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SHANK AND BIT PUNCH.

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To all whom it may concern:

Be it known that we, JESSE DITSON and ARTHUR E. PETERS, citizens of the United States, residing at Littleton, Arapahoe County, State of Colorado, have invented certain new and useful Improvements in Shank and Bit Punches, of which the following is a specification.

This invention relates to machines for punching hollow articles but more particularly to a pinning out machine of that type adapted for punching the shanks and bits of hollow drill steels, in order to clear the bore of the steel, especially during the process of sharpening and shanking.

One object of the present invention is to enable a punch to be hammered into the hollow article as a drill steel while at the same time the hammer cylinder is bodily fed forward automatically by fluid pressure.

Another object of the invention is to enable the hammer cylinder to be retracted or returned by fluid pressure after the article has been punched, while at the same time permitting the hammer to operate so that the punch is driven out of the article by the rearward impact of the piston hammer in the hammer cylinder.

To these and other ends which will hereinafter appear, the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a machine embodying the invention,

Figure 2 is a similar view with the movable elements in a different position, and

Figure 3 is a detail longitudinal sectional view showing the controlling valve in a different position for the return stroke.

Referring to the drawings A represents any suitable base or frame as for instance a portion of the frame of a drill sharpening machine, or a bracket adapted to be secured to the base of the drill sharpening machine, or a separate pedestal upon which the shank and bit punch is adapted to be mounted in any suitable manner as by means of the bolts B. The article to be punched, as for instance the hollow drill steel C may be held between suitable clamps D in position to be punched.

The punching machine, in accordance

with this invention, comprises the main casing E preferably provided with the cylindrical portion F within which the hammer cylinder G is adapted to be actuated back and forth by fluid under pressure. The hammer cylinder is provided, as shown, with the plunger head H and is closed by the back head J. The main cylindrical casing F may be closed at its rear end by means of the cap K. A fluid actuated piston hammer L of any suitable type, is adapted to reciprocate within the hammer cylinder G and in this instance an anvil block O, which carries the punch P, is adapted to receive the impact blows of the hammer. The punch P may be secured to the reduced end Q of the anvil block O in any suitable manner, as by means of the nut R and lock nut S, so that the punch may be removed as desired. Motive fluid is supplied to the machine through the hollow bore T of the throttle valve U having a controlling handle V. This throttle valve is provided with the admission port W cooperating with the supply passage X in the casing F for admitting fluid behind the plunger head H of the hammer cylinder, and is also provided with the admission port Y leading to the casing F in front of plunger head H.

With the throttle valve U in the position indicated in Figures 1 and 2, and the remaining parts as indicated in Figure 1, motive fluid is admitted behind the plunger head H to force the hammer cylinder forwardly and feed it to its work. At the same time, motive fluid is admitted from the casing F through the supply passages *a* in the hammer cylinder behind the piston hammer L to actuate the hammer forwardly. On the forward stroke of the piston hammer, the cylinder bore in front of the hammer is open to atmosphere through the exhaust passages *b* in the walls of the hammer cylinder.

When the piston hammer has completed its forward stroke as indicated in Figure 2, the rearward bore of the hammer cylinder is exhausted through the passage *c* in the piston leading to the annular groove *d* in the piston, which falls opposite the ports leading to the exhaust passages *b*. Live air pressure from the supply passages *a*

passes to the annular groove d' in the piston and through the longitudinal passage e in the piston to the forward end of the piston for the return stroke. The hammer piston L continues to reciprocate and drive the punch P into the drill steel C or other article to be punched, as the hammer cylinder is bodily fed forward in the casing F.

10 In order to retract or return the hammer cylinder in the casing F and withdraw the punch P from the steel, the valve U is turned to the position indicated in Figure 3, in which case the admission port W in the throttle valve is moved opposite the port through which fluid is supplied to the casing F for the operation of the hammer piston, and a groove f in the periphery of the throttle connects the passage X in the casing F with an exhaust port g , which exhausts the pressure from behind the plunger head H so that the line pressure on the rearwardly acting shoulder j of the plunger H forces the hammer cylinder 25 bodily rearward in the casing F. During the return movements of the hammer cylinder, the piston hammer L continues to operate and by striking against the back head J of the hammer cylinder taps or hammers the punch P out of the drill steel C.

We claim:

1. In a shank and bit punch, the combination with a drill steel clamp of a pin punch for opening the bore of a drill steel placed 35 in the clamp, a stationary casing, a hammer cylinder having a plunger head and movable forwardly and rearwardly in said casing by fluid pressure for advancing the punch toward and withdrawing it away 40 from the clamp, a fluid actuated piston hammer in said cylinder for delivering repeated blows to the punch when engaged in the bore of the drill steel, a passageway through said cylinder into said casing forwardly 45 of said plunger head to conduct motive fluid into said cylinder, and a valve for distributing motive fluid to the casing both behind and in front of said plunger head during the movement of the hammer cylinder in one 50 direction while constantly supplying motive fluid to actuate the piston hammer to cause it to automatically deliver such repeated blows in rapid succession on both the forward and rearward movements of the hammer cylinder.

2. In a shank and bit punch the combination with a drill steel clamp of a pin punch for opening the bore of a drill steel placed 60 in the clamp, a stationary casing closed at the rearward end, a hammer cylinder having a plunger head movable forwardly and rearwardly in said casing by fluid pressure for

advancing the punch toward and withdrawing it away from the clamp, a fluid actuated piston hammer in said cylinder for delivering repeated blows to the punch when engaged in the bore of the drill steel, a passageway through said cylinder into said casing forwardly of said plunger head to conduct motive fluid into said cylinder, and 70 a valve for distributing motive fluid to the casing both behind and in front of said plunger head during the movement of the hammer cylinder in one direction while constantly supplying motive fluid to actuate 75 the piston hammer to cause it to automatically deliver such repeated blows in rapid succession on both the forward and rearward movements of the hammer cylinder.

3. In a shank and bit punch, the combination with a drill steel clamp of a pin punch for opening the bore of a drill steel placed in the clamp, a casing, a hammer cylinder having a plunger head, a fluid actuated piston hammer in said cylinder for delivering repeated blows to the punch when engaged 85 in the bore of the drill steel, passageways leading to said casing rearwardly of said cylinder and through said casing to the interior of said cylinder, a valve for connection to a source of motive fluid supply and having alternate positions whereby motive fluid may be introduced simultaneously to 90 both sides of said cylinder plunger head for one position of said valve, and exhausted from the casing at one side of said plunger head and admitted to the other side of said plunger head in another position of said valve.

4. In a shank and bit punch, the combination with a drill steel clamp of a pin punch for opening the bore of a drill steel placed in the clamp, a casing closed at one end, a cylinder within said casing having a plunger head at one end and guided in said casing at its other end, a hammer piston within said cylinder for delivering repeated blows to the punch when engaged in the bore of the drill steel, passageways leading to said casing forwardly of said plunger head 110 for the introduction of motive fluid to said cylinder, a passageway to said casing rearwardly of said plunger head, and a valve associated with all said passageways and having alternate operating positions in both of which access is had by motive fluid to the casing forwardly of said plunger head and to said cylinder, and in only one of which access is had by motive fluid to the casing rearwardly of said plunger head.

In testimony whereof we have signed this specification.

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