No. 717,965. PATENTED JAN. 6, 1903.

J. C. BLUNDELL.

PNEUMATIC DRIVER AND CUSHION FOR LOOM SHUTTLES.

APPLICATION FILED NOV. 30, 1901. RENEWED DEC. 13, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

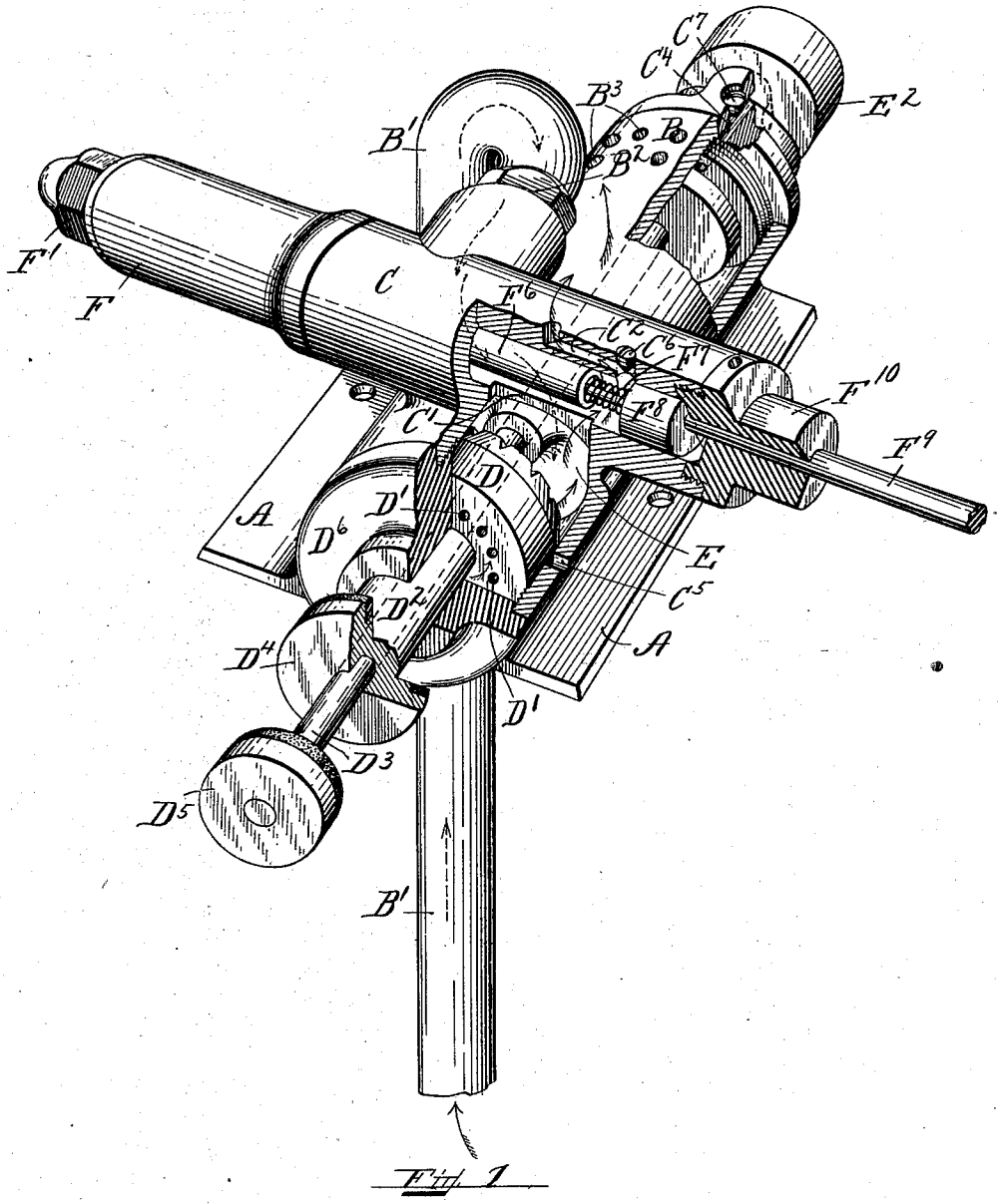


Fig. 1

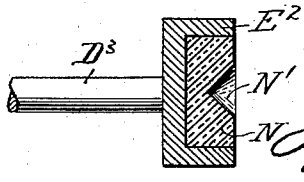


Fig. 11.

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NO MODEL. 3 SHEETS—SHEET 2.

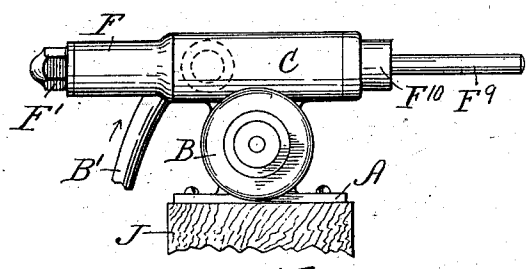


Fig. 1.

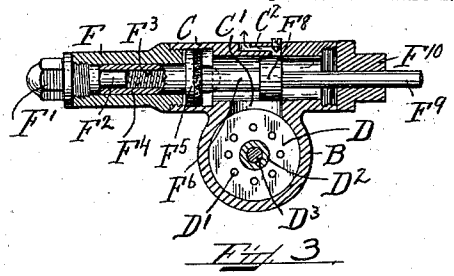


Fig. 3.

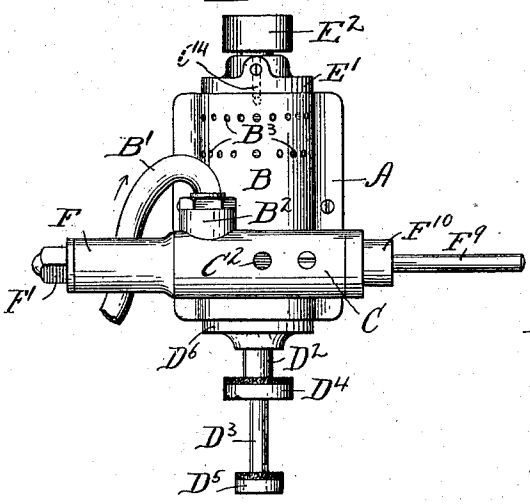


Fig. 4.

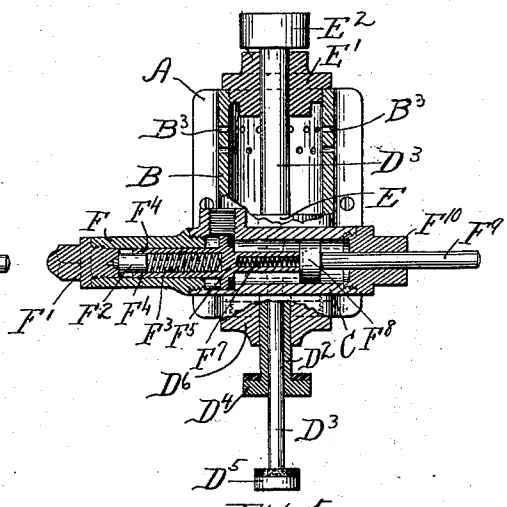


Fig. 5.

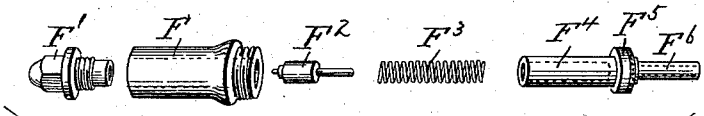


Fig. 6.

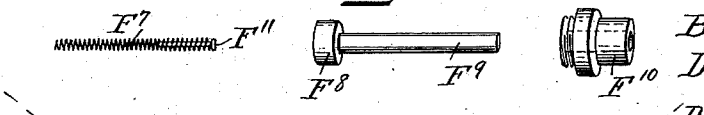


Fig. 7.

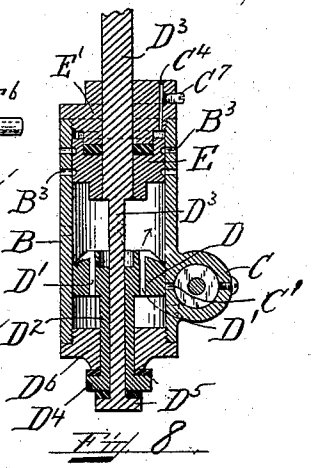


Fig. 8.

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No. 717,965. PATENTED JAN. 6, 1903.

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PNEUMATIC DRIVER AND CUSHION FOR LOOM SHUTTLES.

APPLICATION FILED NOV. 30, 1901. RENEWED DEC. 13, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

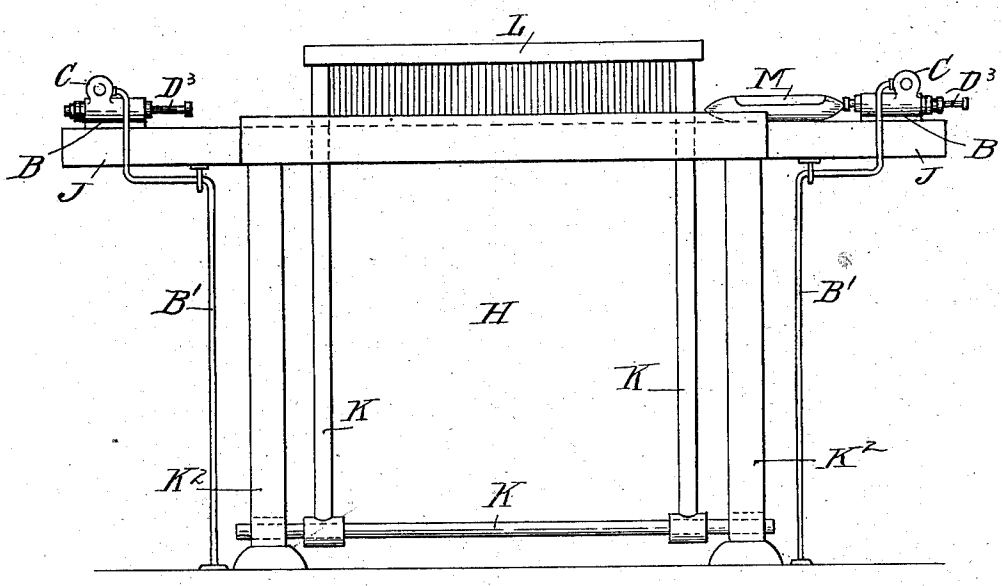


Fig. 9

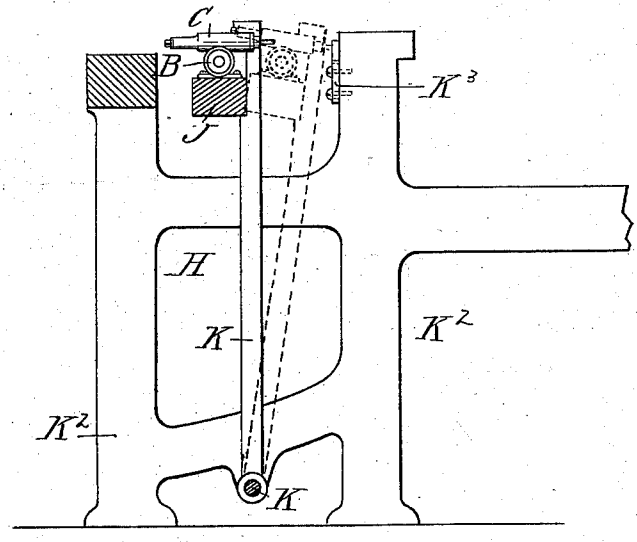


Fig. 10

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UNITED STATES PATENT OFFICE.

JOHN C. BLUNDELL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO PNEUMATIC TEXTILE MACHINERY COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PNEUMATIC DRIVER AND CUSHION FOR LOOM-SHUTTLES.

SPECIFICATION forming part of Letters Patent No. 717,965, dated January 6, 1903.

Application filed November 30, 1901. Renewed December 13, 1902. Serial No. 135,164. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. BLUNDELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic Drivers and Cushions for Loom-Shuttles, of which the following is a specification.

My invention relates to new and useful improvements in pneumatic drivers and cushions for loom-shuttles; and its object is to drive the shuttle by the reed in both directions and to provide for the driving of the shuttle from one side to the other by compressed air and to cushion by air the shuttle at the end of the throw.

My invention consists of certain novel features hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which illustrate a construction embodying my invention, Figure 1 is a perspective view, partly in section, of my pneumatic driver and cushion. Fig. 2 is a detail side view. Fig. 3 is a sectional view. Fig. 4 is a plan view. Fig. 5 is a sectional view. Figs. 6 and 7 are views of detail parts hereinafter described. Fig. 8 is a sectional view. Fig. 9 is a front view of the loom, showing my improved device located on both ends with the shuttle in position to be driven to the opposite end. Fig. 10 is a cross-sectional view through Fig. 9. Fig. 11 is a detail view of the head which drives the shuttle.

Like letters of reference refer to like parts throughout the several views.

My device consists of a base-plate A, by which it may be secured to the lay or lathe of the loom, and of a lower cylinder C. Within the cylinder B is arranged a plunger D, having a series of openings D′ therethrough and having a shaft D^2 and a head D^4, located around the shaft D^3, which is also provided with a head D^5, adapted to engage with the head D^4, as hereinafter described, and both of said shafts D^2 and D^3 pass through the cylinder-head D^6 of the cylinder B. Located in the cylinder B forward of the plunger D is a piston E, fast on the shaft D^3, and on said shaft at its extreme forward end is the head E^2, located beyond the cylinder-head E′, through which the shaft D^3 passes. The forward end of the cylinder B is provided with a series of perforations B^3, through which the air in the cylinder escapes upon the forward movement of the piston E. In the upper cylinder C is located the valve F^5 for normally closing communication between the port B, through which compressed air enters from the pipe B′ and the interior of the cylinder B. This valve, as shown in Fig. 5, is provided with a forwardly-projecting sleeve F^4, in which is located the spring F^3, and in said spring is the finger F^2 to prevent the spring F^3 from buckling, and said finger is held in place by means of the nut F′, which screws into the end of the outer sleeve F, which in turn is screwed onto the cylinder C. The opposite end of the valve F^5 is provided with a sleeve F^6, in which is located the spring F^7, and within said coiled spring F^7 is a finger F^{11}, adapted to keep the spring F^7 from buckling, and located beyond said spring is the piston-head F^8, having a shaft F^9 projecting through the cylinder-head F^{10} of the cylinder C, and said piston and shaft are normally out of contact with the sleeve F^6 by means of the spring F^7, as shown in Fig. 1. This device is secured, as shown in Fig. 9, on the opposite ends of the lathe J, beyond the reed L of the loom H, and said lathe J is carried by the rocker-arms K, which are rocked by the rocker-shaft K′, journaled in the end supports K^2, and said rocker-shaft may be operated by any suitable power.

In the operation of my device as the shuttle passes by the reed the lathe moves up and drives the filling against the warp or cloth, at which time the lathe J and coöperating parts are in the position shown in full lines, Fig. 10, and as the rocker-arms move to the position shown in dotted lines, Fig. 10, the shaft F^9 strikes the projection K^3 on one of the end supports K^2, and this upward movement of the shaft F^9 causes the piston F^8 to move up into contact with the sleeve F^6 and compresses the spring F^7 and closes the exhaust-port C^2, Fig. 1, and the continued movement of the piston F^8 opens the valve F^5 against the tension of the spring F^3, and air

passes from the pipe B′ through the port B^2 into the cylinder C and down through the port C′ into the cylinder B, the parts previously described being in the position shown in Fig. 3 as this operation takes place. This air passes into the cylinder B, as indicated in dotted arrows, Fig. 1, between the piston E and the plunger D and drives the piston E forwardly from the position shown in Figs. 1 and 5 to that shown in Fig. 8, and the air ahead of the piston E is forced out through the perforations B^3 in the cylinder B. During this forward movement of the piston E the head D^5 comes into contact with the head D^4 of the plunger D and moves said plunger forwardly until it reaches the position shown in Fig. 8 and closes the port C′. This forward movement of the piston E with its shaft D^3 drives the head E^2 outwardly and causes the shuttle M to be thrown to the opposite end of the lathe, where it is cushioned by a device similar in construction and operation to that shown and described at the right-hand end of the lathe or lay of the loom. During this time the lathe has moved upwardly, and the shaft F^9 has left contact with the projections K^3, and the springs F^7 and F^3 operate to move the parts back into their normal positions, leaving the port C^2 open. The device at the right-hand end of the drawing, Fig. 9, after this operation has its head E^2 in the outer position similar to that shown on the left hand of Fig. 9 and ready to receive and cushion the shuttle M, which is sent from the left to the right in a manner identical for that described for sending it from right to left. As the shuttle M strikes the head E^2 it drives the shaft D^3, with the piston E′, rearwardly, and when the piston E comes in contact with the plunger it forces said plunger backward; but inasmuch as the air has passed to the rear of the plunger D on the forward movement, as previously described, this plunger moves rearward only so fast as the air at the rear of it can escape through the ports C^5 until said ports are closed by the plunger D and then through the perforations D′. In the forward movement of the piston E the air exhausts freely from the ports B^3, and as the piston reaches the end of the cylinder-head which covers these ports the piston on its further travel is slowly cushioned, as the area of outlet from the air ahead of it is restricted by the port C^4. The backward movement of the piston E forces the air through the perforations D′ of the plunger D and out through the ports C^5, and when it comes into contact with the plunger D it moves it backward, and the air to the rear of the plunger escapes through the port C^5 until said port is closed by the plunger D, when the air escapes through the perforations D′ out through the ports C′ and C^2, so that the movement of the plunger rearwardly after it covers the ports C^5 forms a slower cushion, as the exhaust is retarded during this latter movement. The head E^2 (shown in Fig. 11) is recessed to hold the rawhide filling N, which is countersunk at N′ to receive the end of the shuttle and in perfect alinement with the way of the loom and the center of the shuttle. By driving the shuttle on its center the liability of the shuttle jumping from the way is avoided, which liability is apt to occur in the present style of loom-shuttles where the picker-sticks are used, owing to the fact that said picker-sticks strike the shuttles above their longitudinal center line, and by my arrangement the countersink in the rawhide wears evenly, for the reason that it is always struck in the same place. The openings of the ports C^2 C^4 are large enough to exhaust the air faster than is desired, and the screws C^6 C^7 are inserted projecting into said ports and open or close the ports, according to the amount of cushion it is desired to obtain at the ends of the cylinders.

Having thus ascertained the nature of my invention and set forth a construction embodying the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus of the character described, a cylinder, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, mechanism operated by compressed air for driving the shuttle, and means independent of said air-inlet-controlling valve for regulating the escape of air from the cylinder and thereby cushioning said driving mechanism on its return stroke.

2. In an apparatus of the character described, a cylinder, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, mechanism operated by compressed air for driving the shuttle, and means controlled by said driving mechanism for regulating the escape of air from the cylinder and thereby cushioning said driving mechanism on its return stroke.

3. In an apparatus of the character described, a cylinder, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, mechanism operated by compressed air for driving the shuttle, and means independent of the said air-inlet-controlling valve and controlled by said driving mechanism for regulating the escape of air from the cylinder and thereby cushioning said driving mechanism on its return stroke.

4. In an apparatus of the character described, a cylinder, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, a piston operated by compressed air for driving the shuttle, a plunger operated by said piston and provided with perforations, and ports in the cylinder through which the air at the rear of the plunger escapes until closed by

said plunger after which the air exhausts from the rear of the plunger through the perforations.

5. In an apparatus of the character described, a cylinder, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, a piston in said cylinder operated by compressed air for driving the shuttle, and a plunger in said cylinder operated by said piston for cushioning the shuttle.

6. In an apparatus of the character described, a cylinder, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, a piston in said cylinder operated by compressed air for driving the shuttle, a plunger in said cylinder operated by said piston for cushioning the shuttle, and means for producing a slow cushion at the end of the stroke.

7. In an apparatus of the character described, a cylinder mounted on the lathe, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet and opened on the movement of the lathe in one direction, means for closing said valve upon the movement of the lathe in the opposite direction, mechanism operated by compressed air for driving the shuttle, and means independent of said air-inlet-controlling valve and controlled by said driving mechanism for regulating the escape of air and thereby cushioning said driving mechanism on its return stroke.

8. In an apparatus of the character described, a cylinder mounted on the lathe, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet and opened on the movement of the lathe in one direction, means for closing said valve upon the movement of the lathe in the opposite direction, a piston in said cylinder and operated by compressed air for driving the shuttle, ports in the cylinder through which the air is exhausted from in front of the piston on the forward movement of the piston, and a port in the head of the cylinder through which the air slowly exhausts from in front of the piston when said ports are closed by the piston.

9. In an apparatus of the character described, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, a piston in said cylinder and operated by compressed air for driving the shuttle, exhaust-ports at the forward and rear ends of the cylinder through which air escapes upon the forward and return movements respectively of the piston, means for cushioning the piston at the end of its forward stroke, and means independent of said air-inlet-controlling valve for regulating the escape of air from the cylinder and thereby cushioning the piston on its return stroke.

10. In an apparatus of the character described, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, a piston in said cylinder and operated by compressed air for driving the shuttle, exhaust-ports at the forward and rear ends of the cylinder through which air escapes upon the forward and return movements respectively of the piston, means for cushioning the piston at the end of its forward stroke, and means controlled by said piston for regulating the escape of air and thereby cushioning the piston on its return stroke.

11. In an apparatus of the character described, a cylinder, a source of compressed air, an inlet for the compressed air to the cylinder, a valve controlling said inlet, a piston in said cylinder and operated by compressed air for driving the shuttle, and means in said cylinder controlled by said piston for regulating the escape of air and thereby cushioning said piston on its return stroke.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 26th day of November, A. D. 1901.

JOHN C. BLUNDELL.

Witnesses:
E. L. HARLOW,
A. L. MESSER.