Jan. 31, 1939. L. K. DAVIS 2,145,714

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Fig. 1.

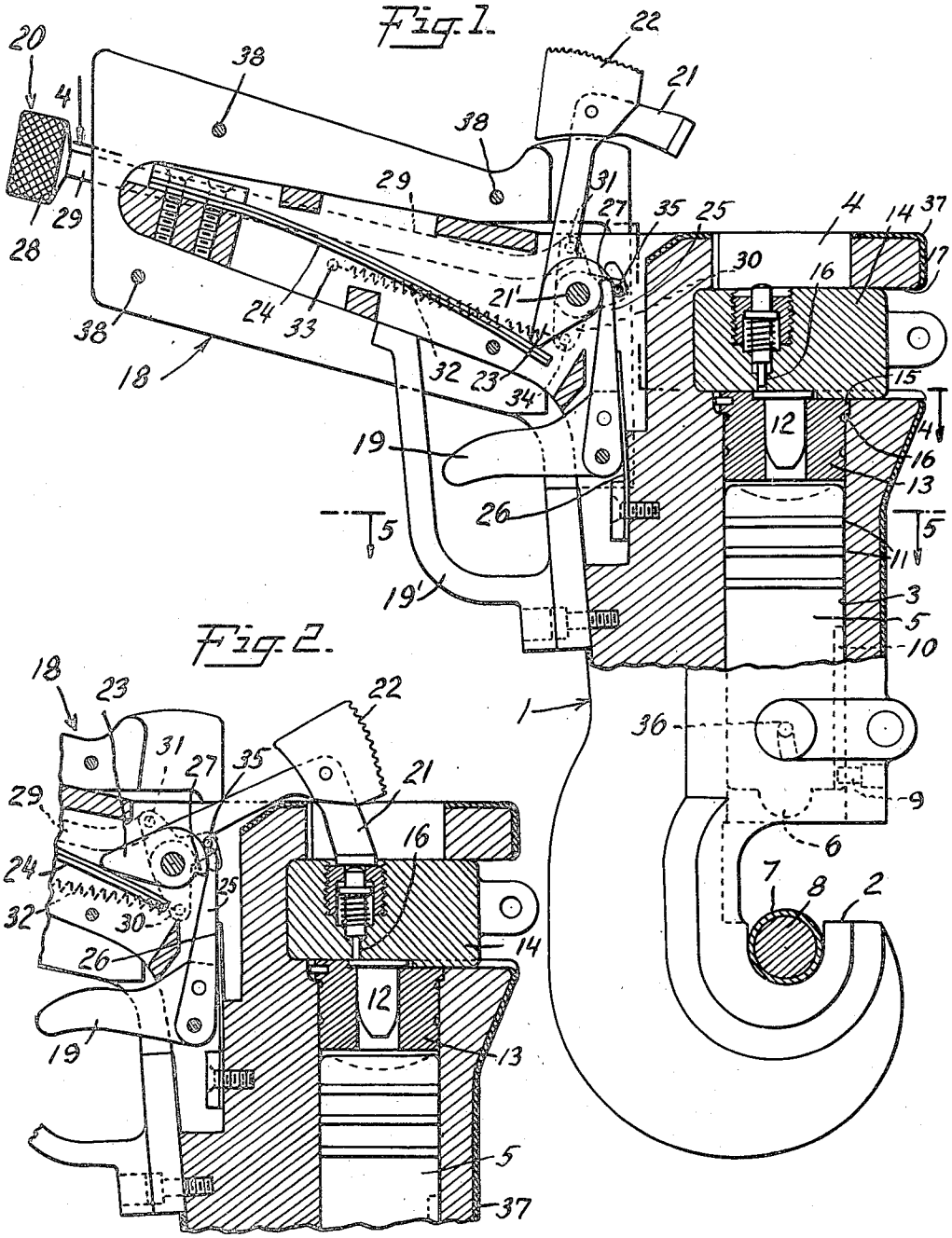


Fig. 2.

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Fig. 3.

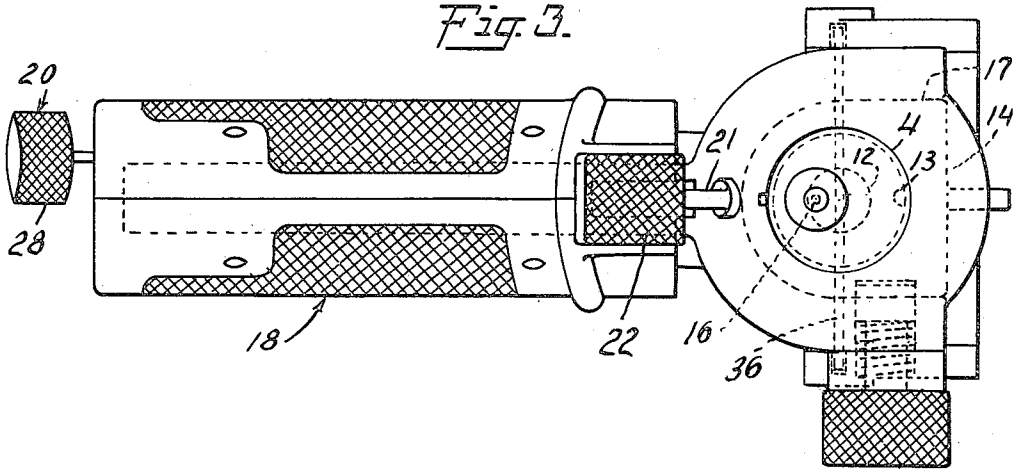


Fig. 4.

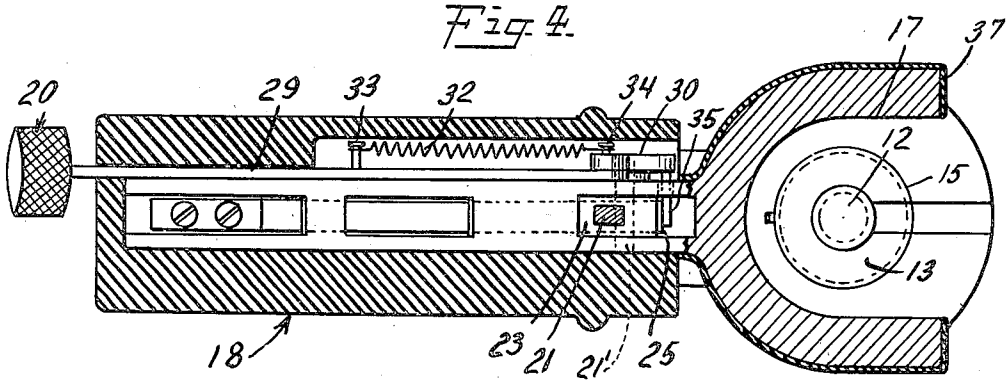


Fig. 5.

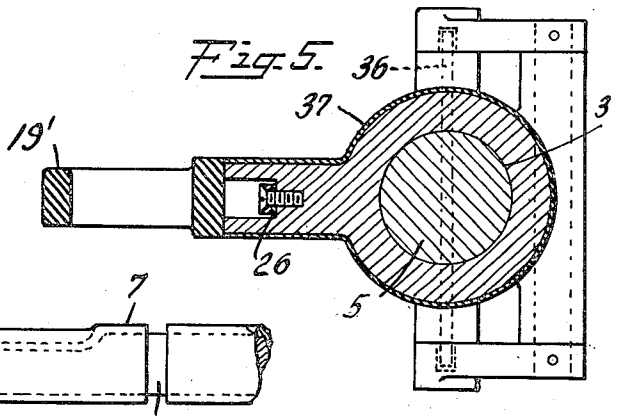
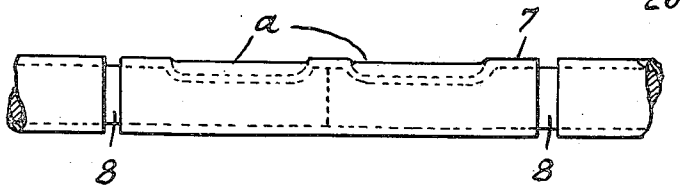


Fig. 6.



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Fig. 7.

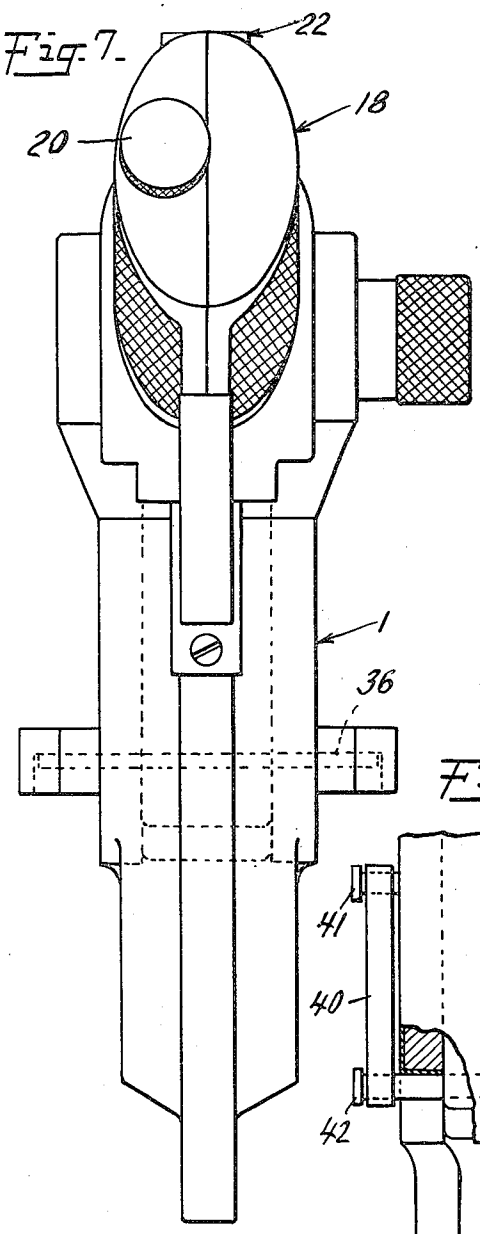


Fig. 8.

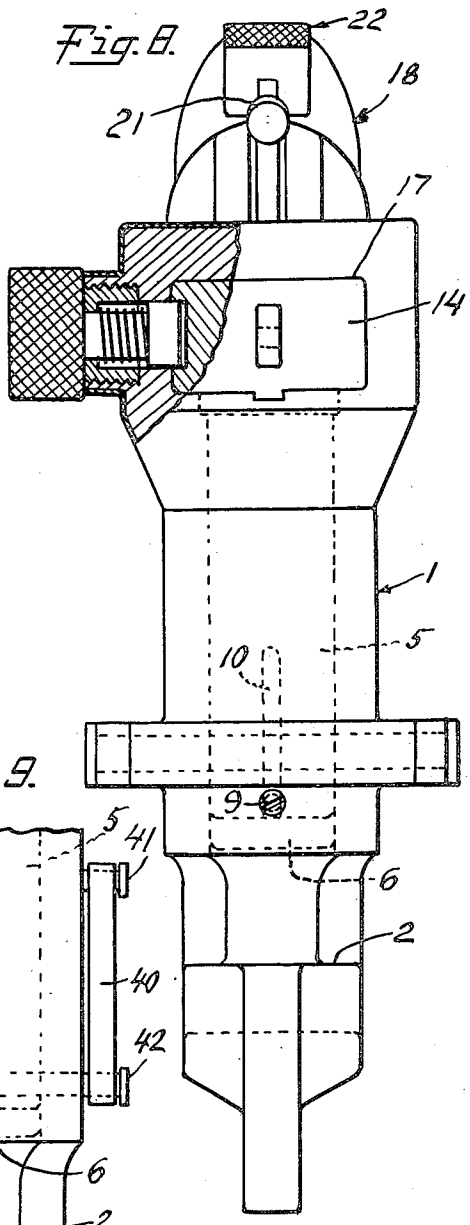
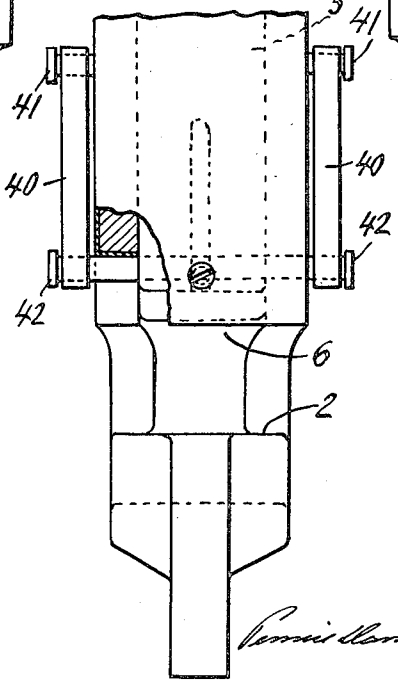


Fig. 9.



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Patented Jan. 31, 1939 2,145,714

UNITED STATES PATENT OFFICE

2,145,714

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Application February 10, 1936, Serial No. 63,072

7 Claims. (Cl. 140—113)

This invention relates to improvements in impact presses of the type suitable for splicing cables and for performing other operations involving the use of a pair of die elements which must be brought together or toward each other with the force of a sudden impact. My invention is particularly useful as applied to impact devices operated by the force of an explosive charge.

My invention is particularly concerned with improvements which contribute to the safety of operation of impact presses, the invention being also concerned with improvements which simplify the construction of impact presses and improve their efficiency.

In general, impact presses of the type here under consideration comprise a frame and a pair of die elements, the frame being provided with means for receiving and exploding a charge of powder which provides the energy required to cause the die elements to perform their intended function, such as compressing a metal sleeve onto the ends of a cable. The use of these devices, as they have heretofore been made, has been hazardous, the presses being ordinarily made so that the operator can hold the device with one hand and with the same hand operate a trigger, or the like, to cause the charge of powder to explode. The other hand of the operator is thus free, and, if he is at all careless, he may be seriously injured by having his other hand in the vicinity of the die elements at the moment the charge is exploded. An object of this invention is to provide a safety latch associated with the firing mechanism in such manner that both hands of the operator must be kept on the handle of the tool in order to fire the charge, thus eliminating the possibility of injuring either hand by having it close to the die elements at the moment the device is operated. A further object of the invention is to provide means for insulating the impact device so that the operator will not be in danger of being electrocuted in the event the device accidently touches a live wire or cable, and I also contemplate making the device so that it cannot be the means of causing a short circuit between conductors carrying electric current at high potential.

Another feature of my invention is the provision of die elements one of which is integral with the frame and the other of which is integral with the explosively actuated piston. This avoids the danger of misalignment of the die elements which might result in breakage and possible injury to the workman, as well as mutilation or destruction of the cable joint sleeve or other object engaged by the die elements. Still another feature of the invention is the construction and arrangement of the frame and piston whereby the piston and the die element associated therewith may be readily inserted in the frame and as easily removed whenever it becomes necessary to clean, repair or replace the piston. Another feature of the invention is the provision of means for normally holding the movable die element in its raised position and for automatically returning this die element to its raised position after the impact blow has been delivered.

The frame may be provided with a cylinder or bore extending longitudinally thereof and adapted to receive a piston. The cylinder has an open end through which the piston may be inserted and the frame may be provided with a laterally extending opening through which a breechblock may be inserted, the arrangement being such that after the breechblock has been removed a cartridge holder normally held in place by this block can be removed endwise through the open end of the cylinder and the piston with its die element may then be removed through the open end of the cylinder.

The various objects and advantages of my invention will be more apparent upon considering the following detailed description of certain embodiments thereof illustrated in the accompanying drawings in which:

Fig. 1 is an elevation of an impact press embodying my invention parts being cut away to illustrate details of construction;

Fig. 2 is a fragmentary section view of a portion of the device shown in Fig. 1 showing some of the movable parts in another position;

Fig. 3 is a plan view of the device shown in Fig. 1;

Fig. 4 is a transverse section view, taken on line 4—4 of Fig. 1;

Fig. 5 is a transverse section view taken on line 5—5 of Fig. 1;

Fig. 6 is an elevation of a cable joint illustrating a typical use of the impact device;

Fig. 7 is a left side elevation of the device shown in Fig. 1;

Fig. 8 is a right side elevation of the device shown in Fig. 1, parts being cut away to illustrate details of construction and

Fig. 9 is a fragmentary elevation of a device similar to that shown in Fig. 1 but embodying certain modifications.

The embodiment of my invention illustrated in Figs. 1 to 5, 7 and 8 of the accompanying draw-

ings comprises a metal frame 1 having a hook-shaped lower portion including what may be characterized as a die element 2, preferably although not necessarily integral with the main body of the frame. The frame 1 is provided with a cylinder or bore 3 extending longitudinally thereof and having an exposed open end 4. The cylinder 3 is adapted to receive a piston 5 carrying a die element 6. It will be understood that the die elements 2 and 6 are in a sense complementary die elements adapted to engage a piece of work such as the sleeve 7 on the ends of a cable 8. The piston 5 is slidably mounted in the cylinder of the frame and when the cylinder is driven downward by a sudden impact blow the die element 6 engages the sleeve 7 to indent the same as shown at *a* in Fig. 6, thus firmly bonding the sleeve to the ends of the cable 8. The die element 6 comprises a projection carried by and preferably integral with the lower face of the piston 5 and this die element is not larger than the diameter of the piston 5. The open end 4 of the cylinder is at least as large as the lower portion of the cylinder so that the piston 5 and the die element 6 carried thereby can be readily withdrawn through the open end 4 of the cylinder. When the device is in use the piston 5 is normally mounted in the cylinder 3 being held in proper angular position by a pin 9 registering with the slot 10 extending along one side of the piston. The piston may be provided with packing as shown at 11 to insure a tight fit between the piston and the cylinder wall. A cartridge 12 containing explosive material is carried by a cartridge holder 13 which is normally held in place by a breechblock 14. The cartridge holder 13 may have a rim 15 adapted to engage a shoulder 16 on the frame 1 and it will be understood that the breechblock 14 serves to hold the cartridge holder with its rim firmly against the shoulder 16. Where the cartridge holder is provided with a rim of this character the open end portion 4 of the cylinder may be made large enough so that this cartridge holder can be readily inserted through this opening.

The breechblock 14, carrying a spring mounted firing pin 16, may be inserted into the frame laterally through a lateral port or opening 17.

A laterally projecting handle 18 is provided as a means for enabling the workman to hold the impact device, and the firing mechanism for detonating the explosive charge includes a trigger 19 and a safety catch 20 associated with this handle 18. This mechanism also includes a hammer 21 adapted to strike the firing pin 16 and provided with a thumb piece 22 whereby the hammer can be cocked. The hammer 21 is provided with a cam element 23 engaging a flat spring 24 so that the hammer may be cocked against the tension of this spring. After the hammer is drawn back to a certain point the end of an arm 25 carried by the trigger 19 is caused by a flat spring 26 to engage a projection 27 integral with the hammer 21, whereby the hammer is held in its raised position. The safety catch 20 comprises the hand button 28, a shaft or wire 29 on which this button or ring is mounted and a yoke 30 rotatably mounted on the hammer shaft 21'. The shaft 29 is connected to the yoke 30 at a point above the shaft 21' by a suitable pin connection 31 and a coiled spring 32 fixed to the handle at 33 is connected to the yoke 30 at a point below the shaft 21', as shown at 34. From this description of the parts it will be understood that the spring 32 serves to bias the safety catch 20 in a position such that a locking pin 35 engages the outer surface of the trigger arm 25 to lock the end of this arm firmly in place against the hammer projection 27. With this locking pin 35 in the position shown in Fig. 1 it will be understood that the trigger 19 cannot be actuated.

To operate the device it is necessary to grasp the handle 18 with one hand and with the index finger of this hand engaging the trigger 19 and then with the other hand pull the safety catch button 28 until the locking pin 35 is raised to such an extent that it occupies the position shown in Fig. 2 and then the trigger 19 is pressed to pull the trigger arm 25 away from the hammer projection 27. This releases the hammer which, under the action of the flat spring 24, strikes the firing pin 16 and thus the cartridge 12 is exploded.

When the cartridge is exploded the force of the charge tends to cause the piston 5 to suddenly move downward in the cylinder 3 but this movement may be initially retarded by a shear pin 36 passing through the side portions of the frame and through the piston, as best illustrated in Figs. 1 and 5. The force of the charge is such that this shear pin is sheared at each side of the piston and the piston is then free to move downward under the force of the sudden impact until the die element 6 engages and compresses the work-piece resting in the lower die element 2.

The frame 1 is preferably dipped or otherwise coated with a layer 37 of some suitable insulating composition so that if the frame accidentally touches a live wire or cable the metal portion thereof will not become charged with electricity. Likewise the handle 18 is preferably made of insulating composition. This handle is preferably made in two parts and bolted together, as shown at 38. The trigger 19 and the trigger guard 19' are also of insulating material as is the safety catch button 28 and the hammer thumb piece 22. The provision of this electrical insulation makes the operation of the device safe and a most important safety factor is the provision of the trigger 19 and the safety catch button 28, arranged so that both of these devices cannot be operated by one hand. This insures that when the device is used both hands of the operator must be in the immediate vicinity of the handle and thus far removed from the danger zone where the die elements 2 and 6 are located.

I prefer to have the die elements 2 and 6 integral with the bottom portion of the frame and with the lower end of the piston 5 respectively, for in this way misalignment of these elements is avoided which might otherwise cause injury to the workman and damage to the cable joint or other piece of work between the die elements.

The modification illustrated in Fig. 9 involves the use of bands or strips of rubber 40 or equivalent elastic material the purpose of which is to hold the piston 5 in its raised position until the charge has been exploded and to return the piston to this position after the impact blow has been delivered. Each of these bands or strips of elastic material may be mounted on a pin 41 carried by the frame and a pin 42 carried by the piston and it will be understood that when the charge is exploded these bands or elastic pieces will stretch to accommodate the movement of the piston and then contract to return the piston to its raised position. All of the other parts of the device shown in Fig. 9 are the same as those illustrated in Figs. 1 to 5 and 7 and 8.

It is to be understood that my invention is not

limited to the details of construction illustrated in the accompanying drawings but includes such modifications thereof as fall within the scope of the appended claims.

I claim:

1. An impact press comprising a frame having a cylinder with a portion thereof for receiving a slidable piston and with an open end having a bore at least as large as that of the said portion, said frame also having a lateral opening communicating with said cylinder, a piston in said cylinder, a cartridge holder, and a breechblock for holding said cartridge holder in position and removable through said lateral opening so that the piston and cartridge holder may be removed through the open end of the cylinder after said breechblock has been removed said breechblock being normally confined between portions of said frame.

2. An impact press comprising a frame having a cylinder with a portion thereof for receiving a slidable piston and with an open end having a bore at least as large as that of said portion, said frame also having a lateral opening communicating with said cylinder, a piston in said cylinder, a die element carried by said piston and having a diameter less than that of the cylinder, a cartridge holder, and a breechblock for holding said cartridge holder in position and removable through said lateral opening to permit the piston, cartridge holder and the die element carried by said piston to be removed through the open end of the cylinder said breechblock being normally confined between integral portions of said frame.

3. An impact press comprising a frame having a cylinder therein, a piston in said cylinder, means for supporting an explosive charge in said frame, firing mechanism for firing the said charge and elastic means associated with said frame and said piston for normally holding the piston in a retracted position and for returning the said piston to said position after the said charge has been fired, the said elastic means comprising strips of elastic material connected to each side of said frame and to said piston.

4. An impact press comprising a frame having a cylinder therein, a piston in said cylinder, means for supporting an explosive charge in said frame, a handle carried by said frame, firing mechanism for said explosive charge associated with said handle, a firing mechanism controlling trigger positioned at the junction of said handle and said frame, a normally effective locking device for said firing mechanism, and a manipulative device for said locking means projecting from the end of said handle.

5. An impact press comprising a frame having a cylinder therein, a projection carried by said frame and extending into said cylinder, a piston in said cylinder, packing rings on said piston engaging the wall of said cylinder, a work engaging member integral with piston, said piston having a groove therein registering with said projection whereby said projection may guide the movement of said piston and work engaging member throughout their travel, means for supporting an explosive charge in said frame and means for firing said charge.

6. An impact press comprising a frame having a cylinder therein, a piston in said cylinder, means for supporting an explosive charge in said frame and in communication with said cylinder, mechanism for firing said explosive charge, a handle secured to and projecting laterally from said frame, a firing mechanism controlling trigger positioned adjacent the junction of said handle and said frame and operable to release said firing mechanism by a movement transverse to said handle, a normally effective lock for said firing mechanism, and a lock disabling device projecting from the end of said handle and operable to disable said lock by a movement longitudinally of said handle.

7. An impact press comprising a frame having a cylinder therein, a piston in said cylinder, means for supporting an explosive charge in said frame and in communication with said cylinder, a handle secured to and projecting laterally from said frame, firing mechanism for said explosive charge comprising a hammer and a hammer actuating spring, means for controlling said hammer comprising a manually operable trigger positioned adjacent the junction of said handle and said frame, a normally effective lock for preventing the release of said hammer by said trigger, and means for disabling said lock comprising a manipulative member projecting from the free end of said handle and operable to disable said lock by a movement longitudinally of said handle and outwardly therefrom.

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