

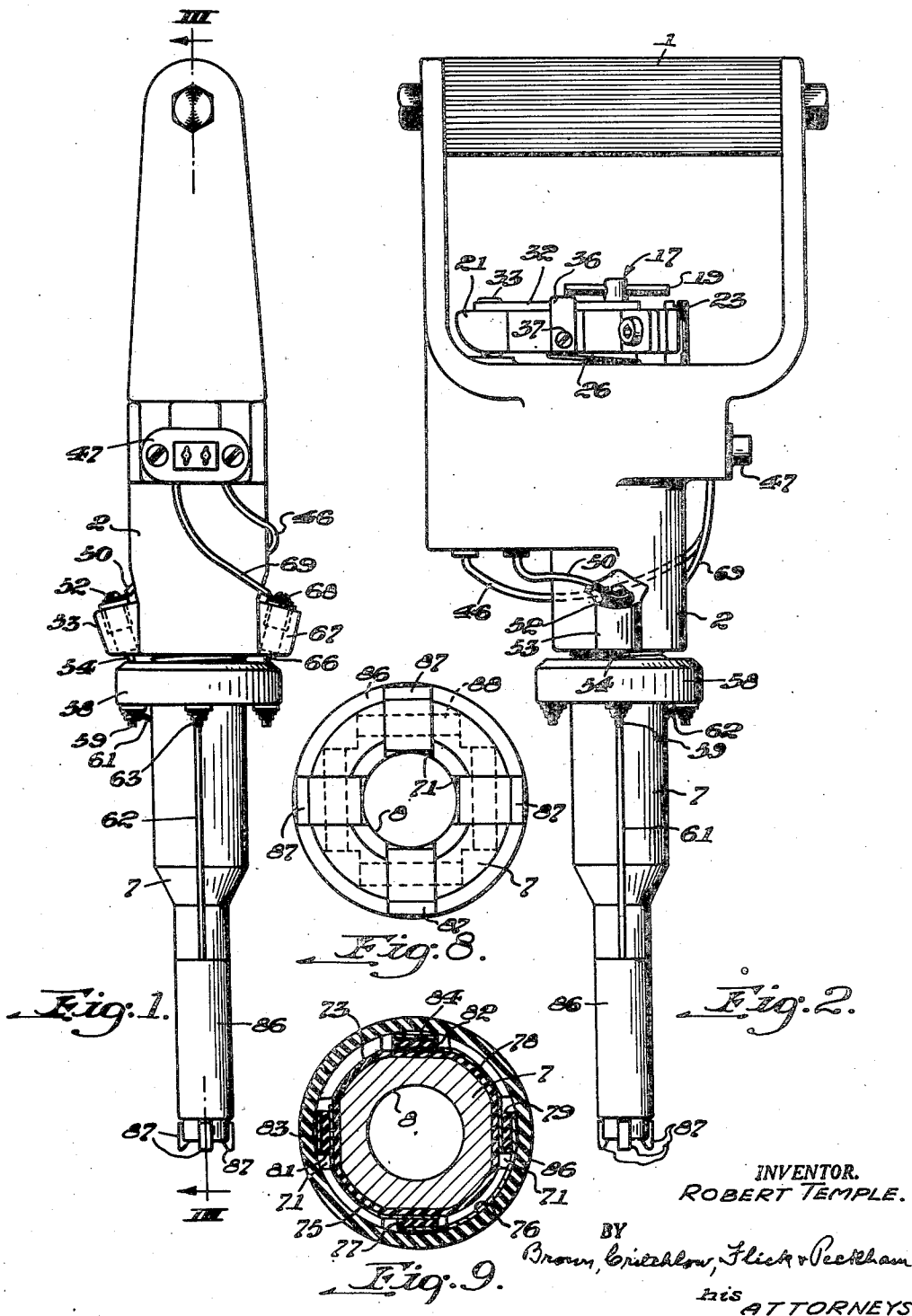
March 21, 1950

R. TEMPLE
EXPLOSIVELY ACTUATED DRIVING
TOOL WITH ELECTRIC LOCK

2,501,362

Filed June 22, 1948

3 Sheets-Sheet 1



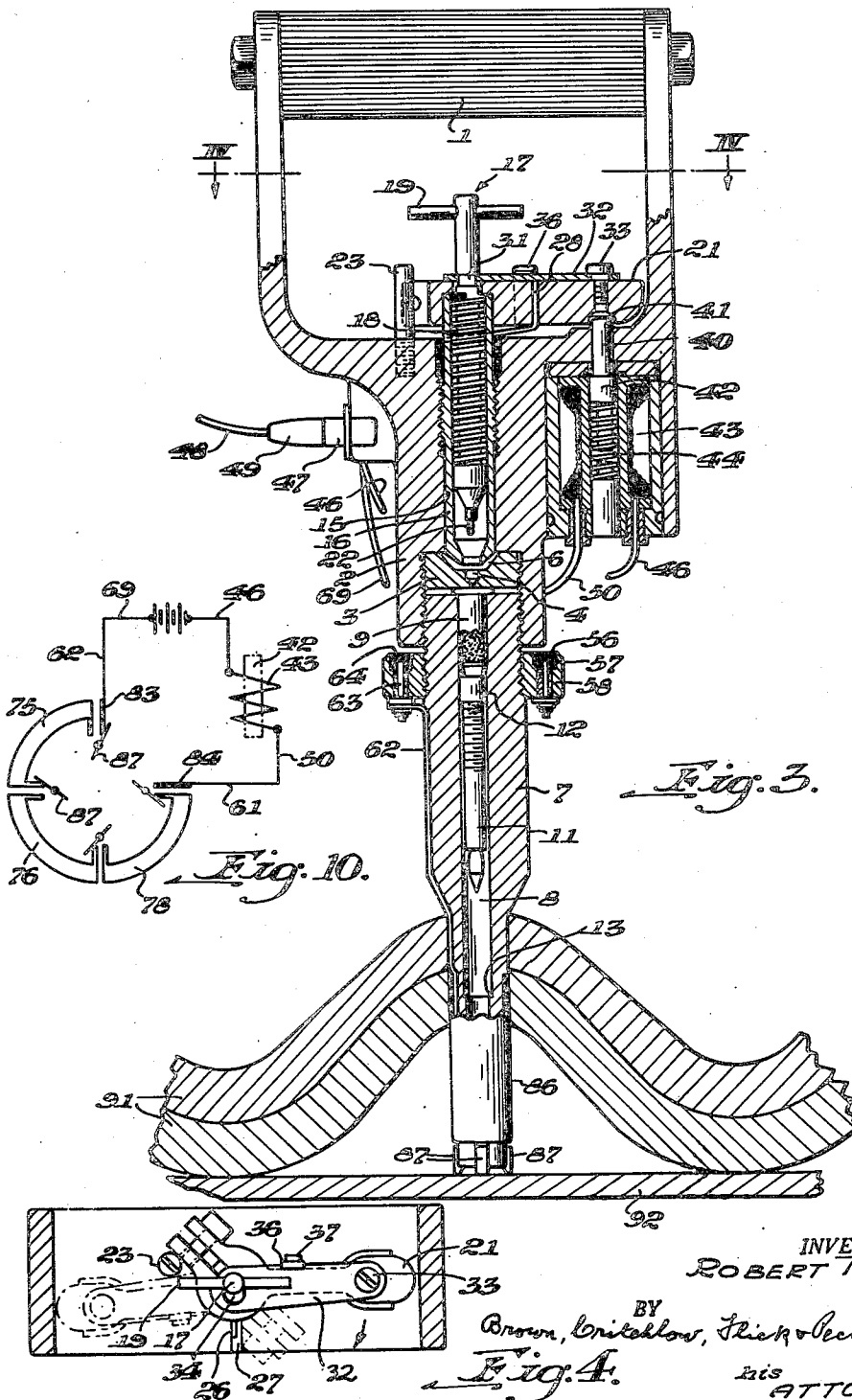
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3 Sheets-Sheet 3

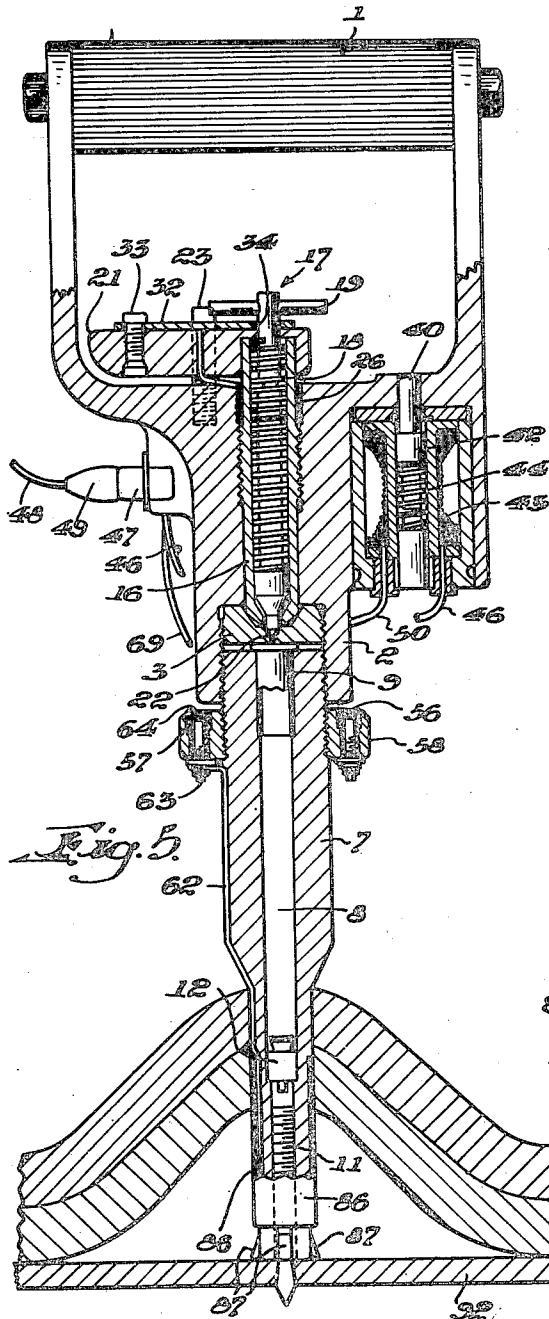


Fig. 5.

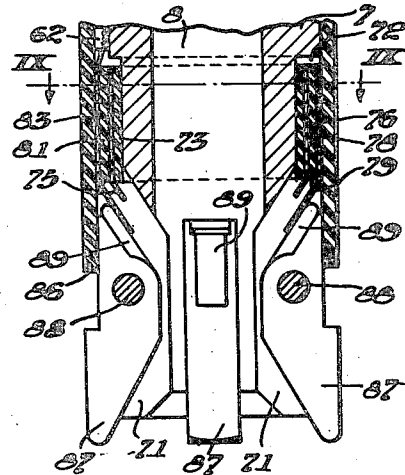


Fig. 6.

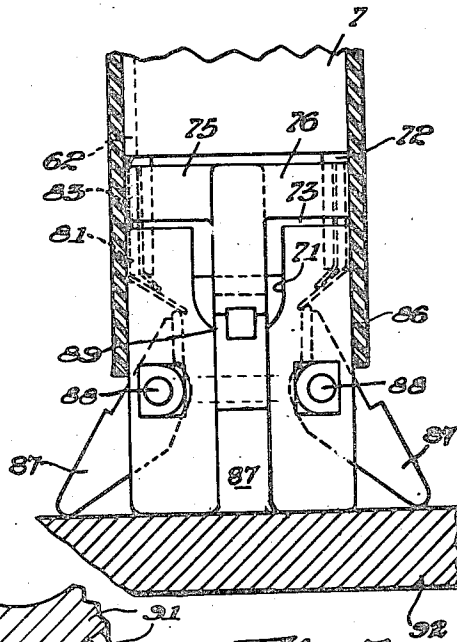


Fig. 7.

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UNITED STATES PATENT OFFICE

2,501,362

EXPLOSIVELY ACTUATED DRIVING TOOL
WITH ELECTRIC LOCKRobert Temple, Swissvale, Pa., assignor to Temple Velocity Equipment, Inc., Wilmington, Del.,
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Application June 22, 1948, Serial No. 34,541

15 Claims. (Cl. 1—47)

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This invention relates to explosively actuated tools that may be used for driving studs and the like, and more particularly to such tools which can not be discharged accidentally or before it is safe to do so.

In one type of explosively actuated driving tool the cartridge that furnishes the driving power is detonated by a firing pin that is driven forward against the cartridge by means of a spring. If such a tool is accidentally dropped on the front end of its barrel the inertia of the firing pin may cause it to strike the cartridge, and the stud or other projectile would be driven out of the barrel, thus endangering any nearby people. Also, there is the danger of unauthorized persons intentionally or accidentally firing the tool. In cases where the front end of the barrel is hidden from view when the tool is in operating position, the muzzle may unintentionally project beyond the side of the member into which a stud is to be driven, so that there is danger of the stud only nicking the member and therefore being projected on past it.

It is among the objects of this invention to provide an explosively actuated driving tool which can not be fired accidentally nor by an unauthorized person, and which can not be fired unless the front end of the barrel is completely closed by the member into which the stud is to be driven. Other objects are to provide such a tool in which a spring-actuated firing pin can not detonate the cartridge until a special operation has been performed by the operator, and in which the firing pin automatically returns to a non-firable position whenever the tool is released.

In accordance with this invention a barrel is mounted in front of a breechblock member which is connected to a stock that can be held in the hand. The breechblock is provided with an axial passage therethrough, and the stock is provided with a threaded opening in line with that passage. A firing device is threaded in the stock opening and has a point member projecting from its front end so that when one of said members is slid axially toward the other, the point member can project through the breechblock passage. However, the firing device normally is retracted in the stock opening to keep the point member from projecting through the breechblock passage and into engagement with a cartridge pressed against the front of the breechblock. In order to permit the tool to be discharged, there is a turning element for the firing device which is adapted to be turned manually in one direction for screwing the firing device forward in the stock opening a

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predetermined distance so that the point member can project through the breechblock passage when the slidable member is moved as far as possible toward the other of said members. When the turning element is released, the firing device automatically is turned in the opposite direction to return it to its retracted position. This preferably is done by means of a spring. It also is desirable to provide a stop for limiting the distance that the turning element can be turned in either direction. The firing device may include a sleeve threaded in the stock opening and containing a firing pin which is urged forward in it by means of a spring. The turning element normally is held in non-firing position by means of a locking member which can be disengaged from it only when an electric circuit is energized. Preferably, the circuit can not be completed until contact members at the front end of the barrel close the circuit. The contact members are not closed unless the muzzle is pressed squarely against a solid member.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a front view of the tool; Fig. 2 is a side view thereof; Fig. 3 is a central longitudinal section taken on the line III—III of Fig. 1, with the tool cocked and about to be pushed down into operative position; Fig. 4 is a transverse section through the handle taken on the line IV—IV of Fig. 3; Fig. 5 is a view similar to Fig. 4, but immediately after the tool has been fired; Fig. 6 is an enlarged fragmentary view of the lower end of the tool in vertical section; Fig. 7 is a view similar to Fig. 6, but with the barrel shown in elevation and pressed against a metal plate; Fig. 8 is an enlarged end view of the lower end of the tool; Fig. 9 is a cross section taken on the line IX—IX of Fig. 6; and Fig. 10 is an electrical diagram of the unlocking circuit in the tool.

Referring to the first four figures of the drawings, the stock is in the form of a D-handle provided with a hand grip 1. Opposite the grip the stock has a forwardly projecting portion 2 provided in its front end with a threaded recess. Screwed as far as possible into this recess is a breechblock 3 having an axial passage 4 through it and a recess 6 in its back. Also screwed into the stock recess is the rear end of a barrel 7 that has a front portion of reduced diameter. The rear end of the axial bore 8 through the barrel is adapted to receive a cartridge 9, the rim of which is clamped between the barrel and the breechblock. Barrels with different size bores for receiving studs 11 of different diameters are

interchangeable with the one shown. Preferably, the front end of the cartridge is crimped over a forwardly tapered rear portion of a piston member 12 that is detachably connected to the rear end of a stud for supporting it centrally in the barrel. The stud may have a threaded rear end and a shoulder for limiting the distance that it can be driven into an object. The bore through the front end of the barrel is slightly smaller than in the rest of the barrel so that piston 12 will be stopped by the shoulder 13 as the stud leaves the barrel.

Extending through the stock is an opening 15 in line with breechblock passage 4, and extending through opening 15 is a firing device for detonating cartridge 9. The firing device includes a sleeve 16 provided centrally with threads registering with threads in the stock opening. Slidably mounted in the sleeve is a firing pin 17 that is urged forward by a coil spring 18 encircling the pin. Forward movement of the pin in the sleeve is limited by the reduced front end of the sleeve. The pin extends out of the rear end of the sleeve and is provided with a cross bar 19 to permit it to be pulled backward in the sleeve against the resistance of the spring.

It is a feature of this invention that simply pulling back the firing pin and then releasing it will not detonate the cartridge, whereby accidental discharge of the tool is avoided. With this invention it first is necessary to perform another operation before the firing pin will be able to strike the cartridge. Accordingly, sleeve 16 projects from the rear end of stock opening 15 and has rigidly mounted on it a lever or arm 21 so that the sleeve can be turned to screw it forward through the stock far enough to permit the point 22 of the firing pin, when it is projecting from the front end of the sleeve, to strike the cartridge as shown in Fig. 5. The position to which the arm is swung manually is shown in broken lines in Fig. 4, and in full lines in Fig. 5. A stop member 23 is screwed into the stock in the path of both ends of the arm to limit the distance that the arm can be turned in either direction to only that necessary for moving the sleeve into and out of firing position.

An important part of the invention is that the moment the operator releases arm 21, the sleeve automatically is returned to its retracted position where the firing pin is inoperative. This is accomplished by a spring 26 coiled around the rear end of the sleeve in front of the arm. One end of the spring is anchored in a slot 27 (Fig. 4) in the stock, while the other end projects into a hole 28 in the arm. This torsional spring is put under such tension when the arm is swung manually to firing position that it will automatically swing the arm back to its original position, shown in full lines in Fig. 4, when released.

The back part of the firing pin is provided with a circumferential groove 31 (Fig. 3) so that when the pin is pulled back in the sleeve a trigger member 32 can move into the groove and hold the pin in its retracted or cocked position. As shown in Figs. 3 and 4, the trigger is in the form of a flat metal strip that is pivotally connected to the outer end of the arm by a screw 33. The inner end of the trigger has a keyhole shape opening 34 through it, through which the firing pin extends. The smaller part of this opening is just large enough to receive the grooved portion of the firing pin to hold it retracted, which is the position shown in Fig. 4. The trigger is urged toward pin-retaining position, that is the narrow

opening of the keyhole slot, by means of a flat spring 36 fastened by a screw 37 to one side of the arm and pressing against one edge of the trigger to swing it counterclockwise around screw 33, as viewed in Fig. 4. Thus, when the pin is pulled back until its groove 31 leaves the arm 21, the trigger snaps into the groove and prevents the pin from moving forward again. However, when the arm is swung around clockwise to the broken line position in Fig. 4 to screw the sleeve ahead, the projecting leading edge of the trigger 32 strikes stop 23 by which the trigger is pushed back to its original position to permit the firing pin to spring forward through the larger part of the keyhole shape trigger opening 34, as shown in Fig. 5. It will be seen that if the firing pin accidentally is released before the arm is swung around to the stop, the pin will not strike the cartridge because the sleeve will not be far enough forward in the stock to permit it to do so.

Another feature of this invention is that the arm can not be swung to firing position until it is unlocked by someone authorized to use the tool. The lock is formed by a pin 40 projecting up into a socket 41 in arm 21. The pin is slidably mounted in a bore in the stock and is integral with a sliding core 42 of a solenoid coil 43 that is mounted in a larger bore in the stock. The pin is urged into socket 41 by a coil spring 44 inside the coil, but is pulled out of the socket when the coil is energized to pull the core downward in the coil. One wire 46 from the coil is connected to an electric socket 47 mounted on the opposite side of the stock. The operator carries an electric battery which is connected by an electric cord 48 to a plug 49 that can be inserted in the electric socket to furnish the electricity for energizing the solenoid. The tool arm cannot be unlocked unless the tool is connected to plug 49. However, as a precaution against firing the tool when the front end of the barrel is not completely covered by the object into which a stud is to be driven, merely connecting the plug and socket 47 will not energize the coil. This is because the other wire 50 from the coil is not connected directly to the electric socket, but to a circuit that includes a number of switches in series which must be closed before the circuit to the coil can be completed. These switches are carried by the front end of the barrel and are adapted to be closed when the muzzle is pressed against the object into which the stud is to be driven.

Wire 50 is connected to a terminal 52 mounted in a lug 53 projecting from one side of the stock, as shown in Figs. 1 and 2. Also mounted in this lug in electrical communication with the terminal is a pin 54. The projecting lower end of the pin engages an arcuate metal contact strip 56 (Fig. 3) mounted in a ring 57 of insulating material in a circular groove in a metal ring 58 screwed on the upper end of barrel 7. Connected to the contact strip is a screw 59 (Figs. 1 and 2) that extends through the metal ring from which it is insulated. The lower end of this screw is connected to an insulated wire 61 that extends down the barrel in a groove cut in its side. The lower end of the wire is connected to one end of a series of electrical switches which will be described presently, while the other end of the series of switches is connected to a similar insulated wire 62 that extends up along the barrel in a groove about 90° from the other wire. As shown in Fig. 3, the upper end of this second

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wire is connected to a screw 63 insulated from the metal ring but extending therethrough and connected to another arcuate metal contact strip 64 mounted in the insulating ring with its ends spaced from contact strip 56. Engaging contact strip 64 is a pin 66 (Fig. 1) which is mounted in a lug 67 projecting from the side of the stock opposite to lug 53. The pin is electrically connected to a terminal 68 which is connected by a wire 69 to electric socket 47. The electrical connections just described between the pins and the contact strips provide a convenient way for breaking the circuit when the barrel is unscrewed from the stock to receive a cartridge and a stud.

The electric switches referred to above are shown in detail in Figs. 6 to 9. The lower end of the barrel is provided with four vertical slots 71, 90° apart. The lower portions of these slots extend through the wall of the barrel, while their upper portions extend only part way through the wall. Also, the upper ends of the slots are connected by a recess 72 extending around the outside of the barrel. Mounted in this recess is a band 73 of insulating material that has projections extending down the slots a short distance. Extending about three-quarters of the way around the recess are strips of spring metal. One of these, 75, engages the insulating band and has projections at its ends extending down in the slots and beyond the insulation. The next strip 76 has longer end projections than the first one and is insulated from the first strip by a piece of insulation 77. The third strip 78 is like the first one, and it engages the insulating band and is spaced from the second strip by insulation 79. The adjacent ends of the first and third strips 75 and 78 are spaced by insulation 81 and 82, respectively, from straight spring metal strips 83 and 84, the upper ends of which are connected to the wires 62 and 61 extending up the barrel. The ends of the metal strips extend down below the lower ends of the insulating pieces 77, 79, 81 and 82 that separate them, and thus form the contact members of four electric switches connected in series. Encircling all of these switch parts is an insulating sleeve 86.

For pushing the lower ends of the outer strips 76, 83 and 84 in contact with the inner strips 75 and 78, levers 87 are mounted on pivot pins 88 in the lower ends of slots 71. The lower ends of the levers normally project below the barrel a short distance, and the upper ends of the levers are provided with blocks 89 of insulation which engage the lower ends of the outer metal strips 76, 83 and 84. When the barrel is pressed down against an object, the tapered lower ends of the levers slide outward and thereby swing their upper ends inward to bend the outer metal strips into engagement with the inner strips. This completes a circuit through all of the switch strips and thus closes the circuit between wires 61 and 62. The complete electric circuit is shown diagrammatically in Fig. 10. It is not until all four switches have been closed in this manner that the electric circuit to solenoid 43 is closed. When that circuit is closed, the locking pin 40 is withdrawn from the socket in arm 21 so that the latter can be swung around to move the sleeve 16 and firing pin 17 downward into firing position, as previously described.

The operation of the tool disclosed herein now will be reviewed. The tool is loaded by unscrewing the barrel from the stock and inserting a cartridge, having a stud secured to its front end,

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in the bore of the barrel. The loaded barrel is screwed back into the stock, and the wires 61 and 62 are electrically connected to wires 50 and 69, respectively, through the medium of pins 54 and 66 which engage contact strips 56 and 64, respectively. If, for example, corrugated sheets, 91 of roofing material or the like are to be attached to a metal beam or plate 92, the barrel is inserted in holes in the sheets and moved downward until levers 87 touch the plate, as shown in Fig. 3. At, or before, this time electric plug 49 can be plugged into socket 47 so that an electric current will be supplied to the tool. However, as the electric switches at the lower end of the barrel are open (see Fig. 6), locking pin 40 will remain in its upper position in which it keeps arm 21 from being turned. The operator pulls firing pin 17 up until trigger 32 snaps into groove 31 in the pin. If the trigger accidentally is moved so that the firing pin is released, the cartridge will not be discharged because at this time sleeve 16 is locked in its upper position in the stock and therefore will prevent the tip of the pin from striking the cartridge.

After the firing pin has been retracted to cock the tool, the muzzle of the barrel is pressed down against plate 92 to spread out levers 87, as shown in Fig. 7, which causes them to close the four switches with which they are connected. If any one of the levers is not swung on its pivot, due to that lever projecting over an edge of the plate, the circuit through the switches will remain open and the tool can not be fired because arm 21 cannot be swung around to firing position. This will prevent the tool from being discharged when the lower end of the barrel is not completely covered by plate 92, and therefore will keep the stud from merely nicking the edge of the plate and passing on through it, which might endanger anyone below it.

Assuming that all four switches are closed, the electric circuit to solenoid 43 is completed and the solenoid is energized. This causes pin 40 to be drawn out of socket 41 in arm 21, thereby unlocking the arm. The operator then swings the arm clockwise until it strikes stop member 23. This screws sleeve 16 down in the stock until it substantially engages breechblock 3. Trigger 32 first engages stop 23 and is held stationary by it while the arm moves ahead. This causes the trigger to be withdrawn from groove 31 so that the firing pin will be released and driven ahead by spring 18 against the cartridge which it detonates. As soon as enough pressure is built up to force the tapered upper end of piston 12 out of the cartridge, the piston and stud will be driven down through the barrel. The piston will be stopped by shoulder 13, so the stud will leave the piston and be driven into plate 92.

The operator then can release arm 21 which will be swung back to its original position by means of spring 26, thereby retracting sleeve 16 far enough to prevent the firing pin from detonating the next cartridge until the arm again is swung by the operator clockwise against stop 23. As soon as the tool is lifted from the plate the electric switches at the lower end of the barrel will open and the circuit to the solenoid will be broken. Spring 44 therefore will project pin 40 up into the arm to lock it until the switches again are closed. After the tool has been withdrawn from the corrugated sheets a suitable fastening member can be inserted in the hole in the sheets and screwed onto the upper end of the stud anchored in the plate. The barrel is removed from the stock and

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the spent cartridge and piston 12 are removed so that a new cartridge-piston-stud assembly can be inserted in the barrel for the next operation of the tool.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. An explosively actuated driving tool comprising a stock, a breechblock member connected to the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock member, the stock being provided with a threaded opening in line with said passage, a firing device threaded in said opening and having a point member projecting from its front end, one of said members being slidable axially toward the other to project said point member through said passage, said device normally being retracted in said opening to keep said point member from projecting through said passage, a turning element for the firing device adapted to be turned in one direction for screwing said device forward in said opening a predetermined distance so that said point member can project through said passage when said slidable member is moved as far as possible toward the other member, and means operative automatically when the turning element is released for turning said device in the opposite direction to return it to its retracted position, whereby a safety is provided for the tool.

2. An explosively actuated driving tool comprising a stock, a breechblock member connected to the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock member, the stock being provided with a threaded opening in line with said passage, a firing device threaded in said opening and having a point member projecting from its front end, one of said members being slidable axially toward the other to project said point member through said passage, said device normally being retracted in said opening to keep said point member from projecting through said passage, a turning element for the firing device adapted to be turned in one direction for screwing said device forward in said opening a predetermined distance so that said point member can project through said passage when said slidable member is moved as far as possible toward the other member, and a spring connected to the turning element for turning it in the opposite direction to return said device to its retracted position, whereby a safety is provided for the tool.

3. An explosively actuated driving tool comprising a stock, a breechblock rigidly connected to the front of the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from projecting through said passage, the pin being manually retractible in the sleeve against the resistance of said spring, a

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turning element for the sleeve for screwing the sleeve forward in said opening a predetermined distance so that the pin can be projected through said breechblock passage by the spring when the pin is released, and means operative automatically when the turning element is released for turning the sleeve in the opposite direction to return it to its retracted position, whereby a safety is provided for the tool.

4. An explosively actuated driving tool comprising a stock, a breechblock rigidly connected to the front of the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from projecting through said passage, the pin being manually retractible in the sleeve against the resistance of said spring, the rear end of the sleeve projecting from said opening, an arm rigidly mounted on said rear end of the sleeve for turning it in one direction in order to screw the sleeve forward in said opening a predetermined distance so that the pin can be projected through said breechblock passage by the spring when the pin is released, and a spring connected to said arm for turning it in the opposite direction to return the sleeve to its retracted position.

5. An explosively actuated driving tool comprising a stock provided with an opening extending through it, a barrel detachably connected to the stock at the front end of said opening and adapted to receive an explosive cartridge, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from touching the cartridge, the pin being manually retractible in the sleeve against the resistance of said spring, a turning element for the sleeve for screwing the sleeve forward in said opening so that the pin can be projected against the cartridge by the spring when the pin is released, and means operative automatically when the turning element is released for turning the sleeve in the opposite direction to return it to its retracted position, whereby a safety is provided for the tool.

6. An explosively actuated driving tool comprising a stock, a breechblock rigidly connected to the front of the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from projecting through said passage, the rear end of the sleeve projecting from said opening, an arm rigidly mounted on said rear end of the sleeve for turning it in one direction in order to screw the sleeve forward in said opening a predetermined distance, a trigger pivotally mounted on said arm,

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the pin being provided with a groove for receiving a portion of the trigger when the pin is retracted in the sleeve against the resistance of said spring, a spring urging the trigger toward the pin, a stop member for pushing the trigger out of said pin groove when the arm is turned in said one direction a predetermined distance, and a spring connected to said arm for turning it in the opposite direction to return the sleeve to its retracted position.

7. An explosively actuated driving tool comprising a stock, a breechblock member connected to the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock member, the stock being provided with a threaded opening in line with said passage, a firing device threaded in said opening and having a point member projecting from its front end, one of said members being slidable axially toward the other to project said point member through said passage, said device normally being retracted in said opening to keep said point member from projecting through said passage, a turning element for the firing device turnable in one direction for screwing said device forward in said opening a predetermined distance so that said point member can project through said passage when said slidable member is moved as far as possible toward the other member, said element being provided with a socket, a locking pin slidably mounted in said stock adjacent said socket, a spring normally pressing the locking pin into the socket to keep the turning element from being turned, a solenoid coil carried by the stock, and means for conducting electricity to the coil to energize it so that it will pull the locking pin from said socket.

8. An explosively actuated driving tool comprising a stock, a breechblock member connected to the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock member, the stock being provided with a threaded opening in line with said passage, a firing device threaded in said opening and having a point member projecting from its front end, one of said members being slidable axially toward the other to project said point member through said passage, said device normally being retracted in said opening to keep said point member from projecting through said passage, a turning element for the firing device turnable in one direction for screwing said device forward in said opening a predetermined distance so that said point member can project through said passage when said slidable member is moved as far as possible toward the other member, the side of said element facing the barrel being provided with a socket, a locking pin slidably mounted in said stock in front of said socket and beside said threaded opening, a spring normally urging the locking pin into the socket to prevent said element from being turned, a solenoid coil mounted in the stock beside said threaded opening for pulling the locking pin out of said socket when the coil is electrically energized, and means for electrically connecting the coil in an electric circuit.

9. An explosively actuated driving tool comprising a stock, a breechblock member connected to the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock member, the stock being provided with a threaded opening in line with said passage, a firing device threaded in said opening and having a point member projecting from its front end,

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one of said members being slidable axially toward the other to project said point member through said passage, said device normally being retracted in said opening to keep said point member from projecting through said passage, a turning element for the firing device turnable in one direction for screwing said device forward in said opening a predetermined distance so that said point member can project through said passage when said slidable member is moved as far as possible toward the other member, the side of said element facing the barrel being provided with a socket, a locking pin slidably mounted in said stock in front of said socket and beside said threaded opening, a spring normally urging the locking pin into the socket to prevent said element from being turned, a solenoid coil mounted in the stock beside said threaded opening for pulling the locking pin out of said socket when the coil is electrically energized, a plurality of normally open electric switches carried by the barrel, means for electrically connecting the switches in series in a circuit connecting the coil with a source of electric current, and levers pivotally connected to the front end of the barrel and projecting in front of it for closing said switches when all of the levers are tilted by pushing the barrel against an object.

10. An explosively actuated driving tool comprising a stock, a breechblock member connected to the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock member, the stock being provided with a threaded opening in line with said passage, a firing device threaded in said opening and having a point member projecting from its front end, one of said members being slidable axially toward the other to project said point member through said passage, said device normally being retracted in said opening to keep said point member from projecting through said passage, a turning element for the firing device adapted to be turned in one direction for screwing said device forward in said opening a predetermined distance so that said point member can project through said passage when said slidable member is moved as far as possible toward the other member, a lock for said turning element, electrically operated means for releasing said lock, an electric circuit for said means, a plurality of normally open electric switches carried by the barrel and connected in series in said circuit, and levers pivotally connected to the front end of the barrel and projecting in front of it for closing said switches when all of the levers are tilted by pushing the barrel against an object.

11. An explosively actuated driving tool comprising a stock, a breechblock member connected to the stock and provided with an axial passage therethrough, a barrel connected by screw threads to the stock in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a firing device threaded in said opening and having a point member projecting from its front end, one of said members being slidable axially toward the other to project said point member through said passage, said device normally being retracted in said opening to keep said point member from projecting through said passage, a turning element for the firing device adapted to be turned in one direction for screwing said device forward in said opening a predetermined distance so that said point member can project through said passage when said slidable member is moved as far as

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possible toward the other member, a lock for said turning element, electrically operated means for releasing said lock, an electric circuit for said means including a pair of contact members mounted on the front portion of the stock with their front ends engaging the rear surfaces of a pair of contact strips mounted on the barrel, whereby said circuit is broken when the barrel is unscrewed from the stock, a plurality of normally open electric switches carried by the barrel and connected in series in said circuit, and switch-actuating members projecting from the front end of the barrel for closing said switches when the front ends of all of said actuating members are pushed by the barrel against an object.

12. An explosively actuated driving tool comprising a stock, a breechblock rigidly connected to the front of the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from projecting through said passage, the pin being manually retractible in the sleeve against the resistance of said spring, a turning element for the sleeve for screwing the sleeve forward in said opening a predetermined distance so that the pin can be projected through said breechblock passage by the spring when the pin is released, a lock for said turning element, electrically operated means for releasing said lock, an electric circuit for said means, a plurality of normally open electric switches carried by the barrel and connected in series in said circuit, and switch-actuating members projecting from the front end of the barrel for closing said switches when the front ends of all of said members are pushed by the barrel against an object.

13. An explosively actuated driving tool comprising a stock, a breechblock rigidly connected to the front of the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from projecting through said passage, the pin being manually retractible in the sleeve against the resistance of said spring, a turning element for the sleeve for screwing the sleeve forward in said opening a predetermined distance so that the pin can be projected through said breechblock passage by the spring when the pin is released, a lock for said turning element, electrically operated means for releasing said lock, an electric circuit for said means, a plurality of normally open electric switches carried by the barrel and connected in series in said circuit, and levers pivotally connected to the front end of the barrel and projecting in front of it for closing said switches when all of the levers are tilted by pushing the barrel against an object.

14. An explosively actuated driving tool comprising a stock, a breechblock rigidly connected

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to the front of the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from projecting through said passage, the pin being manually retractible in the sleeve against the resistance of said spring, an arm for turning the sleeve in one direction to screw the sleeve forward in said opening a predetermined distance so that the pin can be projected through said breechblock passage by the spring when the pin is released, the side of the arm facing the barrel being provided with a socket, a locking pin slidably mounted in said stock in front of said socket and beside said threaded opening, a spring normally urging the locking pin into the socket to prevent said element from being turned, a solenoid coil mounted in the stock beside said threaded opening for pulling the locking pin out of said socket when the coil is electrically energized, a plurality of normally open electric switches carried by the barrel, means for electrically connecting the switches in series in a circuit connecting the coil with a source of electric current, and levers pivotally connected to the front end of the barrel and projecting in front of it for closing said switches when all of the levers are tilted by pushing the barrel against an object.

15. An explosively actuated driving tool comprising a stock, a breechblock rigidly connected to the front of the stock and provided with an axial passage therethrough, a barrel mounted in front of the breechblock, the stock being provided with a threaded opening in line with said passage, a sleeve threaded in said opening, a firing pin slidably mounted in the sleeve, a spring urging the pin forward in the sleeve so that the pin normally will project from the front end of the sleeve a predetermined distance, the sleeve normally being retracted in said opening to keep the projecting end of the pin from projecting through said passage, the pin being manually retractible in the sleeve against the resistance of said spring, a turning element for the sleeve for screwing the sleeve forward in said opening a predetermined distance so that the pin can be projected through said breechblock passage by the spring when the pin is released, a lock for said turning element, electrically operated means for releasing said lock, an electric circuit for said means, a plurality of normally open electric switches carried by the barrel and connected in series in said circuit, the front end of the barrel being provided with a plurality of circumferentially spaced slots, a pair of normally spaced switch contact members mounted in each slot, a lever pivotally mounted in each slot for tilting movement to press one of the adjoining contact members into engagement with the other, said levers projecting from the front end of the barrel and tiltable when their front ends are pushed by the barrel against an object, and means electrically connecting said pairs of contact members in series in said circuit.

ROBERT TEMPLE.

No references cited.