

Oct. 4, 1938.

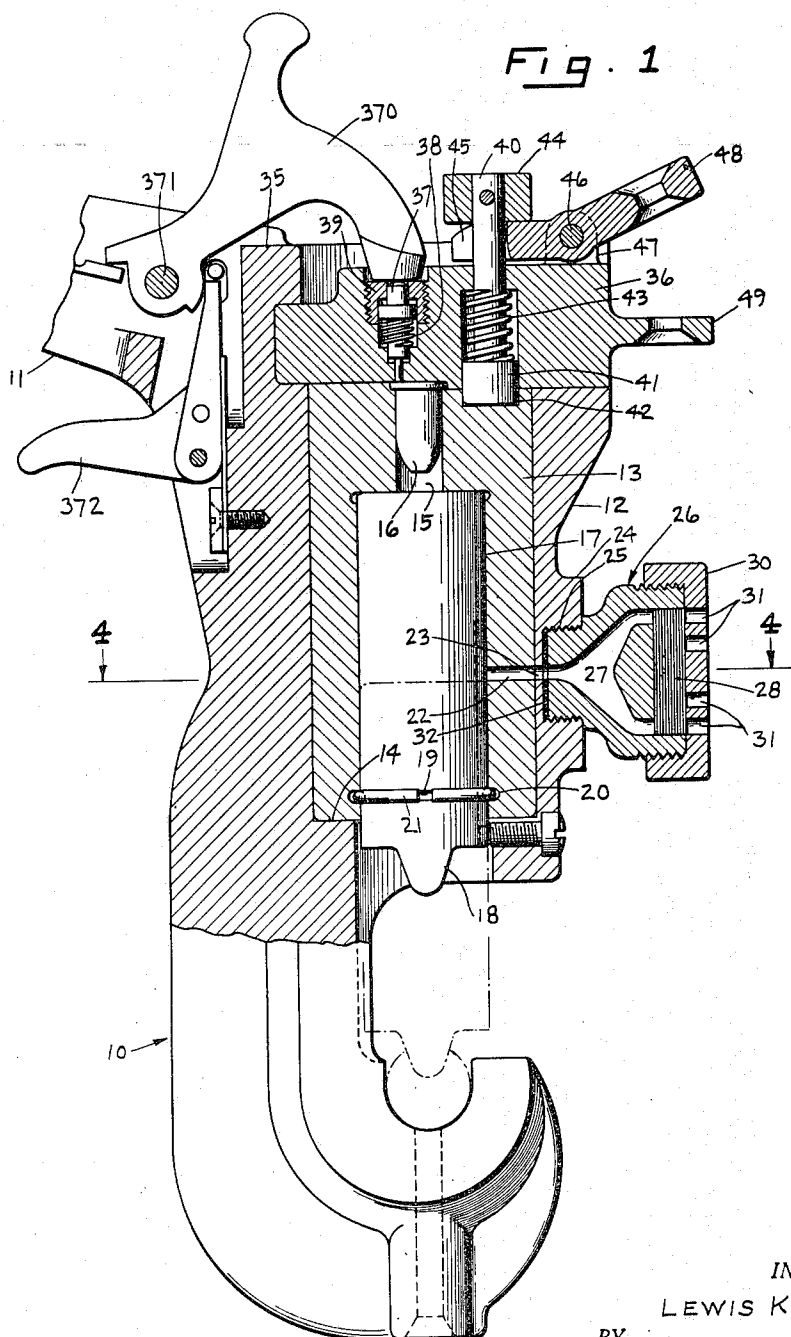
L. K. DAVIS

2,132,148

IMPACT PRESS

Filed Jan. 30, 1937

2 Sheets-Sheet 1



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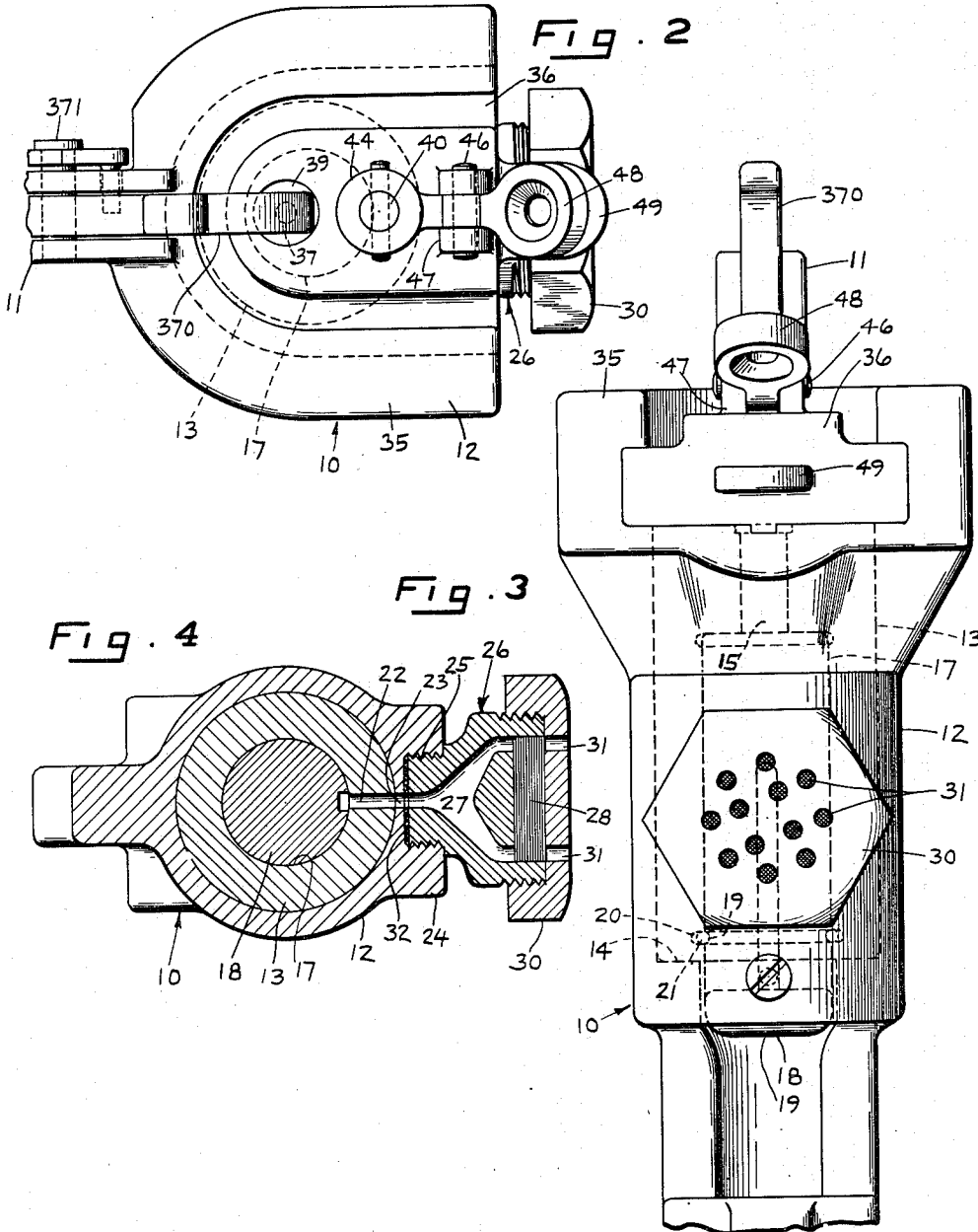
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12 Claims. (Cl. 140—113)

This invention relates to improvements in impact presses of the type suitable for splicing cable and performing other operations involving the forceful driving of a hammer, plunger or die, into engagement with work supported in operative relation to the hammer, plunger or die. In my prior co-pending application, Serial No. 63,072, filed February 10, 1936, I have described an impact press for this purpose in which the motive force is supplied by the combustion of a charge of propellant powder. The present invention contemplates certain improvements and refinements in the device of my former application.

It has been found, as a result of extensive testing under actual working conditions, that the temperatures and pressures developed within the cylinder of a device of this character are such as to cause undesirable erosion of the surfaces of the cylinder and/or the head of the piston. The present invention contemplates novel means and combinations of means, first, for reducing and controlling initial pressures; and second, for effecting a reduction in pressure immediately upon completion of the power stroke of the piston; thereby obviating the erosion due to the maintenance of pressures in the cylinder at a time when such pressure does not serve any useful purpose.

The invention further contemplates a new and improved breech mechanism which securely and effectively closes the breech end of the firing chamber or cylinder and at the same time is readily removable to effect reloading.

The invention further contemplates a barrel or cylinder which is removably held in the machine frame and may be quite readily removed and replaced when excessive use has impaired its functioning.

In the drawings:

Fig. 1 is a side elevation, partly in section, of an impact press embodying the present invention.

Fig. 2 is a plan view of the same press.

Fig. 3 is a front elevation of the press.

Fig. 4 is a horizontal section substantially on the line 4—4 of Fig. 1.

The machine comprises a main frame, identified generally by the numeral 10, the lower portion of which is formed in a C-shape to provide a work supporting anvil. The upper portion of the frame comprises a lateral extension 11 forming a handle. The body 12 of the frame above the anvil forming portion is of generally cylindrical exterior shape with such reinforcing and part supporting extensions and projections as may be

desirable. This portion of the frame comprises a cylindrical bore and counterbore adapted to receive and support the barrel or cylinder 13, the lower end of said cylinder resting on the shoulder 14 joining the bore through the lower end of the frame 12 with the larger counterbore extending the greater part of the length of the body of said frame.

In my prior co-pending application, above-identified, the machine frame comprises a cylindrical bore which receives the hammer or piston. When the wall of this bore becomes pitted or eroded it is necessary to discard the entire frame. According to the present invention, the cylinder or barrel is made a separate member supported and held in the frame proper in the manner just described; thus, a worn or eroded cylinder is capable of ready replacement.

The barrel or cylinder 13 comprises at its upper end a chamber 15 adapted to receive a cartridge such as 16. The chamber 15 communicates with the larger cylindrical chamber 17 adapted to receive a piston-like member 18, which member, according to the embodiment of the invention illustrated in the drawings, is provided with a hammer face particularly designed to impact and indent a cable splicing sleeve of a material such as copper or brass. The piston 18 is yieldingly held in retracted or elevated position in the cylinder 13 by suitable devices, one form of which may be as follows:

At an appropriate position in the length of the piston a circular groove 19 is formed in its periphery. When the piston is elevated this groove stands opposite a somewhat deeper groove 20 in the interior wall of the cylinder 13. Within the grooves 19 and 20 is placed a broken elastic metal ring 21, the stock of such ring preferably being of circular cross section, so that the ring may be spread or cammed outwardly by engagement with the camming upper surface of the groove 19. The ring tends to spring inwardly into the groove 19, which groove is of such depth that when it is occupied by the ring the outer portion of the ring projects outwardly into the groove 20. When sufficient downward force is exerted on the piston, the ring will be cammed out of the groove 19 into the groove 20, the periphery of the piston sliding through it in the upward and downward movement of the piston. The parts are so proportioned and the ring is of such rigidity as to require a substantial build up of pressure above the piston before the ring is displaced and the piston permitted to move. This type of piston restraining means has for certain types of work

been found an effective substitute for the shear pin illustrated in my application above-identified and also in my Patent No. 2,030,686

It has likewise been discovered that erosion of cylinder and piston can be substantially eliminated without loss of efficiency by providing a vent through the wall of cylinder 13 and the surrounding frame 12, which vent is opened when the piston reaches its lowermost or advanced position. When the piston has reached this position the blow has been delivered to the work upon the anvil and, while it is desirable to prevent an immediate rebound of the piston from the work, it has been found possible to so vent the cylinder as to materially relieve burning the cylinder and piston while still maintaining such a pressure on the piston as will preclude an immediate rebound of the piston and a consequent springback of the work upon the anvil which has been deformed by the piston. Accordingly, the present invention provides an aperture 22 extending transversely through the wall of cylinder 13 just above the lowermost position of piston 18, and an aperture 23 through the wall of the frame 12 in alignment with the aperture 22.

Since tools of this character may be used in places where the air contains considerable amounts of inflammable gases, it is desirable to damp and extinguish such powder combustion flame as might otherwise be projected into the air. For this purpose, there is associated with the apertures 22 and 23 a flame arrester which may be constructed as follows:

The adjacent portion of frame 12 is formed into a suitable boss 24 which is counterbored and threaded to receive a threaded portion 25 of a flame arrester identified generally by the numeral 26 and comprising a passage 27 aligning with the aperture 23. The passage 27 is suitably divided to distribute and transmit the flame passing therethrough to a chamber 28 which is filled with a suitable flame arresting and absorbing material. A number of thicknesses of copper screen have been found very effective for this purpose. In the embodiment illustrated in the drawings, the chamber 28 is occupied by several superposed layers of copper screen of 100 mesh. The outer portion of the body 26 of the flame arrester is threaded to receive a cap 30 which covers the chamber 28, the portion of said cap over such chamber comprising a plurality of apertures such as 31 through which the gases cooled by the flame arrester finally escape. The joint between the threaded end 25 of the flame arrester and the boss 24 of the frame may be sealed by a rubber gasket 32, said gasket being apertured to provide a passage from aperture 23 to flame arrester passage 27. A device of this character has been found to be very effective in reducing burning and erosion of the piston and cylinder without the undesirable transmission of flame and heated gases to the exterior.

The improved breech mechanism may be constructed as follows:

The upper end 35 of the frame 12 conforms to the exterior configuration illustrated in Fig. 2, the cylinder receiving bore extending through the upper end of the frame and being intersected by a transverse slot of greater width and length than the cylinder bore and adapted to receive a transversely moving breech block 36. The breech block comprises an aperture adapted to receive a firing pin 37, firing pin retracting spring 38, and firing pin holding nut 39. The firing pin is adapted to be struck by a hammer 370 pivoted at 371 and

controlled by a trigger 372. Said breech block is held in breech closing position and against movement in its slot in the frame by a plunger 40 comprising an enlarged foot 41 adapted to be received in a recess 42 in the surface of the upper end of the cylinder 13, said cylinder being, as shown in the drawings, immediately adjacent the breech block. The foot 41 is urged into recess 42 by suitable means such as a spring 43 encircling the shank of plunger 40. Means are provided for withdrawing the foot 41 and thus unlocking the breech for movement transversely out of the frame, which means may comprise a head 44 on the plunger 40 adapted for engagement by the forked end 45 of a lever pivoted at 46 in ears 47 upstanding from the breech block 36. The front end 48 of said lever forms a handle, the depression of which elevates the plunger 40, this operation being facilitated by a handle 49 projecting outwardly from the body 36 of the breech block and adapted to be grasped along with handle 48. By grasping these handles and depressing handle 48, plunger 40 is lifted to withdraw foot 41 from recess 42 and thereupon the breech block can be moved laterally out of the slots in frame 12 to permit the insertion of a cartridge into chamber 15.

It is to be understood that this 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.

What is claimed is:

1. An impact press comprising a frame having an aperture adapted to receive and support a replaceable cylinder, a cylinder in said frame comprising a bore adapted to receive a piston, a piston in said cylinder, means associated with said frame adapted to hold and ignite a piston propelling charge, and means for retarding movement of said piston comprising matching grooves in the peripheries of said cylinder and said piston respectively and a ring elastically held in both said grooves and displaceable from one of them by pressure on said piston.

2. An impact press comprising a frame apertured to receive a replaceable cylinder, a cylinder in said frame, a piston in said cylinder, means for propelling said piston from a normal position through a power stroke, and means for initially retaining said piston against the force of said propelling means comprising a peripheral groove in said cylinder, a matching peripheral groove in said piston, a ring of elastic material normally resting in said matching grooves and thereby retaining the piston in normal position but adapted to be displaced out of one of said grooves when the force tending to propel said piston from normal position exceeds a predetermined amount.

3. An impact press comprising a frame apertured to receive a replaceable cylinder, a cylinder in said frame, a piston in said cylinder, means for closing said cylinder comprising a transverse slot in said frame, a breech block adapted to be slidably received in said slot and to abut the upper end of said cylinder, and means for retaining said breech block in said slot.

4. An impact press comprising a frame apertured to receive a replaceable cylinder, a cylinder in said frame, means for closing one end of said cylinder comprising a transverse slot in said frame open at one end, a breech block adapted to be received in said slot, and means for retaining said breech block in cylinder closing position comprising a plunger extending through said

breech block and a recess in said frame adapted to receive a portion of said plunger.

5 An impact press comprising a frame apertured to receive a replaceable cylinder, a cylinder in said frame, means for closing one end of said cylinder comprising a transverse slot in said frame open at one end, a breech block adapted to be received in said slot, means for retaining said breech block in cylinder closing position
10 comprising a plunger extending through said breech block and a recess in said frame adapted to receive a portion of said plunger, and means for retracting said plunger to permit removal of said breech block comprising a lever pivoted to
15 said breech block and engaging said plunger.

6. An impact press comprising a frame apertured to receive a replaceable cylinder, a cylinder in said frame, means for closing one end of said cylinder comprising a transverse slot in said frame open at one end, a breech block adapted to be received in said slot, a spring pressed plunger extending through said breech block, a recess in said frame adapted to receive a portion of said plunger, and means for retracting said plunger
20 against the force of its spring comprising a lever pivoted to said breech block and engaging said plunger.

7. An impact press comprising a frame apertured to receive a replaceable cylinder, a cylinder in said frame, means for closing one end of said cylinder comprising a transverse slot in said frame open at one end, a breech block adapted to be received in said slot, a spring pressed plunger extending through said breech block, a recess in said frame adapted to receive a portion of said plunger, and means for retracting said plunger
35 against the force of its spring comprising a lever pivoted to said breech block and engaging said plunger and a handle projecting from said breech block and adapted to be grasped by the operator along with said lever.

8. An impact press comprising a frame apertured to receive a replaceable cylinder, a cylinder in said frame, a piston in said cylinder, means
45 for retaining said piston in normal position comprising matching grooves in the periphery of said cylinder and said piston respectively and an elastic ring normally occupying portions of both of said grooves but adapted to be displaced into one of them by adequate pressure to permit movement of the piston, means for closing said cylinder above said piston comprising a transverse groove in said frame open at one end, a breech block slidably received in said groove and abutting said cylinder, pressure generating means
55 carried by said breech block, and means for retaining said breech block in cylinder closing position comprising a plunger extending through said breech block and a recess in said frame adapted to receive a portion of said plunger.

9. A unitary portable tool for the splicing of cables and the like comprising a work support, a piston cylinder mounted in alignment with said work support, said piston cylinder being held
60 in a frame rigidly connected to said work support, a piston in said cylinder, pressure generat-

ing means for moving said piston comprising an explosive device, means for firing said explosive device, an exhaust vent for the gases of explosion extending through said cylinder and said frame, said vent being normally covered by said piston
5 and opened by the movement of said piston, and means associated with said vent for preventing the passage of flame while permitting the escape of gas, said means comprising a body of foraminous heat conducting material and a housing
10 therefor.

10. A unitary portable tool for the splicing of cables and the like comprising a work support, a piston cylinder mounted in alignment with said work support, said piston cylinder being held in
15 a frame rigidly connected to said work support, a piston in said cylinder, pressure generating means for moving said piston comprising an explosive device, means for firing said explosive device, an exhaust vent for the gases of explosion extending through said cylinder and said frame, said vent being normally covered by said piston and opened by the movement of said piston, and means associated with said vent for preventing the passage of flame while permitting
25 the escape of gas, said means comprising a housing threaded to said frame, a body of foraminous metal in said housing, and a perforated cover threaded to said housing.

11. In a unitary portable tool for the splicing
30 of cables and the like, the combination with a work support, a piston cylinder mounted in alignment with said work support, said piston cylinder being held in a frame rigidly connected to said work support, a piston in said cylinder, pressure
35 generating means for moving said piston comprising an explosive device, and means for firing said explosive device; of means for preventing erosion of said piston by the gases of explosion and permitting the escape of said gases from said cylinder while preventing the escape of flame,
40 said means comprising aligned apertures in said cylinder and said frame, and a flame arrester secured to said frame, said flame arrester comprising a body of foraminous metal and a housing
45 therefor.

12. In a unitary portable tool for the splicing of cables and the like, the combination with a work support, a piston cylinder mounted in alignment with said work support, said piston cylinder being held in a frame rigidly connected to said work support, a piston in said cylinder, pressure generating means for moving said piston comprising an explosive device, and means for firing said explosive device; of means for preventing erosion of said piston by the gases of explosion and permitting the escape of said gases from said cylinder while preventing the escape of flame, said means comprising aligned apertures in said cylinder and said frame, and a
60 flame arrester secured to said frame, said flame arrester comprising a housing threaded to said frame, a body of foraminous metal in said housing, and a perforated cover threaded to said housing.

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