be admitted to the cylinder D at the proper moment to cause a movement of its piston, and consequently of the shuttle, at the instant that the shed is properly opened. This done the valve will stand in position to close the inlet-port wholly or practically and to open the exhaust-port until on the next opening of the shed the valve will be reversed and the shuttle thrown in the opposite direction, this action taking place repeatedly and in the same manner essentially as with the usual mechanical picker mechanism.

The type of engine or motor for effecting the longitudinal movement of the rod F may, as before indicated, be varied, and if the single piston and cylinder represented be employed, as is deemed desirable, any well-known and standard type of valve mechanism may be employed. So, too, said valve may be controlled by connection with any convenient moving part and by any connect-

ing means capable of insuring the proper timing of its movements.

It is particularly to be noted that under the construction above set forth there is no projection whatever of the motor beyond or outside of the picker-arms, and consequently the loom occupies no more floor-space than under present conditions. All the mechanism is contained within the space now occupied by looms of ordinary construction and equipment. Hence the picker mechanism may readily be applied to looms already in existence, or looms fitted with this mechanism may be substituted for looms of ordinary construction without any rearrangement whatever of floor-space.

It is particularly to be noted that the cam K, by which the valve I is actuated, receives its motion through connection with the power-shaft or a power-driven shaft of the loom. Its movements may therefore be controlled as desired and the throw or travel of the shuttle timed with due reference to the formation of the shed. This is important and, in fact, is essential to the proper operation of the loom, it being evident that if the shuttle itself were arranged to trip or open a valve by which to bring about a reverse motion or travel of the shuttle there would be no proper dwell or period of rest and the shuttle would begin its return movement or movement in a reverse direction instantly upon completing the first motion, which is not permissible.

Having thus described my invention, what I claim is—

1. In a loom, the combination with the lathe or lay provided with a shuttle-race; a shuttle; pickers for throwing said shuttle through the raceway; a fluid-pressure motor located between the ends of the raceway and connected with the pickers, for imparting motion thereto and through them to the shuttle; and valve-controlling mechanism, actuated by the driving or power mechanism of the loom, whereby its movements may be timed and varied to control the motor as desired.

2. In a loom, the combination with a lathe containing a shuttle-race; a shuttle; a fluid-pressure motor carried by the lathe; a rod extending from said motor toward opposite ends of the lathe; picker-arms carried by the opposite ends of said rod and serving as the rod is reciprocated to project the shuttle through the raceway; a valve controlling the supply and exhaust of said motor; and a cam operatively connected with the power-shaft of the loom and serving to actuate the controlling-valve of the motor.

3. In a loom, the combination of a beam or lathe containing a raceway; a shuttle movable in said raceway; a fluid-pressure cylinder carried by the lathe; a piston mounted in said cylinder; a piston-rod projecting from said piston through opposite ends of the cyl-

inder; picker-arms carried by said rod and extending to points at or near opposite ends of the raceway; a valve for controlling ingress and egress of pressure fluid to and from the cylinder; and connections between the power-shaft of the loom and said valve for actuating the latter, substantially as set forth.

4. In combination with the lathe of a loom, provided with a shuttle-race; a shuttle mounted therein; picker-arms for moving said shuttle; a rod connecting said picker-arms; a piston carried by said rod; a cylinder encompassing said piston and provided with suitable valve for controlling the supply and exhaust of fluid-pressure to and from the cylinder; a device carried by the lathe or its supporting-sword for moving said valve at proper times; and connections, substantially such as shown and described, between said valve-actuating device and a moving part of the loom other than the fluid-pressure motor, whereby said device and through it the valve are moved at proper times, notwithstanding the changing positions of the cylinder, valve, and valve-actuating device.

5. In a loom, in combination with a lathe containing a shuttle-race and shuttle; a crank-shaft R, and connections for vibrating the lathe; a supporting rod or shaft P, and swords N for carrying said lathe; a fluid-pressure motor, valve, and valve-actuating device carried by the lathe and its supports and between the latter; and connecting-gear, substantially as shown and described, for transmitting motion from the shaft R to the valve-actuating device.

6. In a loom, the combination of the main frame, lathe, and supporting arms or swords; a supporting-shaft P for the lathe and its swords or arms; a crank-shaft R for vibrating the lathe; a fluid-pressure motor carried by the lathe, and having a controlling-valve; a cam K carried by one of the lathe swords or arms for actuating said valve; and connecting-gear between said cam and shaft R, comprising wheels L, *d*, *f*, *g*, and chains or bands O and Q, the wheel L being carried by one of the lathe swords or supports and connected with cam K, the wheels *d*, *f* being carried by the supporting-shaft P and the wheel *g* by the crank-shaft R, substantially as set forth.

7. In a loom, the combination with a lathe provided with a shuttle-race, of a fluid-pressure motor located between the ends of the shuttle-race; mechanism directly connected to and positively actuated by said motor for alternately projecting a shuttle in opposite directions along the shuttle-race; and a controlling device actuated by a moving element of the loom for regulating the action of the motor.

8. In a loom, the combination with a lathe provided with a shuttle-race, of a single fluid-pressure motor located between the ends of

the shuttle-race and deriving its power from a source independent of the loom; mechanism actuated by said motor for alternately projecting a shuttle in opposite directions along the shuttle-race; and a controlling device actuated by a moving element of the loom for regulating the action of the motor.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL F. PATTERSON.

Witnesses:

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HORACE A. DODGE.