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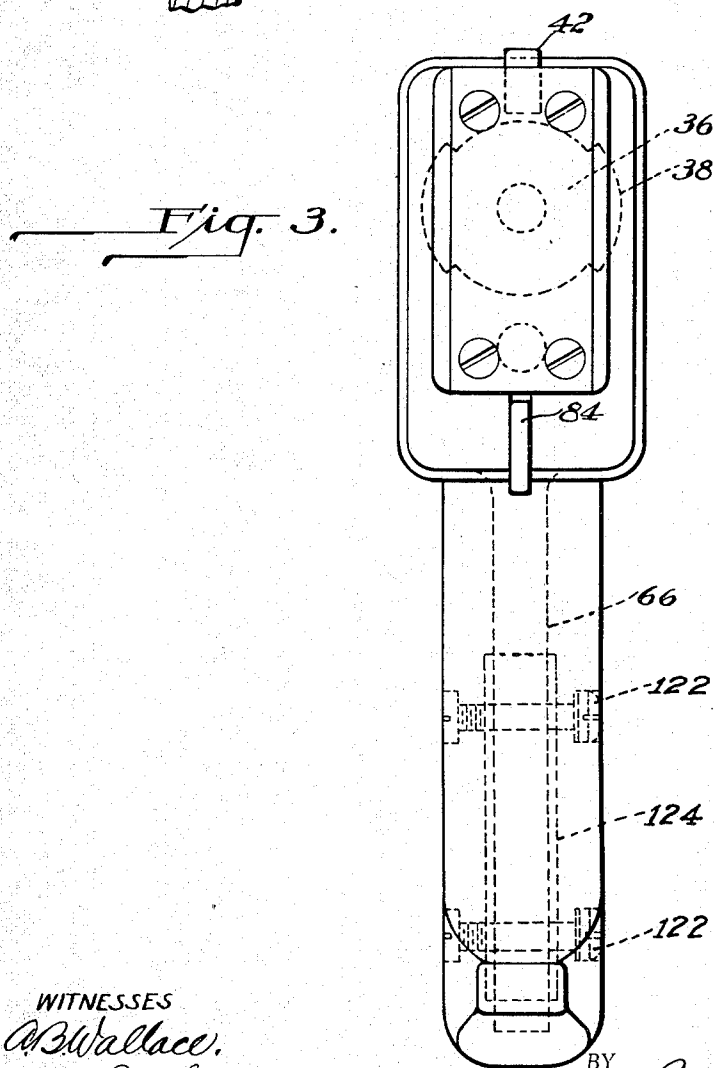
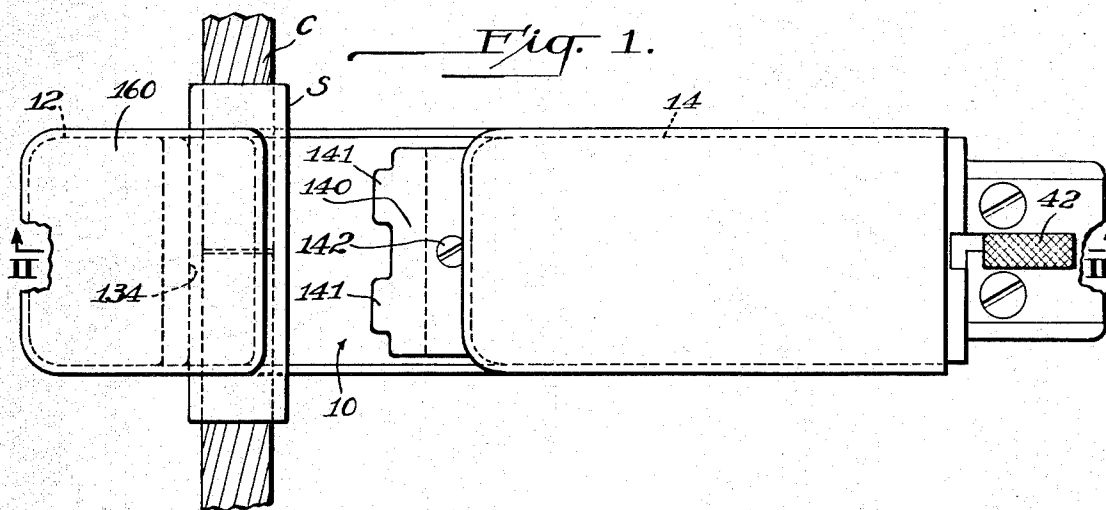
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2,133,364

PRESS

Filed Oct. 7, 1936

2 Sheets-Sheet 1



WITNESSES

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2 Sheets-Sheet 2

Fig. 2.

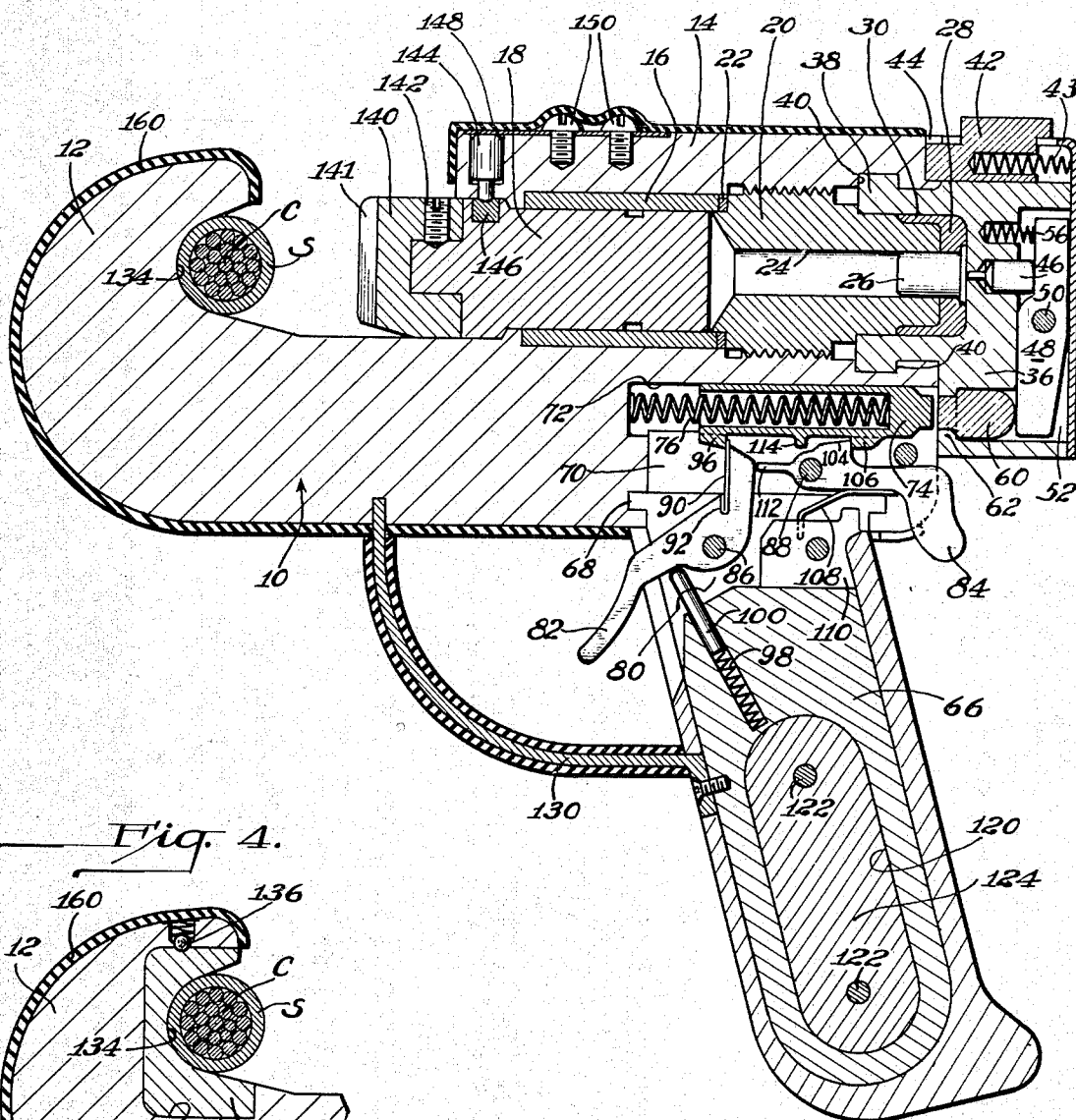
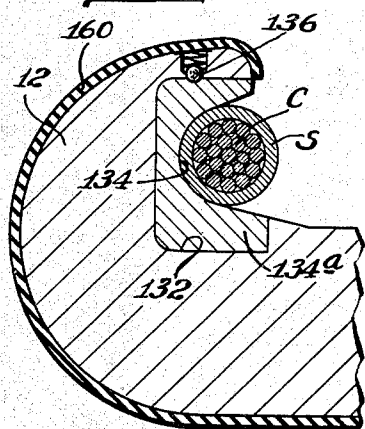


Fig. 4.



WITNESSES

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2,133,364

PRESS

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Application October 7, 1936, Serial No. 104,420

13 Claims. (Cl. 140—113)

This invention relates to presses and more particularly to portable apparatus for joining together pipes, tubes, cables, and the like to provide a satisfactory electrical or other joint.

5 It is the general object of my invention to provide a light weight and truly portable but, strong and rugged press for securing together electric cables, rods, wire rope, pipes and the like by the power developed from explosive means.

10 Another and more specific object of my invention is the provision of an electrically shock-proof, pistol type of press having a C-frame and replaceable associated die members moved together and against the material worked on

15 by trigger controlled explosive means.

Another object of my invention is to provide an explosively actuated press with fool-proof trigger mechanism and a safety catch wherein the number of working parts is reduced to a

20 minimum and they are constructed and arranged to provide the greatest strength, ease of operation and durability.

Another object of my invention is the provision of a substantially noiseless explosive press where-

25 in the moving parts can be readily removed and cleaned.

Another object of my invention is to provide an explosive press of the pistol-type with a simplified removable breech block carrying the firing

30 pin wherein the press cannot be accidentally actuated until the breech block is completely locked in operating position.

The foregoing and other objects of my invention are achieved by the provision of a press

35 comprising a C-frame having opposed arm portions, one of which is provided with a bore slidably receiving a piston movable to and from the other arm portion. A breech is associated with the arm portion slidably carrying the piston

40 and is adapted to receive an explosive charge, such as a blank cartridge. A breech block removably closes the breech and allows recharging of the press. Secured to the frame is a hand grip having associated trigger mechanism controlling the firing of the explosive charge. Die

45 means are carried by the piston and by the opposed arm portion of the frame for engaging with and performing work on material placed between the dies. The press may be insulated against

50 the possibility of an electric short circuit, if desired.

In the accompanying drawings Fig. 1 illustrates a top plan view of a press incorporating the principles of my invention; Fig. 2 is a ver-

55 tical longitudinal sectional view taken on line

II—II of Fig. 1; Fig. 3 is an elevation of the breech block end of the press of my invention; and Fig. 4 is a fragmentary view similar to Fig. 2 of a modified form of my invention having an interchangeable die.

While as heretofore indicated my improved press is capable of use in many relations dependent upon the type of working dies employed, the size of the press and the power developed thereby, it is particularly adapted to connect electric

5 cables by the use of a metal coupling sleeve. The sleeve receives the ends of the cables and is pressed into intimate electrical and mechanical engagement with the cables. Accordingly my invention has been so illustrated and will be thus

10 described.

Referring to the drawings, the numeral 10 indicates as a whole a C-frame or body which is formed with opposed arms 12 and 14. The arm

15 14 is provided with a cylindrical bore which receives a sleeve or liner 16 in turn slidably receiving a piston 18 movable to and from the opposed arm 12. The liner 16 is removably fixed in position by a breech 20 threaded into a suitably tapped and enlarged portion of the bore of

20 the arm 14. To prevent any possible leakage between the liner 16 and around the breech 20 I preferably employ a sealing washer 22 of copper or other soft metal between the abutting ends of the liner 16 and the breech 20.

The breech 20 is formed with an axial bore 24 which is adapted to receive an explosive charge ordinarily in the form of a blank cartridge 26 of any desired powder-carrying content. In order to assist in removing the blank cartridge 26 from

25 the bore 24 after the cartridge has been fired, I have found it advisable but not essential to provide the breech 20 with a cap 28 having a circular flange 30 extending over the reduced end portion of the breech as will be evident from

30 Fig. 2 of the drawings. The breech cap 28 is provided with an axial bore corresponding to the bore 24 of the breech proper and is appropriately shaped to receive the flanged end of the blank cartridge preferably so that the outer face of

35 the blank cartridge is substantially flush with the outer face of the breech cap 28.

Removably secured to the arm 14 of the C-frame 10 is a breech block 36 which closes the breech opening in a manner which will be understood by those skilled in the art. Preferably the breech block 36 is formed with laterally extending bayonet fingers 38 of well known bayonet

40 joint character which are received in bayonet slots 40 cut in the end of the arm 14. By these

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means the breech block can be introduced into the end of the bore of the arm 14 adjacent the end of the breech 20 and given a partial rotation about its axis and thereby locked in position. To lock the breech block in closing position I provide a finger or detent 42 which is slidably carried in the breech block and urged by a spring 43 towards the arm 14. It will be understood that the spring position detent 42 engages in a notch or groove 44 in the arm when the breech block is in its closing position.

Carried in the breech block 36 is a firing pin 46 movable into firing engagement with the blank cartridge 26. The position of the firing pin 46 is controlled by the provision of a rocker 48 pivotally carried about a pin 50 in a slot 52 formed on the back of the breech block. The rocker 48 is normally urged away from the firing pin 46 by means of a spring 56. The end of the rocker 48 opposite the firing pin 46 engages with a slidably positioned button 60 carried in an aperture in the breech block and held against falling out of the breech block by means of a flange 62.

The hammer and trigger mechanism for moving the firing pin 46, rocker 48 and button 60 just described will now be considered. Hand-grip 66 is secured to the C-frame 10 in any suitable manner as by the provision of cooperating tongues and grooves indicated generally at 68. The grip 66 is mounted below a slot 70 formed in the C-frame 10 and extending into a circular recess 72 which slidably receives a hammer 74 normally urged by a coiled compression spring 76 toward the button 60. The grip 66 is formed with a slot 80 which is in alignment with the slot 70 of the C-frame and the aligned slots receive a trigger 82 and a safety catch 84 pivotally supported respectively on pins 86 and 88. The trigger 82 is provided with a flat spring 90 which is secured to the trigger at the point 92 so that the upper end of the flat spring is free for movement away from the trigger. The hammer 74 is provided with a downwardly extending lug 96 behind which the flat spring 90 of the trigger 82 engages. The trigger is normally urged to its full line position shown by a coiled compression spring 98 operating through a pin 100 which engages with the trigger 82, as shown in Fig. 2. The safety catch 84 is formed with a stop 104 having a cammed upper surface and the hammer 74 is provided with a downwardly extending lug 106 which is adapted to engage behind the stop 104, as illustrated in Fig. 2. The safety catch 84 is normally urged upwardly toward the hammer 74 by a ribbon spring 108 carried by a block 110 secured to the grip 66. The safety catch 84 is also provided with a finger 112 which engages with the back side of the trigger 82 when the safety catch is in the on position. Further completing the trigger safety catch and hammer mechanism is a lug 114 on the hammer 74 which lug is adapted to slide upon the cammed upper surface of the stop 104 of the safety catch 84 when the press is actuated as hereinafter described.

While the grip 66 is ordinarily made of metal and in some installations need not be insulated against electrical shock, I preferably construct it so that the press can be used near or even on electric cables carrying live current without transmitting the electric current into the grip of the press. In the embodiment of my invention shown, this is achieved by forming the grip 66 of somewhat reduced size and providing a

central aperture 120 therein. Fiber, hard rubber or other electrical insulating means are molded in the form of a grip and are secured over the outside of the grip 66 as for example by the provisions of screws 122 which extend through an insulating block 124 receives in the aperture 120. A trigger guard 130 is secured to the grip 66 and the C-frame 10 to prevent accidental operation of the trigger in the use of the press.

The arm 12 of the C-frame 10 is adapted to receive and support during the working operation the materials operated upon. Since the embodiment of the invention illustrated and described relates to connecting electric cables together the letters C indicate multi-strand cables having their ends extending into a metal sleeve S. The arm 12 of the C-frame is preferably formed with a permanent die 134 or other working surface, as shown in Fig. 2, adapted to receive the sleeve S. However, in order to adapt the press to operations on cables and sleeves of different size and to allow also for changes of the character of the dies, I may provide a structure as shown in Fig. 4 wherein the arm 12 is formed with a channel 132 adapted to releasably receive a die 134a of any desired characteristic, as for example semi-circular as shown. Means such as a spring positioned ball 136 may be provided to releasably retain the die 134 in the channel 132.

The piston 18 removably carries a cooperating die 140 having, for example, parallel ribs 141 thereon, which die is secured to the piston as by a set screw 142. The piston 18 is held against movement by the explosive means until a predetermined pressure has been built up thereby with the piston then being suddenly released to strike a blow of maximum power. Means for retaining the piston against movement until a desired pressure has been built up may take a plurality of forms. I preferably, however, provide a spring-positioned detent 144 which is slidably carried in the arm 14 of the C-frame 10 and has an end portion extending into a slight aperture in a hardened block 146 carried by the piston 18. The detent 144 is resiliently held in engagement with the aperture of block 146 by a ribbon spring 148 secured to the arm 14 by screws 150. By making the head of the piston which carries the block 146 of slightly greater diameter than the remainder of the piston as shown in the drawings once the block 146 has moved out from under the detent 144 the piston is free to move without contact with the detent.

Preferably the entire press is insulated against electricity and this is achieved by first brass plating the relatively hard and high tensile metal, generally chrome steel, comprising the press parts. Once the parts are brass plated a thin layer of rubber 160 can be vulcanized to the press parts and a permanent and satisfactory union therebetween obtained. This rubber layer also acts as a cushion for the press surface and prevents jars and scratches to the press or the articles contacted thereby.

In the operation of the press the piston 18 is positioned as shown in Fig. 2 prior to the loading of the press and the detent 144, urged downwardly by the ribbon spring 148, engages with the block 146 to hold the piston in this position. The desired die blocks 134, 134a and 140 are formed on or secured to the arm 12 of the frame and to the piston 18, respectively, so that the desired character or work can be performed by the press. In the loading operation the breech block 36 is removed by first moving detent 42 out

of the groove 44 and then turning the breech block about its longitudinal axis so that the bayonet fingers 38 of the block are released from the bayonet slots 40 of the arm 14. With the breech block removed a blank cartridge 26 is placed in the bore of the breech cap 28 and extends into the bore 24 of the breech 20 in a manner clearly shown in Fig. 2. Breech block 36 is then replaced by a reversal of the operation described just above and when the button 60 carried by the breech block is in alignment with the hammer 74 the detent 42 will be urged into the groove 44 of the arm 14 by the compression spring 43. It will be recognized that accidental release of the hammer 74 during the assembly of the breech block and the C-frame can not cause firing of the blank cartridge at any premature time due to the fact that the button 60 is not in alignment with the hammer 74 until such time as the detent catch 42 has fallen into notch 44 in the frame.

During the removal and assembly of the breech block 36 to load the press the hammer 74, trigger 82 and safety catch 84 are in the positions illustrated in Fig. 2, so that the hammer is positively held against movement. This is due to the stop 104 on the safety catch engaging behind the lug 106 on the hammer and because the flat spring 90 of the trigger 82 engages behind the opposed lug 96 on the hammer 74 with the finger 112 on the safety catch holding the trigger and safety catch relatively fixed.

The material to be worked on in the instant case (cable ends C to be connected by a metal sleeve S) is now placed in the die 134 as shown and the press is ready for the compressing and joining operation achieved by firing of the explosive charge, i. e., the blank cartridge 26.

When operated, the press is generally supported through the grip 66 with one or both hands and the safety catch 84 is pushed down so that the stop 104 moves below the lug 106 on the hammer 74. The trigger 82 is then pulled towards the grip 66 in accordance with known procedure and the flat spring 90 engages with the lug 96 of the hammer 74 and slidably carries the hammer back in its recess against the action of the compression spring 76. Since the trigger pin 86 is positioned directly below the lug 96 of the hammer before movement of the hammer, the arcuate movement of the trigger 82 on the pin 86 causes the flat spring 90 to slide downwardly and outwardly on the lug 96 as the hammer is moved against the action of spring 76. Thus when the trigger 82 is pulled down adjacent the grip 66 the flat spring 90 slips over the bottom end of the lug 96 on the hammer.

Inasmuch as the coil spring 76 has been compressed and energy stored therein the release of the hammer from the trigger causes the hammer to move suddenly in the opposite direction to thereby impart a sharp hammer blow to the button 60 carried in the breech block 36. The button 60 moves against the rocker 48 which turns about pin 50 to move firing pin 46 into detonating contact with the blank cartridge 26.

Firing of the blank cartridge 26 results in the very rapid expansion of gases under explosive pressures and when these pressures have built up almost instantaneously to substantially their maximum the pressure on the piston 18 is sufficient to overcome the resistance of the spring detent 144 holding the piston against movement and the piston is driven with high velocity and great force towards the arm 12 of the C-frame 10. The die 140 carried by the front of the pis-

ton 18 engages with the sleeve S carried in the die block 134 and effectively compresses the sleeve ends of the cable C.

Returning to the relation of the trigger, safety catch and hammer mechanisms, once the hammer has moved to fire the blank cartridge 26 the safety catch 84 is held in a position out of engagement with the trigger 82 since the lug 114 carried by the hammer rides upon the cammed upper surface of the stop 104 to hold the safety catch 84 down against the action of the spring 108. This means that the finger 112 of the safety catch 84 is above the upper end of the trigger 82 so that the coiled spring 98 mounted in the grip 66 returns the trigger to and slightly past its original position. This movement is possible since the upper end of the trigger proper passes under the lug 96 on the hammer 74 and the flat spring 90 carried by the trigger bends about its support 92, slides over the lug 96 as the upper end of the trigger moves on by the lug and then the spring itself snaps past the lug 96 and again lies in engagement with the upper portion of the trigger.

Now by pulling the trigger as if to fire, the flat spring 90 backed by the upper end of the trigger engages with the lug 96 on the hammer 74 and the hammer is moved forward so as to withdraw the reduced end portion thereof away from within the flange 62 of the breech block 36. This movement of the hammer also causes lug 114 to ride off of the cammed upper surface of the stop 104 on the safety catch 84 so that the safety catch under the influence of ribbon spring 108 moves up to bring stop 104 into engagement with lug 106 on the hammer. As this action occurs the finger 112 on the safety catch falls down behind the upper end of the trigger 82 and the parts are again in the full line position shown in Fig. 2 and are ready for the next firing operation.

It will accordingly be evident that the press cannot accidentally be actuated inasmuch as the safety catch 84 is substantially fool-proof and must be intentionally operated before the trigger 82 can be pulled. It is impossible to accidentally fire by operating the safety catch and trigger prior to having the breech block 36 in its fully locked-on position, since the button 60 carried by the breech block is only in alignment with the hammer when the detent 42 is in locking engagement with the notch 44 of the arm 14.

After the operation of the press as just described, the detent 42 is moved back against the action of spring 43 and the breech block is removed by a partial rotary movement about its own axis and the piston 18 is then pushed back away from the sleeve S which action usually pops the fired or empty shell of the blank cartridge 26 out of the breech 20 and breech cap 28. If for any reason the cartridge sticks in the breech the breech cap 28 is readily removed and the fired shell easily extracted from the cap. A new and unfired cartridge is then inserted through the breech cap 28 into the bore 24 of the breech, the breech block is replaced, and the press operated again to perform any desired work, perhaps, for example, to take another longitudinally spaced compressive bite on the sleeve S or to operate upon another sleeve as will be understood.

Removal of the piston 18 from the arm 14 of the frame is facilitated by making the overall length of the piston proper slightly less than the distance between the opposed arms 12 and 14. Thus, when the die 140 is removed from the end

of the piston 18 by releasing the set screw 142 and no material is on the die 134 the piston 18 can be taken out of its supporting liner 16 and cleaned and likewise thereby facilitate cleaning of the breech 20 of the press. However, when the die 140 is secured to the end of the piston the forward movement of the piston as a result of the firing of the blank cartridge 26 is terminated with a substantial portion of the piston 18 still in the liner 16 and arm 14. Thus the expanded gases under high pressures are retained against sudden release into the atmosphere and the operation of the press is accordingly substantially noiseless with the gases condensing or escaping gradually and quietly after a pressing operation.

The insulating cover of rubber 160 upon the press and the insulated grip 66 particularly adapts the press to use in connecting electrical cables where certain associated cables are carrying electricity. Any danger of shock to the user of the press and the likelihood of short circuits between adjacent cables is reduced to a minimum and I have found the feature novel and advantageous.

It will be seen that the objects of the invention have been achieved by the provision of a light weight portable press of sturdy and dependable construction which is readily loaded and fired, and which is adapted to perform a plurality of pressing operations.

Particularly I have provided a pistol press which in one commercial form weighs less than nine pounds but which will connect electric cables up to one inch in diameter under pressures of as high as 25,000 pounds per square inch. The apparatus includes safety features whereby the press cannot be operated except when the breech is fully closed and locked in place and wherein moreover safety catch mechanism is incorporated with the operating trigger so that the trigger cannot accidentally be pulled.

The press is quiet in operation, readily cleaned and is insulated against short circuiting or shock from electricity.

While in accordance with the patent statutes one embodiment of my invention has been illustrated and described in detail, it will be appreciated that the invention is not limited thereto or thereby but is defined in the appended claims.

I claim:

1. A pistol-type press comprising a C-frame having opposed arm portions, a piston slidably carried in a bore in one arm portion and movable to and from the other arm portion, means holding the piston against movement until substantially a maximum pressure has been built up behind the piston, a breech mounted in the first-named arm portion in alignment with the piston and adapted to receive an explosive charge, a breech block removably closing the breech, mechanism associated with the breech block and allowing firing of the explosive charge only when the breech block is fully secured, a hand-grip on the C-frame, trigger mechanism associated with the grip and controlling the firing of the explosive charge, a safety catch directly engaging and releasably holding the trigger mechanism against movement, die means removably carried by the piston and by the opposed frame arm portion for engaging with and performing work on material placed between the dies, and means for insulating substantially the entire exposed outer surface of the frame and grip against electric shock.

2. A press comprising a C frame having opposed arm portions, a piston slidably carried in a

bore in one arm portion and movable to and from the other arm portion, means holding the piston against movement until substantially a maximum pressure has been built up behind the piston, a breech removably mounted in the first-named arm portion in alignment with the piston and adapted to receive an explosive charge, a breech block removably closing the breech, mechanism associated with the breech block and allowing firing of the explosive charge only when the breech block is fully secured, mechanism controlling the firing of the explosive charge, a safety catch releasably holding the firing mechanism against movement, die means removably carried by the piston and by the opposed frame arm portion for engaging with and performing work on material placed between the dies, and means for insulating substantially the entire exposed outer surface of the press against electric shock.

3. A press comprising a C-frame having opposed arm portions, a piston slidably carried in a bore in one arm portion and movable to and from the other arm portion, a breech removably mounted in the first-named arm portion in alignment with the piston and adapted to receive an explosive charge, a breech block having a breech block connection with the frame and removably closing the breech, mechanism associated with the breech block and allowing firing of the explosive charge only when the breech block is fully secured, mechanism controlling the firing of the explosive charge, a safety catch releasably holding the firing mechanism against movement, and die means carried by the piston and by the opposed frame arm portion for engaging with and performing work on material placed between the dies.

4. A press comprising a C-frame having opposed arm portions, a piston slidably carried in a bore in one arm portion and movable to and from the other arm portion, means holding the piston against movement until substantially a maximum pressure has been built up behind the piston, a breech mounted in the first-named arm portion in alignment with the piston and adapted to receive an explosive charge, a breech block removably closing the breech, mechanism associated with the breech block and allowing firing of the explosive charge only when the breech block is fully secured, a hand-grip on the C-frame, trigger mechanism associated with the grip and controlling the firing of the explosive charge, a safety catch engaging directly with the trigger mechanism and releasably holding it against movement, and die means removably carried by the piston and by the opposed frame arm portion for engaging with and performing work on material placed between the dies.

5. A press comprising a frame having opposed arm portions, a sleeve in a bore in one arm portion, a piston slidably carried in the sleeve and movable to and from the other arm portion, a breech mounted in the first-named arm portion in alignment with the piston and adapted to receive an explosive charge, said breech sealing against the end of the sleeve, a breech block removably closing the breech, trigger mechanism associated with the frame and controlling the firing of the explosive charge, and die means carried by the piston and by the opposed frame arm portion for engaging with and performing work on material placed between the dies.

6. A press comprising a frame having opposed arm portions, a piston slidably carried in a bore in one arm portion and movable to and from the

other arm portion, a breech mounted in the first-named arm portion in alignment with the piston and adapted to receive a cartridge, a breech block removably closing the breech, a cartridge extractor cap removably clamped between the breech and the breech block, trigger mechanism controlling the firing of the explosive charge, and die means carried by the piston and by the opposed frame arm portion for engaging with and performing work on material placed between the dies.

7. A press comprising a frame, a die carried by the frame, a piston slidably mounted in the frame for movement to and from the die, means releasably holding the piston away from the die, a mating die carried by the end of the piston, a breech behind the piston and adapted to receive an explosive charge, a breech block removably secured over the breech, a firing pin carried by the breech block, a rocker carried by the breech block for moving the firing pin, a hammer slidably carried in the frame and engageable with the rocker only when the breech block is completely secured to close the breech, a trigger for controlling the operation of the hammer, a safety catch for controlling operation of the trigger, and a surface layer of electric insulating material over the press.

8. A press comprising a frame, a die carried by the frame, a piston slidably mounted in the frame for movement to and from the die, means releasably holding the piston away from the die, a mating die carried by the end of the piston, a breech behind the piston and adapted to receive an explosive charge, a breech block, means for securing the breech block over the breech, a firing pin carried by the breech block, a rocker carried by the breech block for moving the firing pin, a hammer slidably carried in the frame and engageable with the rocker only when the breech block is completely secured to close the breech, a trigger for controlling the operation of the hammer, and a safety catch engaging with both the hammer and the trigger for controlling operation of the trigger.

9. A press comprising a frame, a die carried by the frame, a piston slidably mounted in the frame for movement to and from the die, a mating die carried by the end of the piston, a breech behind the piston and adapted to receive an explosive charge, a breech block, means for securing the breech block over the breech, a firing pin carried by the breech block, a rocker carried by the breech block for moving the firing pin, a hammer slidably carried in the frame and engageable with the rocker only when the breech block is completely secured to close the breech, a trigger for controlling the operation of the hammer, and a safety catch for controlling operation of the trigger.

10. A press comprising a frame, a die carried by the frame, a piston slidably mounted in the frame for movement to and from the die, a mating die carried by the end of the piston, a breech

behind the piston and adapted to receive an explosive charge, a breech cap removably positioned over the breech and adapted to receive at least part of the explosive charge, a breech block, means for securing the breech block over the breech cap and holding both the cap and block in position, and means for firing the explosive charge.

11. A press comprising a frame, a die carried by the frame, a piston slidably mounted in the frame for movement to and from the die, means releasably holding the piston away from the die, a mating die removably carried by the end of the piston, a breech behind the piston and adapted to receive an explosive charge, means for removably closing the breech, and means for firing the explosive charge to move the piston and mating die with explosive force against material placed between the dies, said apparatus being so constructed and arranged that the piston is removable from the frame only when no material is between the dies and when the mating die is removed from the piston whereby in operation no sudden release of the gases of the fired explosive charge occurs but the piston can readily be removed to allow the press to be cleaned.

12. A press comprising a frame, a die carried by the frame, a piston slidably mounted in the frame for movement to and from the die, a mating die removably carried by the end of the piston, a breech behind the piston and adapted to receive an explosive charge, means for removably closing the breech, and means for firing the explosive charge to move the piston and mating die with explosive force against material placed between the dies, said piston being of such length that it is removable from the frame only when no material is between the dies and when the mating die is removed from the piston whereby in operation no sudden release of the gases of the fired explosive charge occurs but the piston can readily be removed to allow the press to be cleaned.

13. A piston-type press comprising a frame, relatively movable dies carried by the frame, explosive means for moving the dies, means for detonating the explosive means including a hammer slidably mounted in the frame, a compression spring resiliently holding the hammer against movement in one direction, a safety catch releasably holding the hammer against movement in the same direction, a trigger engaging with the hammer and constructed and arranged when pulled with the safety catch released to move the hammer and compress the compression spring and to thereafter release the hammer so that it detonates the explosive means under the energy of the compression spring, and a finger on the safety catch extending into engagement with the trigger when the safety catch is on and preventing movement of the trigger and thus the hammer is detonating direction.

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