United States Patent

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[33] **Great Britain**
[31] **8655/69**

[54] **POWER TOOLS**
15 Claims, 5 Drawing Figs.

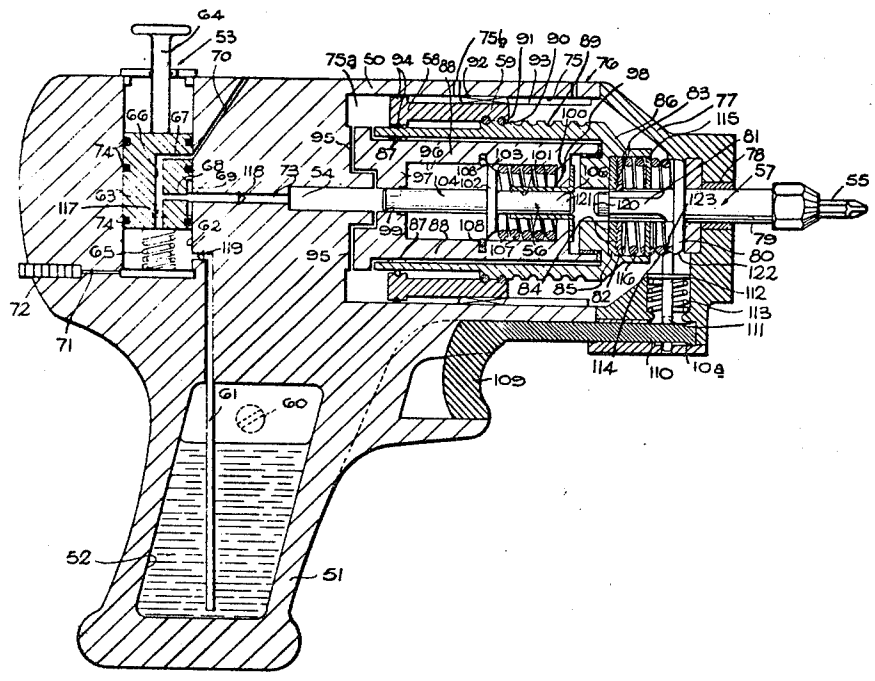
[52] **U.S. Cl.** **173/107,** 60/26.11, 144/32, 227/10
[51] **Int. Cl.** **B25d 9/11,** B25b 21/02
[50] **Field of Search** 173/106, 107, 116; 144/32; 227/9, 10; 60/26.1, 26.11

[56] **References Cited**
UNITED STATES PATENTS

2,403,675	7/1946	Mitchell	173/107
2,824,547	2/1958	Sherrill	173/106
3,403,738	10/1968	Burkhart et al.	144/32
3,499,590	3/1970	Bayer et al.	227/10

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ABSTRACT: The specification discloses a power hand tool, i.e. a tool arranged to be hand held but having a power-driven working element which is arranged to be operated by high-pressure gas produced by the explosion of an explosive charge. The tool includes control means arranged so that the working element can either be impacted and rotated or impacted only or rotated only. In one embodiment of the tool the order in which the working element can be impacted and rotated may be reversed. The preferred explosive charge is a liquid monofuel.



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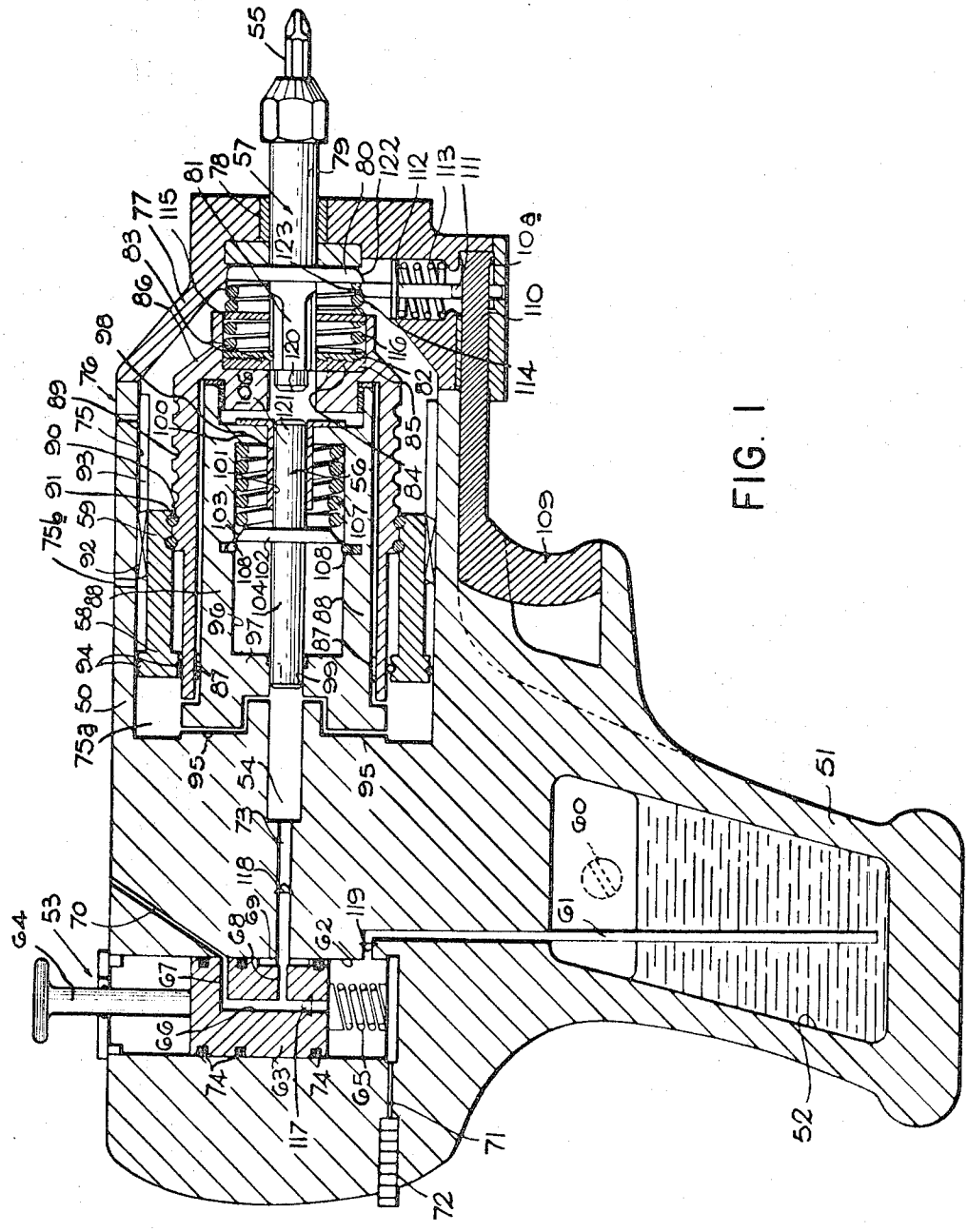
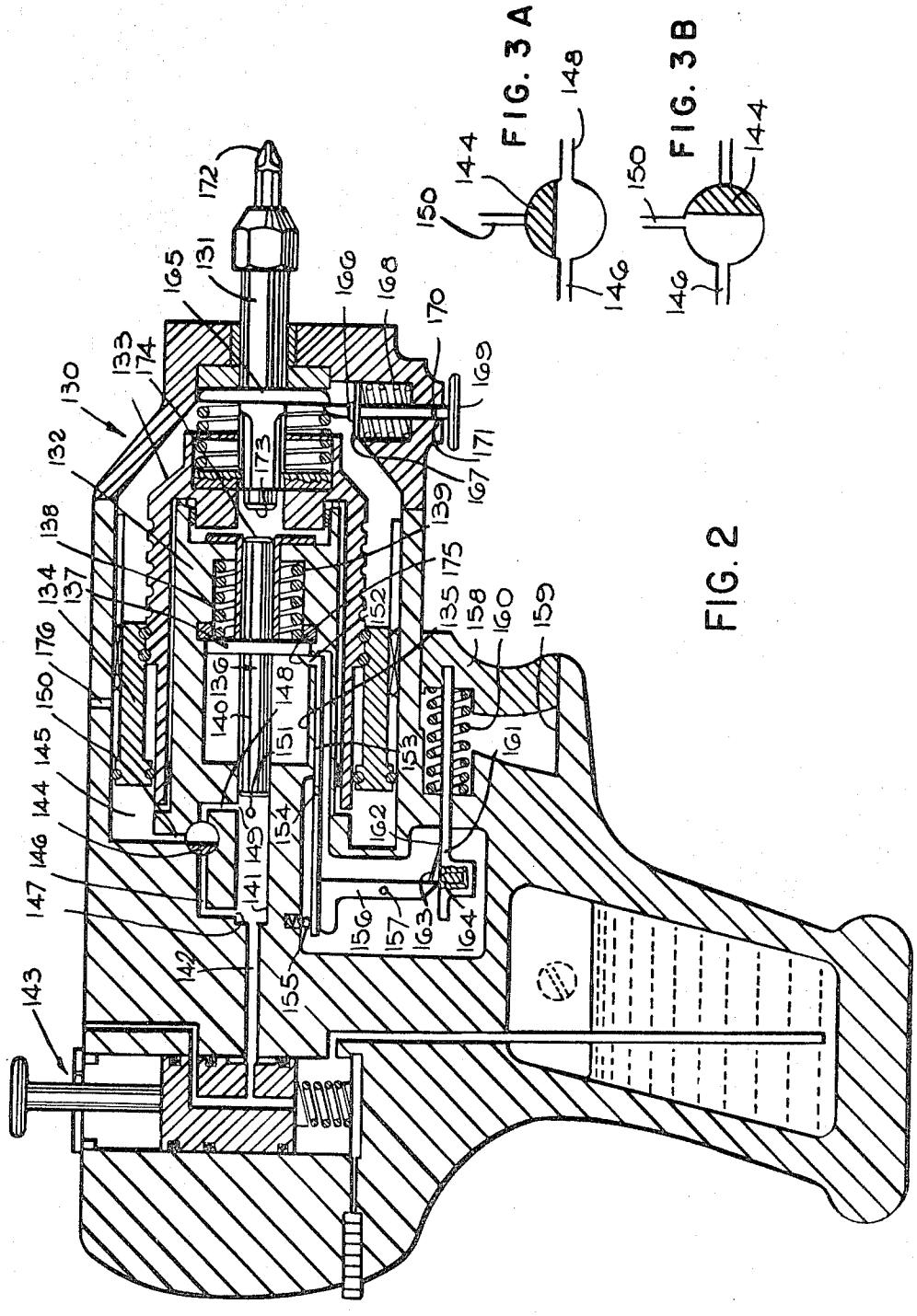


FIG. 1

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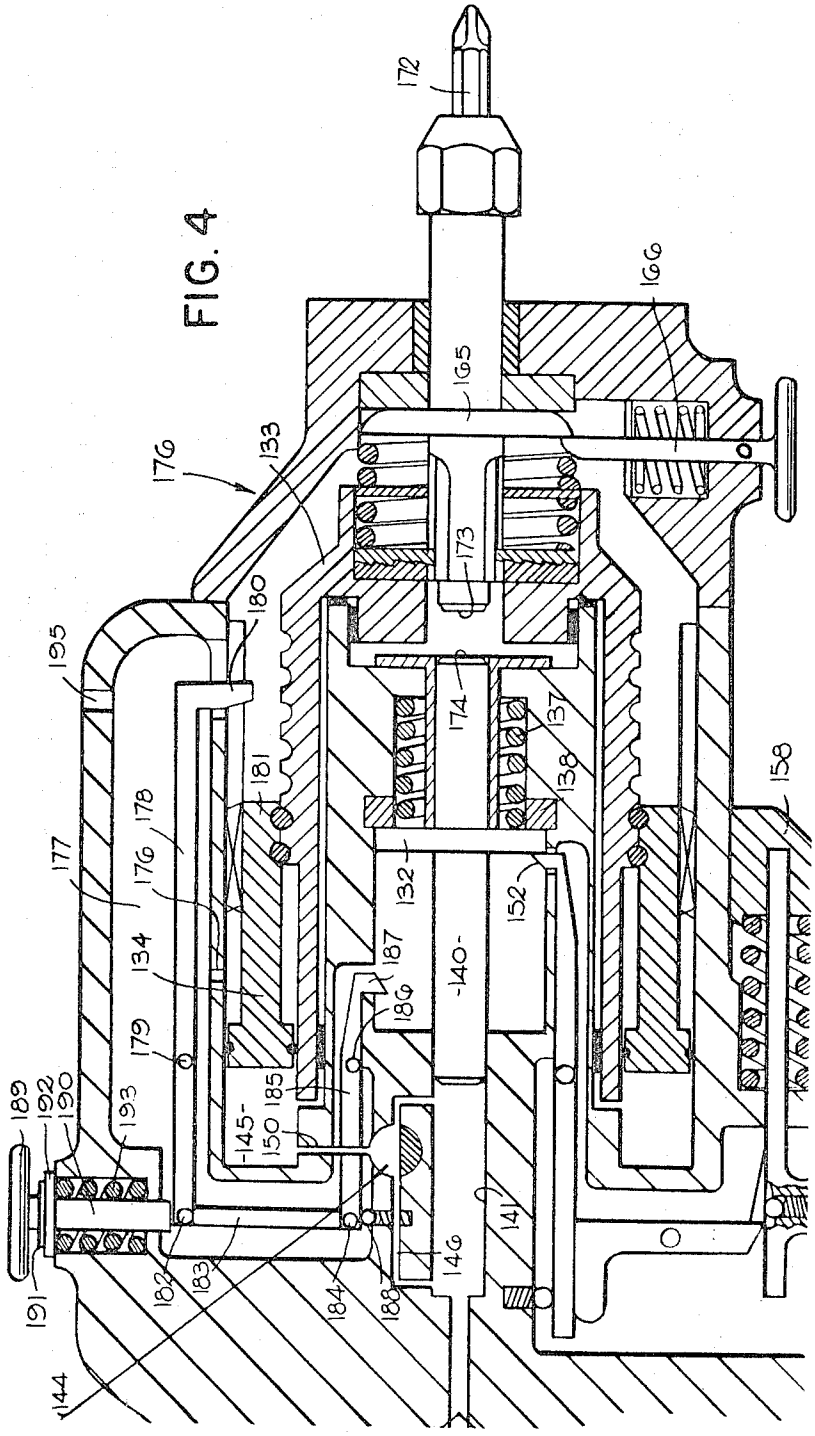
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FIG. 4



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POWER TOOLS

BACKGROUND OF THE INVENTION

1 Field of the Invention

The invention is concerned with power tools which are arranged to be hand held and are intended for driving fasteners such as screws or nuts.

2. Description of the Prior Art

Power hand tools for rotating and impacting fasteners have already been proposed and manufactured to operate off compressed air which is normally available in a factory. The pressure of such air which is normally available however limits the application of such tools, so far as they are applied to insert self-tapping and piercing screws, to inserting such screws into comparatively thin sheet metal. The normal air pressures available are insufficient to enable the screws to be driven into comparatively thick sections, e.g. steel sections of a thickness of one-eighth inch or more.

It is an object of the present invention to provide a power tool which will be capable of inserting self-tapping and piercing screws into comparative thick sections and which may be controlled so that as well as providing a rotation and an impact it may provide a rotation only or an impact only.

SUMMARY OF THE INVENTION

According to the invention there is provided a power tool comprising a body, a working element mounted on the body for reciprocation and rotation relative thereto an impact member mounted in a first chamber in the body and operable to deliver impacts to the working element, a rotary drive member mounted in a second chamber in the body and operable to rotate the working element, receiving means in the body to receive an explosive charge which, when exploded, produces high-pressure gas in one of said chambers; open-ended passage means extending between said chambers; and a part on the member in said one chamber which normally covers the end of the passage means in said chamber but which uncovers said end when said member has been operated by the high pressure gas to allow the latter to flow along the passage means to the other chamber to operate the member mounted therein.

By exploding an explosive charge within the body, gas can be obtained for powering the tool at a higher pressure than the normally available compressed air. The energy available will thus be capable of effecting work which cannot be effected with known guns using compressed air normally available in factories.

The explosive charge may be of any type and may be provided by cartridges or by caseless charges although it is preferred to use a liquid monofuel such as isopropyl nitrate.

The tool may be used for inserting a self-tapping and piercing screw in a workpiece and in this instance the working element comprises a screwdriver bit.

In an alternative arrangement, the tool can be arranged for running up a nut and in this case the working element will be a nut-engaging member and will be caused to rotate prior to being impacted. A nut may be thus run up on a threaded shank and when it has been tightened it may be impacted and thus locked in position.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in detail by way of example with reference to the accompanying drawings in which:

FIG. 1 is a section through a tool constituting a first embodiment of the invention arranged for inserting a self-tapping and piercing screw in a workpiece and so that the working element is impacted and then rotated;

FIG. 2 is a section through a tool constituting a second embodiment of the invention and arranged so that the working element can be impacted and rotated, impacted only or rotated only;

FIGS. 3A and 3B are diagrams showing the positions of the valve means of the tool of FIG. 2;

FIG. 4 is a part section through a tool constituting a third embodiment of the invention in which the order of impact and rotation can be reversed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS.

Referring first to FIG. 1 this shows a tool comprising a body 50 having a hollow handle portion 51 within which is provided a reservoir 52 for a liquid monofuel e.g. isopropyl nitrate. A manually operable pump 53 is provided on the body to pump the monofuel from the reservoir 52 to a decomposition chamber or breech 54 provided in the body 50.

Slidably and rotatably mounted at one end of the body 50 is a working element in the form of a screwdriver bit 55. An impact member 56 is slidably mounted in the body and is arranged to be driven into contact with the rear end of an anvil 57 as a result of an explosion of the monofuel in the chamber 54 so as to deliver an impact to the screwdriver bit 55. In addition, the gases produced by the explosion are fed to act on a piston 58 connected to a ball nut 59 which causes, when the piston is driven, the anvil 57 to rotate, thus to rotate the bit 55.

The reservoir 52 is provided with a filler aperture closed by a filler plug 60 which enables the reservoir to be filled with the monofuel. A tube 61 extends from the bottom of the reservoir 52 into the body 11 and communicates with a cylinder 62. A piston 63 is slidably mounted in the cylinder 62 and has a manually operable piston rod 64 connected thereto at its upper end and is acted upon, at its lower end, by a coil compression spring 64 which urges the piston 63 upwardly.

The piston 63 is provided with an axially extending passage 66 and two transversely extending passages 67 and 68 which communicate with the passage 66 and with the periphery of the piston 63. At the outer end of the passage 68 the piston 65 is formed with an axially extending slot 69. The body 50 is formed with a passage 70 which extends from the exterior of the body to the wall of the cylinder 62 at a position intermediate its ends. The body 50 is also formed with a further passage 71 extending from the exterior of the body to the bottom of the cylinder 62 and a flow-control valve 72 is provided in the passage 71. A passage 73 extends from one end of the decomposition chamber 54 to the cylinder 62. Sealing rings 74 are carried by the piston 63 and engage the wall of the cylinder 62.

The body is formed with a cylindrical bore 75 at its front end 76. A nose piece 77 is mounted on the front end of the body and is provided with a bearing 78 in which a cylindrical portion 79 of the anvil 57 is slidably and rotatably mounted. The anvil is formed with a circular shoulder 80 and an externally splined spigot 81 which is in nonrotatable engagement with an internally splined clutch member 82 so that the anvil 57 and the clutch member 82 can slide axially relative to one another but are constrained to rotate together.

The clutch member 82 has an operative face formed with teeth 83 which engage teeth 84 on a second clutch member 85. The teeth 83, 84 are so arranged that the clutch acts as a torque-limiting clutch so that if rotation of the bit 55 and hence of the clutch member 82 is prevented the clutch member 85 can slip relative to the clutch member 82. The clutch member 85 is carried in a holder 86 which is rotatably mounted by a bearing 87 on a boss part 88 of the body.

The external surface of the holder 86 is provided with a helical groove 89 of half-circular cross section. Balls 90 are engaged in the groove 89 and also engage in a similar groove 91 provided on the nut 59. The nut 59 is formed with splines 92 which engage with splines 93 provided in the bore 75 so that the nut 59 is permitted to move axially in the body but is prevented from rotating relative thereto. The piston 58 is annular and slides between the bore 75 and the holder 86, being provided with seals 94. The piston 58, nut 59 and holder 86 together constitute a rotary drive member for the working element or bit 55. Passageways 95 are provided between the

chamber 54 and the left hand end of the bore 75 which provides a chamber 75*a* in which the piston 58 is slidable.

The boss 88 is formed with a cylindrical bore 96 having end walls 97 and 98. The end wall 97 is formed with a passage 99 of the same diameter as the diameter of the decomposition chamber 54 and which constitutes an extension of such chamber. The wall 98 is provided with a bush 100 having a bore 101 of the same diameter as the passage 99. The impact member 56 comprises a piston 102 having a tapered circumferential surface 103 of concave form and slidable in the bore 96, a cylindrical spigot 104 slidable in the passage 99 and the chamber 57, sealing means 105 being provided between the passage 99 and the spigot member 104, and a spigot 106 slidable in the bore 101 of the bush 100. A coil compression spring 107 is located in the bore 96 between the end wall 98 and the piston 102. Spring-loaded detents 108 are provided in the wall of the bore 96 to engage with the larger diameter part of the shouldered piston 102 as hereinafter described in detail.

A manually operable and slidably mounted safety trigger 109 is provided on the body and is formed with a lever spring urged in a slot in the body. The lever 110 is formed with an inclined face 110*a* at the free end thereof and is engaged within a slot 111 provided in a finger 112 slidably mounted in the body for movement into and out of engagement with the left-hand face of the shoulder 80 of the anvil 57. A compression spring 113 is provided to urge the finger 112 towards the anvil 57. A compression spring 114 is provided to act between a part 115 provided on the holder 86 and the shoulder 80 to urge the anvil 57 to the right. A further compression spring 116 is provided between the clutch member 82 and said part 115 to urge the clutch member 82 into operative engagement with the second clutch member 85.

The operation of the tool will now be described assuming that the tool has previously been operated and that the parts thereof are in the positions shown in FIG. 1.

After the previous operation the piston 63 of the pump 53 will have been biased to its upper position by the spring 65 and a quantity of the monofuel in the reservoir 52 will have been drawn up the tube 61 and into the cylinder 62 below the piston 63. The amount of monofuel drawn into the cylinder 62 will depend upon how much air is bled into the cylinder 62 through the valve 72 and passage 71 and thus the charge of monofuel can be adjusted by adjusting the valve 72.

The piston rod 64 is moved down manually thereby causing the monofuel beneath the piston 63 to enter the passage 66 past a ball check valve 117. As the piston 63 moves downwardly the passage 67 is moved away from the end of the passage 70 but because the passage 68 is in communication with the slot 69 the passage 68 remains in communication with the passage 73 and so that a charge of monofuel is pumped through the passages 68 and 73 to the chamber 54 via a ball check valve 118 in the passage 73. When the piston 63 has been moved fully downwardly it is released and it returns to its normal position under the influence of the spring 65 and hence a further charge of monofuel is drawn through the tube 61 past a ball check valve 119 and into the cylinder 62 ready for the next operation of the tool.

A screw, not shown, is engaged with the bit 55 and then the screw is engaged with a workpiece, also not shown, into which it is desired to insert the screw. The safety trigger 109 is then pressed thus sliding the lever 110 to the left and causing the face 110*a* to engage the bottom of the slot 111 and withdraw the finger 112 from engagement with the shoulder 80 on the anvil 57. The tool is then pressed against the workpiece so that the anvil 57 slides inwardly, thereby compressing the spring 114 and so moving the end 120 of the anvil into engagement with the end 121 of the impact member 56.

Continued urging of the tool towards the workpiece causes the anvil 57 to move the impact member 56 to the left thereby disabling the detents 108 and so suddenly allowing the impact member 56 to shoot to the left under the influence of the spring 107. The sudden movement of the impact member causes the spigot 104 to project into the chamber 54 thus causing compression of the gas within the chamber and thus an explosion of the monofuel therein.

The hot gases created by the explosion drive the impact member 56 back to the right against the action of the spring 107 and thus bring the ends 120 and 121 into engagement to give the anvil 57 an impact and hence the bit 55 so that the screw engaged by the bit is driven into the workpiece and is caused to pierce its own pilot hole in the workpiece. As the spigot 105 moves to the right it uncovers the inner ends of the passages 95 allowing the gas to flow to the chamber 75*a* to act on the piston 58 causing it to move the nut 59 to the right. Since the nut 59 cannot rotate, because of the splines 92, 93, the balls 90 in the helical grooves 89 and 91 cause the holder 86 to rotate, thereby rotating the clutch member 85, the clutch member 83, the anvil 57 through the splined connection between the clutch member 83 and the anvil, the bit 55 and hence the screw engaged therewith which is caused to tap the pilot hole it previously formed and is driven into the workpiece.

When the screw is fully driven, and assuming that this occurs before rotation of the anvil 57 has ceased, the torque limiting clutch 82, 85 operates to enable continued rotation of the holder 86 whilst rotation of the anvil 57 is prevented. The groove 89 is so shaped that the piston 58 is caused to return to the position shown in FIG. 1 upon completion of the rotation. A vent 75*b* is provided which is uncovered by the piston 58 at the end of its stroke and allows the gas to escape.

The tool is then removed from the driven screw so that the anvil 57 is moved to the right under the influence of the spring 114 and as the shoulder 80 moves to the right its curved peripheral surface 122 engages with a correspondingly shaped surface 123 of the finger 112 and so that the latter is moved downwardly and then is urged upwardly by the spring 113 to engage behind the shoulder 80 as shown in the drawing to prevent movement of the anvil to the left until the trigger 109 is again operated.

Referring now to FIGS. 2 and 3, these show a second embodiment of the invention which in many respects is similar to that described in FIG. 1, where the parts of the tool shown in FIG. 2 are identical to those shown in FIG. 1 and they will only be described briefly.

In the tool of FIG. 1, the screwdriver bit 55 could only be impacted and then rotated. With the tool of FIG. 2, the screwdriver bit of the tool can be impacted and rotated or impacted only or rotated only.

Referring to FIG. 2, the tool has a body 130 which is substantially identical to the body 50 and mounted in the body for rotation and sliding movement relative thereto is an anvil 131 which is arranged and spring biased precisely as the anvil 57 in FIG. 1. Mounted on a boss part 132 of the body is a holder 133 similar to the holder 86 and this is arranged to be rotated by a nut 134 arranged identically to the nut 58.

In a bore 135 in the body is mounted an impact member 136. The impact member has a piston 137 which slides in the bore 135 and engages a resilient washer 138 through which acts a spring 139. The impact member has a spigot 140 which is arranged to enter a decomposition chamber or breech 141 which communicates through a passage 142 with the outlet from a pump 143 which operates precisely as the pump 53 in FIG. 1.

Valve means indicated generally at 144 are situated in passage means between the bore 141 and a chamber 145 in which the nut 134 is slidable. The passage means comprises a first passage 146 having an open end 147 in the decomposition chamber, a second passage 148 which has an open end 149 in tee decomposition chamber and a third passage 150 which opens into the chamber 145. A vent 151 is provided in the decomposition chamber which is open when the valve means 144 is in one of its positions as will be described below.

In place of the spring-loaded detent means 108 of FIG. 1, the tool of FIG. 2 has manually operated detent means. A detent 152 is provided on a lever 153 which is pivoted at 154 in the body. The end of the lever 153 remote from the detent 152

is acted upon by a spring-biased ball 155 tending to rotate the lever 153 in an anticlockwise direction to cause the detent 152 to engage the piston 137. Also engaging the lever 153 is one end of a pivoted rocker 156 which is pivoted at 157. A trigger 158 is slidable in a slot 159 in the body against the action of a spring 160. The trigger 158 carries a rod 161 to which is pivotally mounted at 162 a wedge member 163. The wedge member is urged in a clockwise direction to the position shown by means of a spring urged ball 164.

The anvil 131 carries a shoulder 165 identical to the shoulder 80 in FIG. 1 and this is engageable by a pin 166 which carries a washer 167 and is urged upwardly by a spring 168. The lower end of the pin 166 carries a knob 169 and a pin 170 which is received in a slot 171 in the body. The pin 166 can be withdrawn from engagement with the shoulder 165 by moving the pin downwardly by grasping the knob 169 and then when the pin 170 has left the slot 171 the pin 166 can be turned to cause the pin 170 to engage the external surface of the body.

The valve means 144 and the pin 166 together constitute control means which can be operated so that the anvil 131 can be caused either to be impacted and then rotated or impacted only or rotated only.

The normal arrangement is as in FIG. 1 that the anvil 131 is first impacted and then rotated. Assuming that this is the desired mode of operation, the valve means is placed in the position shown in FIG. 2 by an external knob, not shown. The pump 143 is operated to deliver a charge of monofuel into the decomposition chamber 141 as described in relation to FIG. 1. The safety pin 166 is retracted as described above and is held out of engagement with the shoulder 165. The screwdriver bit 172 carried by the anvil 131 is engaged with a screw to be driven and pressure is put on the tool to move the anvil 131 to the left so that the left-hand end 173 thereof engages the end 174 of the impact member 136. The trigger 158 is then pulled which moves the rod 161 to the left in FIG. 2 causing the wedge member 163 to pivot the rocker 156 and thus pivot the lever 153 so that the detent 152 comes out of engagement with the piston 137.

The spring 139 then urges the impact member 136 to the left and the spigot 140 causes an explosion of the monofuel in the decomposition chamber 141. The gases produced cause the impact member 136 to return to the position shown in the drawings thus compressing the spring 139. The impact member is held in this position by the detent 152 which has an inclined surface 175 and which is automatically returned to hold the impact member in the position shown in FIG. 2 by the following means.

When the rod 161 moves to the right the wedge member 163 moves under the lower end of the rocker 156 and since the spring acting on the ball 155 is stronger than the spring acting on the ball 164, the wedge member is pivoted in an anticlockwise direction and the spring-urged ball 155 holds the lever 153 in the position shown. Thus, it does not matter if the trigger 158 is not released immediately since the lever 153 will return to the position shown in FIG. 2 irrespective of whether the trigger 158 is held or not. As the impact member 136 moves to the right under the influence of the high pressure gases, therefore, the piston 137 will momentarily pivot the lever 153 by engaging the inclined surface 175 but the lever will immediately return to the position shown under the influence of the spring urged ball 155 and will hold the impact member in the position shown. When the trigger 158 is released the rod 161 and the wedge member 163 will return to the positions shown in FIG. 2 ready for the next operation.

As the impact member 136 returns to the position shown in FIG. 2 driven by the high-pressure gas the ends 174 and 173 will engage and an impact will be given to the screw engaged with the screwdriver bit 172. Moreover, the high pressure gases will be prevented from flowing through the first passage 146 by the valve means 144 but will flow through the passage 148 when the end 149 thereof is uncovered by the impact member as the latter moves to the right. When the end 149 is uncovered the gases will flow through the passages 148 and 150 into the chamber 145 and will cause the nut 134 to move to the right to rotate the anvil 131 in the manner described in relation to FIG. 1. The gases will escape through the vent 176 and the nut will be returned to the position shown at the end of rotation. It will be seen that with this setting of the valve means 144 and tee pin 166 the screwdriver bit 172 is given an impact and then a rotation.

In a second setting of the control means the anvil 131 is impacted only.

For impact only, the valve means 144 is moved to the position shown in FIG. 3*a*. This has two effects, firstly it seals off the passage 150 and thus the chamber 145 from the decomposition chamber 141 and secondly it opens the vent 151 to atmosphere. The valve means is moved to this position and the pin 166 is withdrawn from engagement with the shoulder 165 as described below. The screwdriver bit 172 is then engaged with a screw or other device to be impacted and the gun is pushed against the screw or device until the ends 173 and 174 engage. The trigger 158 is then operated to release the detent means as described above and the impact member 136 moves to the left to explode the charge of monofuel which has previously been delivered to the decomposition chamber 141. The high pressure gases generated move the impact member 136 to the right to impact the anvil 131 as described above and the impact member is held in this position by the detent 152 as described. At the end of the movement of the impact member, however, the gases do not flow through the passages to the chamber 145 but escape through the vent 151.

In a third setting of the control means, the valve means 144 is set as shown in FIG. 3(B) and the pin 166 is allowed to engage the shoulder 165 as shown in FIG. 2. In this setting of the control means the anvil 131 will be rotated only as will now be described. Release of the detent 152 by operation of the trigger 158 will cause the impact member 136 to move to the left and explode a charge of monofuel in the decomposition chamber 141. The passage 146 is in communication with the passage 150 and therefore as soon as the gases are generated they pass to the chamber 145 to operate the nut 134. The impact member 136 returns to its position shown in FIG. 2 but since the pin 166 engages the shoulder 165 the ends 173 and 174 do not engage and thus the anvil 131 is not impacted. The gases drive the nut 134 and rotate the anvil 131 through the holder 133 containing clutch means as described in relation to FIG. 1. The gases escape through the vent 176 at the end of the rotation.

It will be seen that the tool of FIG. 2 may be used to impact and rotate the anvil 131 or to only impact the anvil or to only rotate the anvil. It is to be noted that the vent 151 is only open when the valve means 144 is in the position shown in FIG. 3A.

Referring now to FIG. 4, this shows a modification of the tool described in relation to FIG. 3 and in which auxiliary control means are provided to enable the anvil to be rotated first and then impacted. Parts in FIG. 4 which are identical to those in FIG. 3 are indicated by the same reference numerals.

Referring to FIG. 4, the gun body 176 is provided with a chamber 177 which houses the auxiliary control means. The auxiliary control means comprise a first lever 178 pivoted at 179 intermediate its ends. At one end, the lever 178 carries a detent 180 which in the position shown in FIG. 4 is arranged to be engaged by an end 181 of the nut 134. The other end of the lever 178 is pivoted at 182 to the upper end of a rod 183 whose lower end is pivoted at 184 to a second lever 185. The second lever 185 is pivoted at 186 and at its other end carries a detent 187 which, in the position shown in FIG. 4, is arranged to engage the piston 137 when the impact member 140 is in its left-hand position.

The left-hand end of the second lever 185 and thus the rod 183 are urged upwardly by means of a spring urged ball 188. An operating knob 189 is secured to the upper end of an operating rod 190. The operating rod carries a transverse pin 191 which is movable through a slot, not shown, in a plate 192 secured to the body, the pin engaging the upper end of a spring 193.

The auxiliary control means constituted by the levers 178 and 185, the rod 183 and the operating rod 190 are shown in their operative position in FIG. 4, the transverse pin 191 having been passed through the slot in the plate 192 and turned to hold the operating rod 190 in the position shown.

To obtain rotation and then impact of the anvil 131 the operating rod 190 is set in the position as shown in FIG. 4 and the pin 166 is withdrawn from the shoulder 165 as described above and the screwdriver bit 172 is engaged with the device to be driven and the tool is pushed to the right against the device so that the ends 173 and 174 engage.

The trigger 158 is now pressed thus allowing the impact member 140 to move to the left to explode a charge of monofuel which has been delivered to the decomposition chamber 141 from the pump 143 as described above. When the impact member 140 reaches the left-hand end of the stroke the detent 187 engages with the piston 137 and thus holds the impact member in this position. The gases generated by the explosion pass through the first passage 146, the valve means 144 and the third passage 150 into the chamber 145. The gases move the nut 134 to the left thus rotating the anvil 131 through the clutch in the holder 133. Before the nut 134 uncovers the vent 176 the end 181 engages the detent 180 which pivots the lever 178 and thus the lever 185 through the rod 183 thus raising the detent 187 and allowing the impact member 140 to move to the right under the pressure of the gas so that the ends 174 and 173 again come into engagement and the device engaged by the screwdriver bit 172 has an impact delivered thereto. The gases escape through the vent 176 and through a further vent 195 provided in the chamber 177. If it is desired to disable the auxiliary control means so that the tool can operate as described in relation to FIG. 3, the operating rod 190 is turned by the operating knob 189 until the pin 191 can pass through the slot and the plate 192 and can thus move the operating rod 183 downwardly against the operation of the spring urged ball 188 which has the effect of lifting the detent 187 out of the path of the piston 137 and also lifting the detent 184 out of the path of the nut 134. The auxiliary control means can be brought back into operation by turning the pin 191 so that it can pass through the slot in the plate 192 and lifting the control rod 190 so that the pin 191 passes through the slot and may then be turned to rest on top of the plate 192 as shown in FIG. 4.

The preferred monofuel is isopropyl nitrate but if desired other explosive media such as cartridges or caseless charges could be provided and initiation of the explosion could be started by means other than the detonation method described hereinbefore, for example the explosion could be started by means of a spark.

I claim:

1. A power tool comprising a body, a working element mounted on the body for reciprocation and rotation relative thereto, an impact member mounted in a first chamber in the body and operable to deliver impacts to the working element, a rotary drive member mounted in a second chamber in the body and operable to rotate the working element, receiving means in the body to receive an explosive charge which, when exploded, produces high-pressure gas in one of said chambers; open-ended passage means extending between said chambers; and a part on the member in said one chamber which normally covers the end of the passage means in said chamber but which uncovers said end when said member has been operated by the high-pressure gas to allow the latter to flow along the passage means to the other chamber to operate the member mounted therein.

2. A power tool according to claim 1 wherein said one chamber is said first chamber and said part is on the impact member.

3. A power tool according to claim 2 including control means selectively operable to any one of three settings in the first of which the working element is impacted and rotated by said gas and in the second and third of which the working element is respectively impacted only or rotated only by said gas, the control means including valve means in the passage means for controlling the flow of gas through the latter.

4. A power tool according to claim 3 including manually operable disabling means forming part of said control means and including a disabling element engageable with the working element in the third state of the control means to hold the working element out of engagement with the impact member.

5. A power tool according to claim 3 wherein in the second setting of the control means the valve means prevents the flow of gas through the passage means from the first chamber to the second chamber.

6. A power tool according to claim 5 wherein the passage means comprises first, second and third passages all communicating with the valve means, the first and second passages having open ends in the first chamber, said end of the first passage being always uncovered and said end of the second passage being uncovered by said part, the third passage having an open end in the second chamber and wherein in the first setting of the control means the valve means seals the first passage and allows communication between the second and third passages, in the second setting of the control means the valve means seals off the third passage, and in the third setting of the control means the valve means allows communication between the first and third passages.

7. A power tool according to claim 3 wherein the control means has a fourth setting in which the valve means allows the gas to flow to the second chamber simultaneously with its production in the first chamber and including auxiliary control means operable in said fourth setting to prevent the impact member engaging the working element under the influence of said gas until the latter has been rotated by the rotary drive member.

8. A power tool according to claim 2 including detent means releaseably to hold the impact member against the action of a spring means in a cocked position, release of the detent means allowing movement of the impact member under the influence of the spring to initiate the explosion of a charge in said receiving means, the resulting high-pressure gas causing the impact member to compress the spring means and return to its cocked position.

9. A power tool according to claim 8 wherein the detent means is spring-loaded and is rendered inoperative by an end load applied to the impact member by the working element.

10. A power tool according to claim 9 including manually operable disabling means including a disabling element engageable with the working element to prevent the latter applying said end load to the impact member unless the safety means are operated.

11. A power tool according to claim 8 wherein the detent means is spring loaded to an operative position and manual release means is provided for releasing the detent means.

12. A power tool according to claim 8 wherein the receiving means is arranged to receive a charge of a liquid monofuel, the impact member carrying means for initiating decomposition of said fuel to produce said explosion.

13. A power tool according to claim 12 wherein said receiving means comprises a breech and said means for initiating decomposition comprises a firing pin capable of entering the breech.

14. A power tool a according to claim 1 for use in inserting a self-tapping or -piercing screw in a workpiece and wherein the working element comprises a screwdriver bit.

15. A power tool according to claim 7 for use in running nuts and wherein the working element is a nut-engaging member.