No. 651,320. Patented June 5, 1900.

C. B. ALBREE.

DEVICE FOR CHECKING THE REBOUND FROM IMPACT IN RECIPROCATING APPARATUS.

(Application filed Jan. 25, 1900.)

(No Model.)

Fig. 4.

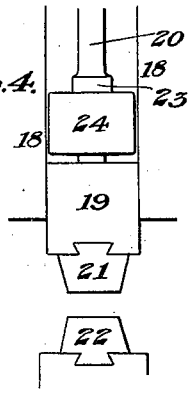


Fig. 5.

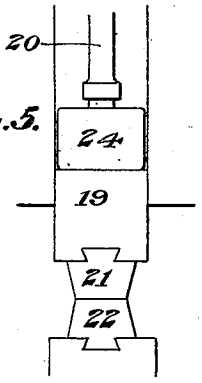


Fig. 3.

Fig. 6.

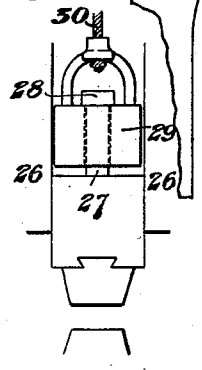


Fig. 1.

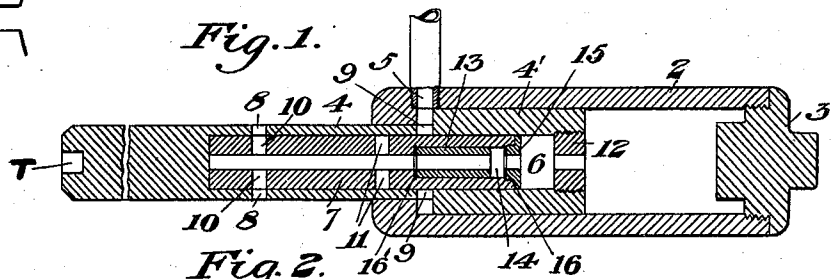
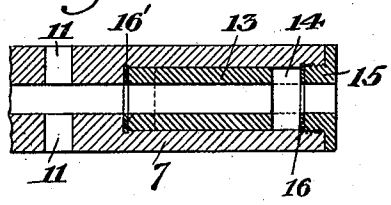


Fig. 2.



WITNESSES

L. A. Conner

G. B. Fleming

INVENTOR

Chester B. Albree

by Bakewell & Bakewell

his Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHESTER B. ALBREE, OF ALLEGHENY, PENNSYLVANIA.

DEVICE FOR CHECKING THE REBOUND FROM IMPACT IN RECIPROCATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 651,320, dated June 5, 1900.

Application filed January 25, 1900. Serial No. 2,724. (No model.)

To all whom it may concern:

Be it known that I, CHESTER B. ALBREE, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Devices for Checking the Rebound from Impact in Reciprocating Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal sectional view of my improved device as applied to the reciprocating part of a pneumatic or steam tool. Fig. 2 is an enlarged detail view of the same. Fig. 3 is a side elevation, broken away and partially in section, of a drop-press to which my device is applied. Figs. 4 and 5 are detail views at different points of operation of the same, and Fig. 6 is a modification as applied to another form of apparatus.

My invention relates, primarily, to the reciprocating part of apparatus of the percussive or hammer type, and is designed to afford a means for preventing or greatly overcoming the rebound of said reciprocating part incident to its impact.

To this end it consists, broadly, in a rider or riders adapted to move with reciprocating part and by impact to absorb or neutralize the rebound thereof.

Referring more particularly to Figs. 1 and 2, in which I show my device as applied to the tool-motor shown and described in my Patent No. 638,490, and it may be applied similarly to the motor of my Patent No. 638,489, 2 represents the cylinder, having a cylinder-head 3 and a piston of two diameters 4 4', which at its end has a socket T, designed to receive the tool or other instrument which it is used for operating. 5 is the inlet-port, connected with a source of compressed air or other motive fluid. The piston has a hollow passage 6 extending through it, preferably cylindrical in form, and in that passage is a valve 7, which fits neatly therein, but can slide back and forth, as hereinafter explained. 8 8 are exhaust-ports leading from the hollow piston, as shown. The valve 7 is formed with openings constituting ports 10, adapted to register with the exhaust-ports 8 when the valve is in the position shown in Fig. 1, and with ports 11, adapted to register with the ports 9 when the valve is in its reverse position. 12 is a stop at the end of the hollow passage of the piston, adapted to limit the back motion of the sliding valve. Within the valve 7, preferably at its inner end, I place a tubular rider 13. This rider is loose in the sense that it is capable of independent motion, and for this purpose it is adapted to slide back and forth. I provide the passage 7 with an enlarged portion 14, said portion 14 having a stop 15 and stop-washers 16 16'. The washers, however, are not essential, being provided merely to afford a cushion for the rider 13.

The operation is as follows: The parts being in the position shown in Fig. 1, motive fluid is admitted through the port 5 and, entering the cylinder at the smaller diameter of the piston, forces the piston back to the rear end of the cylinder, the air which is back of the piston being displaced through the passage 6, hollow valve 7, and exhaust-ports 10 and 8 to the atmosphere. When the piston reaches the end of its back stroke and is stopped by engagement with the head 3, the valve 7 is caused by its inertia to move back into contact with the stop 12, and at the same time the rider 13 is caused to move back into contact with the stop 15, the valve 7 then closing the exhaust-port 8 and putting the ports 9 into communication with the interior of the hollow valve by way of the ports 11, which then register therewith. Thereupon the air passes through the ports 9 11, valve 7, and passage 6 to the cylinder back of the piston, thus tending to equalize the pressure therein with the pressure at the other end of the piston, and by reason of the differential area the piston is forced forward. When it reaches the end of its outstroke or if for any reason, as is very common in tools of this class, its motion should be checked by coming in contact with some obstacle before the end of its normal outstroke is reached, the valve 7 is caused by inertia to move forward into the position shown in Fig. 1, and thereupon the rear end of the cylinder is cut off from the inlet and put into communication with the exhaust, and the compressed air acting on the differential area of the piston forces it back, the cycle of operations being thus continued.

It is apparent that there is danger of the

non-registration of the ports of valve 7 after each impact both forward and rearward due to the elasticity of the valve and piston. To obviate this is one of the objects of the present invention and is accomplished by the rider 13 as follows: When the piston, with its contained valve, has moved to its rearward position, the rider 13 will also assume its extreme rearward position, as shown by dotted lines in Fig. 2, and by reason of its inertia it will maintain a rearward or lagging position during the outward movement of the piston. The instant that the outward movement of the piston is arrested the valve 7 will move forward, as hereinbefore described, to perform its function of altering the flow of air. The instant that the movement of the valve 7 is arrested the rider 13 will move forward by reason of its inertia and, contacting with the forward shoulder 6′, will neutralize the rebounding impetus of the valve. The rider 13 and valve 7 are then in position relative to the piston to repeat the above-described operation at its return inward stroke. It will be understood that the movements above described are very rapid. The piston in ordinary use may reciprocate approximately one thousand times a minute, so that the moment of stoppage of the rider is practically simultaneous with the moment of stoppage of the valve 7. It is obvious that the shape and position of the rider with respect to the valve are unimportant, so long as they do not interfere with the functions of the valve.

Referring now to Figs. 3, 4, and 5, in which I show my device as applied to a steam drop press or hammer, 17 is the frame or standards, having suitable guides 18, in which reciprocates a head 19, to which power is transmitted by a piston-rod 20 from a suitable cylinder. (Not shown.) 21 and 22 are upper and lower dies, respectively, of any desirable shape. The piston-rod 20 is provided with collar 23, adapted to confine the vertical movement of the rider 24 thereon, as shown.

The press or hammer is operated in the usual manner, and my improved device acts as follows: The rider 24 by reason of gravity will normally rest upon the head 19, as shown in Figs. 3 and 5, Fig. 3 showing the position of the parts at rest before the operation of the press or hammer and Fig. 5 showing the position of the parts at rest at the end of a single stroke; but during the descent of head 19, because its speed is greater than the attraction of gravity, said rider 24 will tend to lag behind until caught by the collar 23, when it will descend with the same speed as the head 19, the relative position of the parts midway in their descent being as shown in Fig. 4, and this relative position is maintained until the limit of descent is reached and the movement of the head 19 is arrested. The descent of the rider 24, however, is not arrested until it completes the extent of its movement and strikes the head 19. As stated with reference to Figs. 1 and 2, the movements herein described are rapid, so that the interval between the moment of impact of die 21 upon die 22 and the moment of impact of rider 24 upon head 19 is small.

Referring now to Fig. 6, I show in conventional form a pile-driver of the gravity type, in which I illustrate my device when both reciprocating part and its rider are actuated by gravity. 25 is the reciprocating part or hammer, movable in vertical guides 26 and having pin 27 and head 28 integral therewith. 29 is the rider, confined loosely on the pin 27 by the head 28, to which is secured an actuating-rope 30.

The operation of the apparatus shown in Fig. 6 is similar to that shown in Fig. 3. It will be observed, however, that whereas in the latter case the rider lags by reason of the difference in velocity in Fig. 6 the rider is caused to lag by the suspending rope.

The effect of the action above described will be readily understood. Upon impact of reciprocating parts a portion of the direct force exerted thereby is converted into reflex or rebounding motion, which is immediately absorbed and neutralized by the inertial force exerted by the rider, the said rider being constructed of weight adapted to its individual condition. I have discovered that the rebound of steel upon steel is approximately three-tenths of the direct force exerted, and therefore under such conditions I provide a rider of about three-tenths the weight of the reciprocating part.

The advantages of my invention will be appreciated by those skilled in the art to which it relates, since it affords effective means for overcoming the rebound hereinbefore mentioned. The disadvantages arising from this rebounding in pneumatic tools have been hereinbefore explained, and the disadvantages in the art of press and die works are also well marked. In the latter case many expedients have been attempted to overcome the difficulty, notably the skilful manipulation of the actuating fluid, whereby the reciprocating part is caught on its rebound; but such manipulation necessitates the employment of well-trained and especially-skilled workmen. By the use of my invention this difficulty is overcome and ordinary unskilled labor may be employed.

Many changes may be made in the form, material, and application of my device without departure from my invention as defined in the claims. The rider may be modified in form, position, and size to meet the requirements of individual cases, and, although I ordinarily construct the same of steel or iron, I have found that hard fiber, wood, or analogous material may be used. Other changes will suggest themselves to the skilled mechanic within the scope of my invention.

I claim—

1. A device for checking rebound in reciprocating mechanism, comprising, in combination with a body having a tendency to rebound,

a body arranged to move with the reciprocating part and impact therewith at the limit of its reciprocatory movement; substantially as described.

2. A device for checking rebound in reciprocating mechanism, comprising, in combination with a body having a tendency to rebound, a loose and lagging body arranged to move with the reciprocating part and by its inertia check rebound; substantially as described.

3. In tool-motors having a reciprocating valve, a body loosely carried with said valve and arranged to impact therewith at the limit of its reciprocating movement; substantially as described.

4. In tool-motors having a reciprocating piston and valve, a tubular rebound-checking rider loosely carried by said valve and arranged to impact therewith at the limit of its movement; substantially as described.

5. In tool-motors having a reciprocating piston, a tubular inertia-valve carried therein, and a tubular rebound-checking rider carried within the valve; substantially as described.

6. In tool-motors having a reciprocating piston and valve, a body arranged to reciprocate within said valve and impact therewith at the limit of each reciprocating movement thereof; substantially as described.

In testimony whereof I have hereunto set my hand.

CHESTER B. ALBREE.

Witnesses:
G. I. HOLDSHIP,
H. M. CORWIN.