Sept. 7, 1926.

1,599,199

L. C. BAYLES

SHANK AND BIT PUNCH

Filed August 26, 1925

2 Sheets-Sheet 1

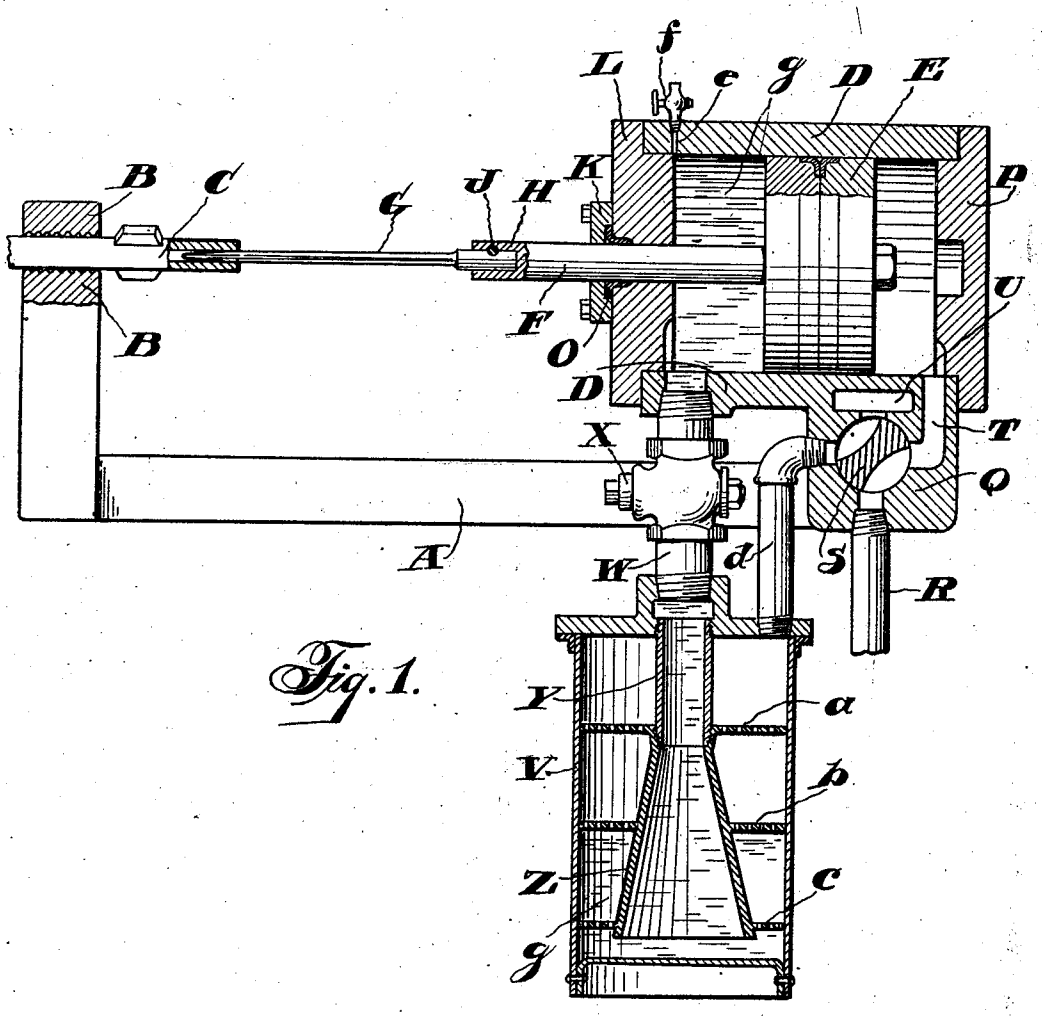


Fig. 1.

INVENTOR
Lewis C. Bayles.
BY
Herbert L. Ogden
HIS ATTORNEY

Sept. 7, 1926.

1,599,199

L. C. BAYLES

SHANK AND BIT PUNCH

Filed August 26, 1925

2 Sheets-Sheet 2

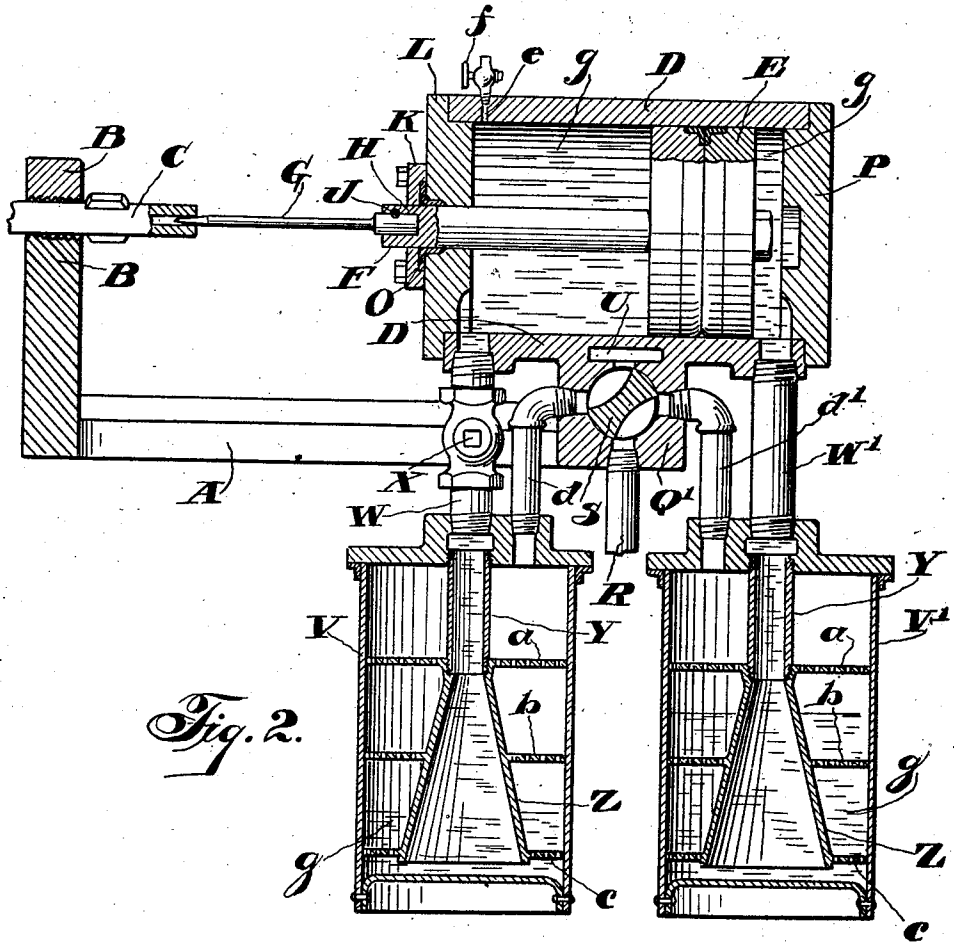


Fig. 2.

INVENTOR
Lewis C. Bayles
BY
Herbert W. Ogden
HIS ATTORNEY

Patented Sept. 7, 1926.

1,599,199

UNITED STATES PATENT OFFICE.

LEWIS C. BAYLES, OF EASTON, PENNSYLVANIA, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHANK AND BIT PUNCH.

Application filed August 26, 1925. Serial No. 52,525.

This invention relates to shank and bit punches, but more particularly for opening the hollow bores of drill steels and similar hollow articles. The machine may be mounted on the frame of a drill steel sharpener or on a pedestal as desired, and means are provided for clamping the drill steel.

The objects of the invention are to improve upon that type of shank and bit punch in which the pin punch is pushed into the drill steel and pulled out of the drill steel by means of a fluid actuated reciprocating piston. In a push punch, as the term is used, power is lost owing to the high velocity of the piston at the start while the resistance to the entrance of the pin punch into the drill steel is least at the entrance of the bore of the drill steel, and to overcome this disadvantage I have provided means for controlling the velocity of the piston so that the velocity will be substantially constant throughout the piston stroke. In this way, the maximum power may be obtained for forcing the pin punch the required distance into the drill steel.

Another object of the invention is to provide means for controlling the velocity of the piston of the punch in both directions and for velocity control in this machine, I prefer to use cushioning fluid, such as oil, and a reservoir tank or tanks for the oil connected to the cylinder of the punch.

Further objects of the invention will hereinafter appear and the invention is shown in its preferred forms in the accompanying drawings, in which

Figure 1 is a side elevation partly in longitudinal section showing one form of the apparatus, and

Figure 2 is another similar view showing the modification.

Referring to the drawings, a suitable base or frame A, which may be the base or frame of a drill sharpener or a separate pedestal, is provided with clamping jaws B which may be the supplemental clamping jaws on a drill sharpener for holding the drill steel C on a drill sharpening machine. These supplemental clamping jaws are commonly provided at one side of the central axis of the machine for various clamping purposes in which case the shank and bit punch would be located on a bracket with its longitudinal axis in line with the supplemental clamping jaws. This, however, is common practice and has been used ever since shank and bit punches have been used so that the actual mounting of the shank and bit punch is not illustrated. References, however, made to U. S. Patent No. 1,304,459 granted May 20, 1919 to Jesse Ditson for drill sharpener, illustrate a bit punch mounted on a bracket at one side of the central axis of the drill sharpener.

Upon the frame A is mounted a cylinder D having a reciprocating fluid actuated piston E, to the piston rod F of which is secured a pin punch G in any suitable manner as by means of the socket H and pin J. The piston rod F extends through a cap K on the front head L of the cylinder and a cup leather O preferably surrounds the piston rod beneath the cap K. The cylinder back head P may be secured to the cylinder in any suitable manner (not shown).

A valve casing Q is conveniently provided on the frame A to which is connected the motive fluid supply pipe R for pressure fluid, such as compressed air, for operating the punch. A suitable valve S controls the supply of motive fluid to the rearward end of the cylinder through the port T and motive fluid is exhausted through the port U.

In the form of the invention shown in Figure 1 means are provided for cushioning the forward stroke of the piston E and thereby controlling the velocity of the piston. For this purpose, I prefer to use a reservoir tank V for cushioning fluid, such as oil, connected at its upper end to the forward end of the cylinder D as by means of the pipe W preferably provided with the valve X for controlling this connection. The reservoir tank V may be constructed in any suitable manner and may be provided with the tube Y flared at its lower end as at Z and extending through the tank to a point near the bottom thereof for conveying oil from the tank to the cylinder. Perforated baffle plates *a*, *b* and *c* may encircle the tube to retard the flow of oil from the cylinder into the tank. A pressure fluid connection *d* is connected between the valve chest Q and the upper portion of the reservoir tank V. A port *e* may be provided for the forward end of the cylinder controlled by the cock *f* forming a vent, but if desired, the oil could pass into and out of

the cylinder through the upper portion of the cylinder at the vent *e* instead of the lower portion as shown in the drawings.

In the operation of the device so far described, let it be assumed that the valve S is in the position indicated in which case pressure fluid from the supply pipe R is admitted behind the piston E to drive it forward and carry the pin punch into the drill steel. The oil *g* in front of the piston is forced through the valve X and pipe W into the reservoir tank V and the rate of flow of oil is controlled by the setting of the valve X thus controlling the velocity of the piston. Full line pressure is obtained against the piston to force it forwardly at a given rate which will be determined for the character of the work being done depending upon the resistance to the entry of the pin into the drill steel. The tank V is vented to atmosphere through the pipe connection *d* and atmospheric port U.

To return the piston and pull the pin out of the drill steel the valve S is reversed in order to connect the supply pipe R to the connection *d* and open the rearward end of the cylinder to atmosphere through the port U. Pressure fluid admitted to the reservoir tank V above the oil *g* will force the oil under pressure back into the forward end of the cylinder and carry the piston rearwardly at a given velocity depending upon the setting of the intermediate valve X. The reciprocation of the piston is controlled by the valve S and the pin may be quickly thrust into the drill steel and withdrawn before the pin has had time to become heated and softened and before the drill steel has cooled sufficiently to grip the pin and prevent its withdrawal.

Without the fluid cushion described, the piston E is driven forward so rapidly during the first part of the stroke to carry the pin into the open end of the steel that the pressure fluid behind the piston expands and the maximum effort is lost as the resistance to the entry of the pin into the steel increases. With my improvement the maximum air pressure is obtained into the steel throughout the entire travel of the pin. For withdrawing the pin from the steel a steady sustained pull is obtained owing to the regulated flow of oil under pressure into the forward end of the cylinder to force the piston rearwardly.

If desired, fluid reservoir tanks may be provided for both ends of the cylinder as shown in the modification in Figure 2 in which an additional reservoir tank V′ is connected by the pipe W′ to the rearward end of the cylinder and a pipe connection *d′* is provided between said tank V′ and the valve casing Q′.

With the position of the parts as indicated in Figure 2, motive fluid from the supply pipe R passes through the connection *d′* to the reservoir tank V′ and oil under pressure passes into the cylinder D behind the piston E to force the piston forwardly while the oil in front of the piston passes into the reservoir V which is open to atmosphere through the atmospheric port U. By reversing the valve S the opposite condition obtains and the oil under pressure from the tank V forces the piston rearwardly while the oil behind the piston passes into the tank V′. The velocity of the piston is controlled in both directions and the piston may be moved forwardly and backwardly at will by manipulating the valve S.

I claim:

1. In a shank and bit punch, the combination of means for clamping a drill steel to be punched, a cylinder, a fluid actuated reciprocatory piston in the cylinder, a pin punch carried by the piston and adapted to enter the drill steel, a reservoir tank for cushioning fluid, a connection leading from the upper end of the tank to the front end of the cylinder, a tube in the tank communicating with the connection for conveying cushioning fluid from the bottom of the tank to the forward end of the cylinder, and means for supplying motive fluid to the cylinder for driving the piston forwardly and for forcing the cushioning fluid from the tank into the front end of the cylinder during the rearward stroke of the piston.

2. In a shank and bit punch, the combination of means for clamping a drill steel to be punched, a cylinder, a fluid actuated reciprocatory piston in the cylinder, a pin punch carried by the piston and adapted to enter the drill steel, a reservoir tank for cushioning fluid, a connection leading from the upper end of the tank to the front end of the cylinder, a tube in the tank communicating with the connection for conveying cushioning fluid from the bottom of the tank to the forward end of the cylinder, a valve for supplying motive fluid to the rearward end of the cylinder in one position of the valve for driving the piston forwardly, and in another position of the valve for supplying motive fluid to the tank for forcing the cushioning fluid from the tank to the front end of the cylinder in readiness to cushion the next forward stroke of the piston, and means in the tank for retarding the flow of cushioning fluid from the cylinder into the tank.

3. In a shank and bit punch, the combination of means for clamping a drill steel to be punched, a cylinder, a fluid actuated reciprocatory piston in the cylinder, a pin punch carried by the piston and adapted to enter the drill steel, a reservoir tank for cushioning fluid, a connection leading from the upper end of the tank to the front end of the cylinder, a tube in the tank communicating

with the connection for conveying cushioning fluid from the bottom of the tank to the forward end of the cylinder, a valve for supplying motive fluid to the rearward end of the cylinder in one position of the valve for driving the piston forwardly, and in another position of the valve for supplying motive fluid to the tank for forcing the cushioning fluid from the tank to the front end of the cylinder in readiness to cushion the next forward stroke of the piston, and perforated baffles encircling the tube to retard the flow of cushioning fluid from the cylinder into the tank.

In testimony whereof I have signed this specification.

LEWIS C. BAYLES.