Dec. 17, 1963 L. V. NASLUND 3,114,423

ROTARY-HAMMER DEVICE

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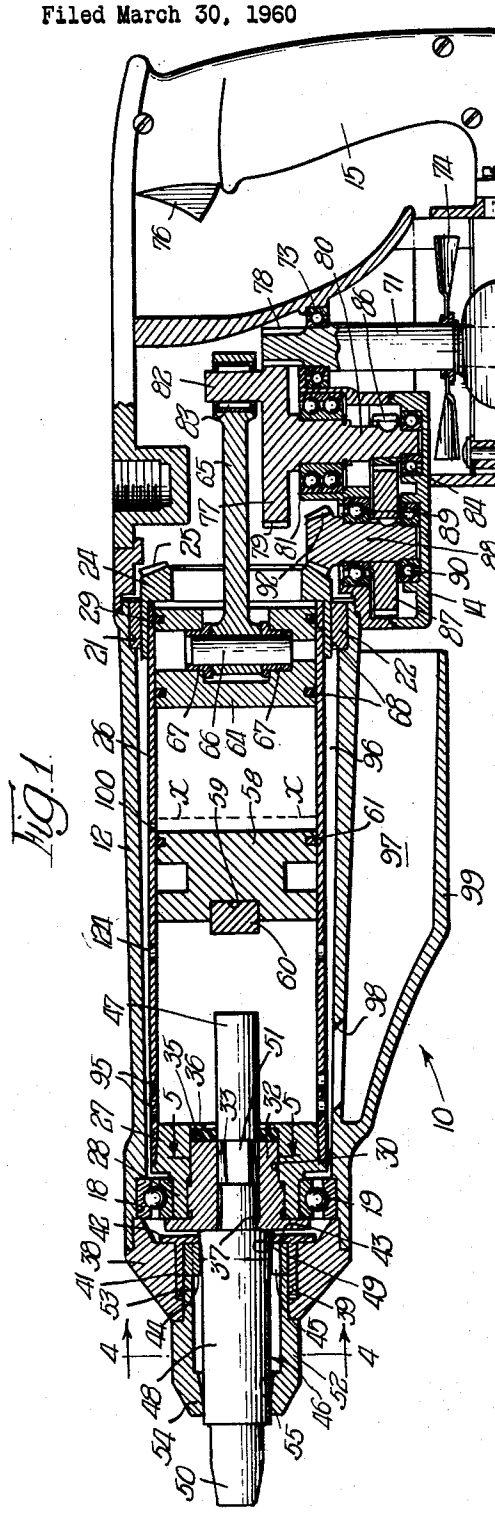


Fig. 1

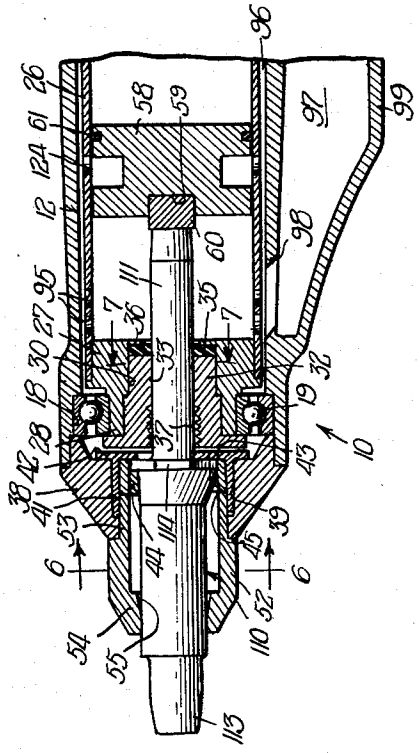


Fig. 2

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Fig. 3

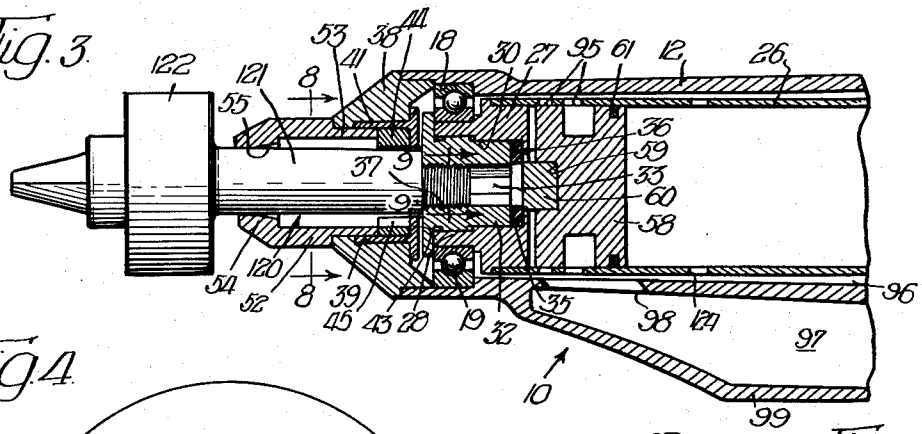


Fig. 4

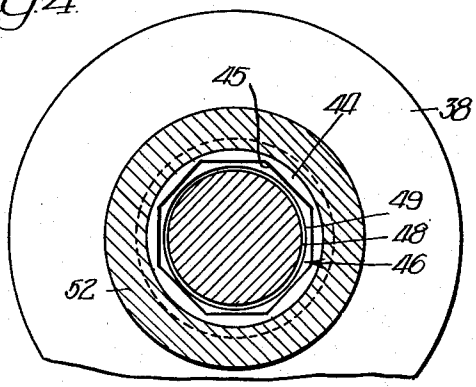


Fig. 5

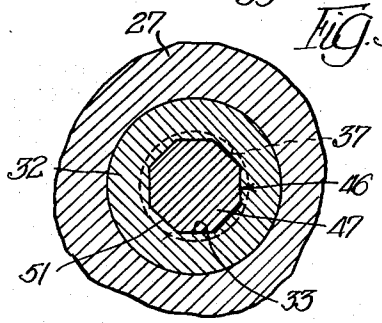


Fig. 6

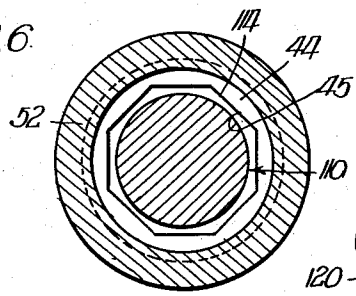


Fig. 9

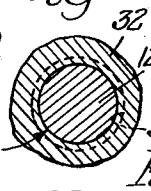


Fig. 7

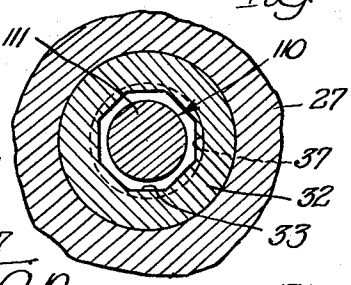


Fig. 8

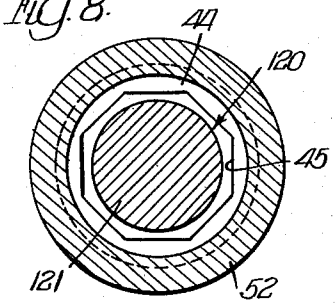
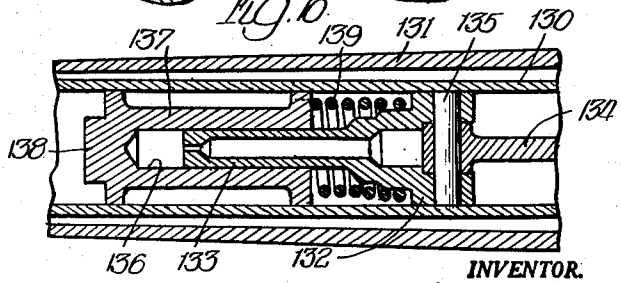


Fig. 10



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3,114,423

ROTARY-HAMMER DEVICE

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8 Claims. (Cl. 173—97)

The present invention relates to a hand operable power device, and more particularly to such a device which provides a combination rotary and hammering action as well as selective and separate rotary and hammering actions.

It is an important object of the invention to provide a new and novel rotary-hammer power device.

It is an important object of the invention to provide a new and novel rotary-hammer device whereby to selectively provide percussion-type drill bits with a combination rotary and hammering action, chisels and star drills with a purely hammering action, and drill chucks with a purely rotary action.

A more detailed object of the invention is to provide a new and novel rotary-hammer device of the character described wherein tool means may be mounted for reciprocating movement in the end of a rotating cylinder or barrel.

Another object of the invention is to provide a new and novel rotary-hammer device of the character described wherein the power unit which provides the reciprocating action of the tool means also provides the rotary action of the cylinder or barrel.

Further objects of the invention are to provide a new and novel rotary-hammer device of the character described which may be readily operated by one person, which is rugged and requires little or no maintenance, and which provides clean, neat holes in masonry and the like with little chipping and cracking of the material.

Certain other objects of the invention will, in part, be obvious, and will in part appear hereinafter.

For a more complete understanding of the nature and scope of the invention reference may now be had to the accompanying drawings wherein:

FIG. 1 is a generally longitudinal vertical section taken through a rotary-hammer device embodying the invention and showing a tool adapter element designed for simultaneous rotary and hammering movements mounted in the device;

FIG. 2 is a fragmentary vertical section of the nose portion of the rotary-hammer device of FIG. 1 showing a tool adapter element designed for hammering movement only mounted in the device;

FIG. 3 is a fragmentary vertical section similar to FIG. 2 but showing a tool adapter element designed for rotary movement only mounted in the device;

FIG. 4 is an enlarged vertical section taken generally on the line 4—4 of FIG. 1;

FIG. 5 is an enlarged vertical section taken generally on the line 5—5 of FIG. 1;

FIG. 6 is an enlarged vertical section taken generally on the line 6—6 of FIG. 2;

FIG. 7 is an enlarged vertical section taken generally on the line 7—7 of FIG. 2;

FIG. 8 is an enlarged vertical section taken generally on the line 8—8 of FIG. 3;

FIG. 9 is an enlarged vertical section taken generally on the line 9—9 of FIG. 3; and

FIG. 10 is a fragmentary vertical section similar to FIG. 1 illustrating another form of striker-actuating structure.

As illustrated in FIG. 1, a rotary-hammer device 10 embodying the invention is provided with a generally right angular multi-part housing or casing including a horizontally disposed tool-supporting portion 12, a vertically disposed power-unit-supporting portion 13, and an intermediate gear-housing portion 14 interconnecting the portions 12 and 13. A suitable handle 15 is secured between the housing portions 13 and 14.

The tool-supporting housing portion 12 which is generally tubular in form is provided on the inner surface of its outer end with an enlarged diameter annular groove 18 in which is seated a ball bearing 19. Likewise, the inner surface of the opposite end of the tubular housing portion 12 is provided with an enlarged diameter annular groove 21 in which is seated a suitable bearing 22. A bevel gear 24 is rotatably supported in the bearing 22 with a gear formation 25 thereon facing toward the handle end of the rotary-hammer device 10. One end of a tubular cylinder or barrel 26 is press fitted in a bore 29 formed in the opposite face of the bevel gear 24. The opposite end of the cylinder 26 has a tube insert 27 threadedly secured therein with the insert 27 having an outwardly projecting reduced-in-diameter portion 28 rotatably supported in the ball bearing 19. The cylinder 26 is therefore supported at its opposite ends for rotation within the housing portion 12.

The tube insert 27 is provided with a through bore 30 having an inwardly projecting radial flange portion 36 at its inner end. A tool element drive member 32 is threadedly secured in the bore 30 with an apertured rubber gasket 35 being disposed between the inner end of the drive member 32 and the flange portion 36 of the tube insert 27. The drive member 32 is provided with an axial through bore having an octagonal formation 33 at its inner end and an internal thread 37 formed at its outer end.

A nose member 38 having a through bore 39 extending therethrough is secured in the outer end of the tubular housing portion 12 in a suitable manner. A generally cylindrical nose insert member 41 is press fitted into the inner end of the bore 39 in the nose member 38 and is provided with an outwardly projecting radial flange portion 42 which is engageable with the inner surface of the nose member 38 and with an inwardly projecting radial flange portion 43. An annular guide member 44 is press fitted into the nose insert member 41 in abutting engagement with the inwardly projecting flange portion 43 thereof. The guide member 44 is provided with an internal octagonal formation 45.

As shown in FIG. 1, a tool adapter 46 is mounted in the nose end of the rotary-hammer device 10 for both reciprocal and rotary movements. The tool adapter 46, which is generally elongated, includes an inner end or shank portion 47 which extends through the bore 33 in the drive member 32 with its inner end adapted to project into the cylinder 26 beyond the inner surface of the tube insert 27. The adapter 46 also includes an enlarged body portion 48 having an outwardly flared shoulder 49 engageable with the outer end of the drive member 32

when the adapter 46 is in its innermost position. The outer end 50 of the adapter 45 is reduced-in-diameter and provided with a taper whereby to permit the mounting thereon in the usual manner of tool elements such as percussion-type drill bits (not shown).

The outer surface of a portion of the shank portion 47 of the adapter 46 is provided with an octagonal formation 51 for both rotary driving and reciprocal sliding interengagement with the octagonal formation 33 in the bore of the drive member 32, as shown in FIG. 5. Thus, the tool adapter 46 is not only reciprocally slidable relative to the nose of the rotary-hammer device 10 but it is also rotatable with the cylinder 26. As shown in FIG. 4, the outwardly flared shoulder 49 on the adapter 46 is not engageable with the octagonal formation 45 of the guide member 44 but is freely rotatable relative thereto.

After the tool adapter 46 is inserted in the rotary-hammer device 10, as described, an adapter lock or tool holder 52 is assembled to the nose end of the rotary-hammer device 10. The adapter lock 51 is provided at its inner end with a reduced-in-diameter portion 53 having an external thread for threaded engagement with an internal thread formed in the outer end of the nose insert member 41. The outer end of the adapter lock 52, which is in substantial spaced relation from the drive member, is provided with an inwardly flanged sleeve portion or annular bearing surface 54 for guiding engagement with the body portion 48 of the tool adapter 46. The inwardly flanged sleeve portion 54, which limits outward movement of the tool adapter 46 as a result of engagement therewith of the outwardly flared shoulder 49 on the tool adapter 46, is provided with an inner taper 55 which is complementary to the outwardly flared shoulder 49 for a purpose to be described.

In the rotary-hammer device illustrated in FIGS. 1–9, the hammering action is provided pneumatically. A free piston or striker member 58 provided with rings 61 is slidably mounted in the cylinder 26 and is provided on its leading face with a recess 59 in which is secured a striker button 60 adapted for striking engagement with the inner end of the tool adapter 46. The striker member 58 is pneumatically actuated with a reciprocating movement by a power driven piston 64 provided with rings 68. The piston 64 is reciprocated in the inner end of the cylinder 26 by a driven crank arm 65. The piston end of the crank arm 65 is pivotally connected to the piston 64 by a dowel pin 66 which extends through aligned bores formed in the end of the crank arm 65 and in guide bushings 67 mounted in the piston 64.

The reciprocal power piston 64 and the rotatable cylinder 26 are both driven by an electric motor 70 which is mounted by suitable fastening means in the housing portion 13 and which has a vertically disposed drive shaft 71. The lower end of the drive shaft 71 is rotatably supported in a bearing 72 and the upper end extends into the housing portion 14 and is rotatably supported in a bearing 73. Preferably, a fan 74 is mounted on the drive shaft 71. The power circuit for the electric motor 70 is a standard type circuit well known in the art and is therefore not shown and described in detail herein. A power cord 75 and an "on and off" switch controlled by a trigger-like member 76 carried on the handle 15 are provided for the power circuit.

Suitable motion transmitting drives are provided between the drive shaft 71 of the electric motor 70 and both the rotatable cylinder 26 and the power piston 64. The upper end of the drive shaft 71 is provided with a gear tooth formation 78 which is meshed in driving engagement with a gear-tooth formation 79 formed on an enlarged upper gear-like portion 77 of a shaft 80, which shaft is rotatably supported in bearings 81 and 84. The gear-like portion 77 is provided on its upper face with an upstanding post 82 which is arranged eccentrically thereon relative to the axis of rotation of the shaft 80. The opposite end of the crank arm 65 from the piston 64 is

bored whereby to permit rotatable mounting thereof on the upstanding post 82 by means of a suitable bearing 83. Thus, during operation of the motor 70 the piston 64 is reciprocated in the inner end of the cylinder 26 in a manner well known in the art.

A pinion gear 86 which is keyed to the lower portion of the shaft 80 meshes with a pinion gear 87 which is keyed to the lower end of a shaft 88 which is supported in bearings 89 and 90. A bevel gear formation 92 is provided on the upper end of the shaft 88 in meshing engagement with the gear formation 25 on the bevel gear 24. Thus, the cylinder 26, which is driven by the motor 70 through the described gear train, is simultaneously rotated as the piston 64 is reciprocated.

As the striker member 58 is pneumatically reciprocated by the power piston 64 in a manner to be described, suitable porting is provided in the cylinder 26. A plurality of ports 95 are formed in the outer end of the cylinder 26 adjacent the inner surface of the tube insert member 27. The ports 95 communicate with an annular manifold space 96 defined between the outer surface of the cylinder 26 and the inner surface of the housing portion 12 which in turn is in communication with an air channel 97 through an opening 98. The air channel 97 is open at its rear end to atmosphere. The air channel 97 is defined by a depending portion 99 of the housing portion 12 which may be formed to provide a second handgrip for the rotary-hammer device 10. A small venting port 100 is formed in the cylinder 26 just forward of the forwardmost position of the leading face of the piston 64.

The pneumatic operation of the device illustrated in FIGS. 1–9 will now be described. In FIG. 1, the piston 64 is shown in its rearwardmost position with its forwardmost position being indicated by the broken line *x*—*x*. The striker member 58 is shown in FIGURE 2 at its point of impact with the end of the tool adapter 46 at which moment the piston 64 would be in its forwardmost position. Movement of the piston 64 from its forwardmost position to its rearwardmost position creates a vacuum between the piston 64 and the striker member 58 which in combination with the atmospheric pressure exerted on the leading face of the striker member 58 causes movement of the striker member 58 toward the piston 64. As the piston 64 begins its forward stroke, the striker member 58 continues its rearward movement toward the piston 64 due to its momentum whereby the air trapped therebetween becomes compressed to create a tremendous pressure between the two piston members. This pressure serves both as an air cushion preventing contact of the striker member 58 with the piston 64 and as the driving force that reverses the striker member's direction and sends it traveling toward the nose end of the rotary-hammer device 10 at a very high velocity to deliver a sharp blow to the inner end of the tool adapter 46. Due to the extreme pressure developed between the striker member 58 and the piston 64 during the working stroke thereof, some of the air may be forced past the striker member 58. During the rearward movement of the piston 64 sufficient air may be drawn into the cylinder 26 through the venting port 100 to compensate for the air lost during the working stroke of the piston 64. During the forward stroke of the striker member 58 the air disposed forwardly of the leading face of the striker member 58 is merely evacuated or exhausted to atmosphere through the ports 95, the manifold space 96, the opening 98 and the air channel 97.

In the embodiment of the invention illustrated in FIG. 1 with the motor 70 turning at approximately 11,760 r.p.m., the piston 64 is reciprocated by the motor 70 at a rate of approximately 2,140 strokes per minute. With a ten ounce striker member it has been established that the striker member 58 moves with an average velocity of approximately 178 inches per second and gives up approximately 6 to 8.4 foot-pounds of energy per blow which corresponds to 0.5 to 0.7 horsepower. The force of the blow produced by a ten ounce striker member has been

experimentally determined to be approximately 3,500 pounds force. Under these operating conditions the duration of the striking impulse is only several hundred microseconds. With the motor turning at 11,760 r.p.m. to reciprocate the piston 64 at approximately 2,140 strokes per minute, the cylinder 26 will be simultaneously rotated at approximately 238 r.p.m. This combination rotary-reciprocal action of tool elements, such as percussion type drill bits, carried on the tool adapter 46 results in the formation of unusually neat holes in masonry and the like with little or no chipping and cracking of the material.

By providing tool adapters of different designs, the rotary-hammer device 10 may provide various tool elements with either a separate rotary action or a separate hammering action. As illustrated in FIGS. 2, 6 and 7, a tool adapter 110 which is adapted to provide reciprocal but non-rotary movement of tool elements carried thereon, such as chisels and star drills, is disposed in the nose end of the device 10. The tool adapter 110 is characterized by a cylindrical inner end or shank portion 111 which extends through the bore in the drive member 32 with the diameter of the shank portion 111 being small enough that there is no rotary driving engagement between the shank portion 111 and either the octagonal formation 33 or the internal thread 37 of the bore of the drive member 32. The inner end of the shank portion 111 projects into the cylinder 26 for impact engagement by the striker member 58. The opposite end 113 of the adapter 110 is tapered for mounting non-rotary tool elements thereon in the usual manner. Intermediate the shank portion 111 and the tapered end portion 113 the adapter 110 is provided with an enlarged octagonally shaped portion 114 adapted for slidable interengagement with the internal octagonal formation 45 of the guide member 44 whereby the adapter 110 is restrained from rotation during reciprocation thereof by the striker member 58. During operation of the device 10 with the tool adapter 110, the cylinder 26 is constantly rotating but is not rotatably driving the adapter 110.

In FIGS. 3, 8 and 9, a tool adapter 120 is disposed in the nose end of the device 10 for non-reciprocal rotary movement. The adapter 120 is provided with a cylindrical shank portion 121 having its inner end externally threaded for threaded engagement with the internal thread 37 formed in the outer end of the bore of the drive member 32 and its outer end externally threaded for receiving a conventional drill chuck 122 adapted to have a non-percussion-type drill bit mounted therein. The outer end of the shank 121 could also be provided with a suitable configuration for mounting a percussion-type drill bit thereon for rotary actuation only. There is no engagement of the shank portion 121 of the drill chuck adapter 120 with the internal octagonal formation 45 of the guide member 44 to hinder rotation thereof. No portion of the shank 121 projects into the cylinder 26, thus preventing any impact engagement therewith by the striker member 58 upon reciprocation thereof. Thus during operation of the device 10, the drill chuck adapter 120 is rotated through its driving engagement with the rotating cylinder 26 but it is not reciprocated.

During operation of the device 10 with the drill chuck adapter 120, means are provided for preventing movement of the striker member 58 whereby to eliminate unnecessary impact engagement thereof against the inner surface of the tube insert member 27, thus substantially reducing unnecessary wear of the parts. As best illustrated in FIGS. 1 and 3, a series of ports 124 is formed in the cylinder 26 rearwardly of the forwardmost position of the rear face of the striker member 58 when the short shank drill chuck adapter 120 is disposed in the device 10 and forwardly of the forwardmost position of the rear face of the striker member 58 when either of the long shank tool adapters 46 or 110 are disposed in the device 10. Because of the exposure of the ports 124 to the space between the striker member 58 and the power piston 64 when the short shanked adapter 120 is used in the device 10, the rearward movement of the power piston 64 is not effective to produce a vacuum in the space between the piston 64 and the striker member 58. Thus, with no pressure differential on opposite ends of the striker member 58, there will be no rearward movement of the striker member 58 during reciprocation of the power piston 64 and, thus, no reciprocation thereof.

Another feature of the rotary-hammer device 10 relates to means adapted for preventing reciprocation of both the striker member 58 and long-shank tool elements mounted in the device 10, such as the tool adapters 46 and 110, during operation of the motor 70 when the tool element is not in working engagement with the material to be drilled, broken up, chipped, etc. When the particular tool element is not so engaged, the first forward stroke of the striker member 58 propels the tool adapter 46, for example, outwardly with such force that the outwardly flared shoulder 49 is retained in the complementary taper 55 of the adapter lock 52 until such time that the tool element on the adapter 46 is brought into engagement with the material to be drilled, etc. With the tool adapter 46 so locked in its outermost position, the inner end of the shank portion 47 thereof terminates within the drive member 32 and does not project into the cylinder 26 for impact engagement by the striker member 58. The striker member 58 is thus positioned in its forwardmost position whereby to expose the ports 124 to the space between the striker member 58 and the power piston 64. As previously described herein, continued reciprocation of the power piston 64 by the motor 70 is ineffective to cause reciprocation of the striker member 58. Impact contact of the tool elements with the material to be drilled, etc. prevents locking of the tool elements in the adapter lock 52 during hammer-like reciprocation thereof.

It is to be understood that the invention is not to be limited to the use of the specific tool adapters 46, 110 and 120 illustrated in the drawings with the device 10 inasmuch as additional forms of tool means may be provided such as one-piece tool elements having suitable shank portions integral therewith, for example.

In FIG. 10 there is illustrated another form of striker-actuating structure. As illustrated, a cylinder 130 corresponding to the cylinder 26 of FIG. 1 is rotatably mounted in a suitable well-known manner in a tubular casing portion 131 corresponding to the tubular casing portion 12 of FIG. 1. A piston 132 having a forwardly extending reduced-in-diameter nose portion 133 is slidably mounted in the cylinder 130 for reciprocation by a power driven crank arm 134. The end of the crank arm 134 is bored for pivotal engagement about a dowel pin 135 mounted in the piston 132. The nose portion 133 of the piston 132 is slidably received in a central rearwardly opening bore 136 formed in a striker member 137 having a hardened flat nose portion 138 for impacting engagement with the inner end of the shank portion of suitable tool means in the same manner previously described for the embodiment of the invention illustrated in FIGS. 1–9. A strong compression spring 139 which is disposed about the nose portion 133 of the piston 132 with its rear end secured to the piston 132 and its forward end engageable with the striker member 138 provides an extremely forceful forward movement of the striker member 138 upon reciprocation of the piston 132 whereby to impart an effective hammer-like action to tool means having a shank portion projecting into the outer end of the cylinder 130. As the cylinder 130 is rotatable in the same manner as the cylinder 26 of the embodiment of FIGS. 1–9, the tool means may be provided with a combined rotary-hammer action.

It will be understood that certain changes may be made in the construction or arrangement of the rotary-hammer

device disclosed herein without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A rotary-hammer device comprising, a casing, a cylinder rotatably mounted in the casing, a nose assembly non-rotatably mounted on said casing adjacent one end of said cylinder, said nose assembly including a generally cylindrical tool holder extending axially of said cylinder, which tool holder is adapted to receive an elongated tool element for supporting the same axially of said cylinder, said tool holder having an annular bearing surface in substantial spaced relation from said one end of the cylinder for guiding engagement with the tool element, a tool driving member mounted in said one end of the cylinder for rotation therewith, said member being centrally bored for reception of a shank portion of said tool element and said member having means for transmitting rotation to the tool element, striker means in said cylinder mounted for reciprocal movement therein and adapted for imparting a hammer-like action to said tool element held in said tool holder and extending through said tool driving member, motor means in said casing, and separate drive means from said motor means for simultaneously actuating said striker means and for rotating said cylinder.

2. A rotary-hammer device comprising, a casing, a cylinder rotatably mounted in the casing, a nose assembly non-rotatably mounted on said casing adjacent one end of said cylinder, said nose assembly including a generally cylindrical tool holder extending axially of said cylinder, which tool holder is adapted to receive an elongated tool element for supporting the same axially of said cylinder, said tool holder having an annular bearing surface in substantial spaced relation from said one end of the cylinder for guiding engagement with the tool element, a tool driving member mounted in said one end of the cylinder for rotation therewith, said member having a central axial bore for reception of a multi-sided shank portion of said tool element, which bore is multi-sided for transmitting rotation to the elongated tool, striker means in said cylinder mounted for reciprocal movement therein and adapted for imparting a hammer-like action to said tool element held in said tool holder and extending through said bore in the tool driving member, motor means in said casing, and separate drive means from said motor means for simultaneously actuating said striker means and for rotating said cylinder.

3. A rotary-hammer device comprising, a casing, a cylinder rotatably mounted in the casing, a nose assembly non-rotatably mounted on said casing adjacent one end of said cylinder, said nose assembly having a rotary tool holder associated therewith, which tool holder has means permitting limited reciprocating movement of an elongated tool element held therein and which tool holder has guide means adapted to cooperate with means on the tool element for preventing rotation of the same, a tool driving member mounted in said one end of the cylinder for rotation therewith, said member being centrally bored for reception of a shank portion of said tool element, striker means in said cylinder mounted for reciprocal movement therein and adapted for imparting a hammer-like action to said tool element held in said rotary tool holder and extending through said tool driving member, motor means in said casing, and separate drive means from said motor means for simultaneously actuating said striker means and for rotating said cylinder, whereby hammering action only is given to said tool element.

4. The rotary-hammer according to claim 3 wherein said tool holder comprises a generally cylindrical member adapted to receive the tool element axially thereof and wherein said guide means comprises a multi-sided ring mounted within said cylindrical member, which ring is adapted for slidable inter-engagement with a complementary shaped portion of said tool element, whereby said tool holder permits reciprocal movement of said tool element while preventing rotation thereof.

5. A rotary-hammer device comprising, a casing, a cylinder rotatably mounted in the casing, a nose assembly non-rotatably mounted on said casing adjacent one end of said cylinder, said nose assembly including a generally cylindrical rotary tool holder extending axially of the cylinder, which tool holder includes an annular bearing surface in substantial spaced relation from said one end of the cylinder, a tool driving member mounted in said one end of the cylinder for rotation therewith, said tool driving member having a central, axial, multi-sided bore therein, an elongated tool element axially disposed in said tool holder for rotary movement and for limited reciprocating movement therein, said tool element being in guiding engagement with said annular bearing surface and including a shank portion adapted to extend through said bore in the tool driving member and into said one end of the cylinder, said shank portion having a multi-sided configuration intermediate the length thereof for mating engagement with said multi-sided bore, whereby said tool element is adapted for rotation with said tool driving member and for sliding reciprocating movement relative thereto, striker means in said cylinder mounted for reciprocal movement therein and adapted for imparting a hammer-like action to said shank portion extending through said bore in the tool driving member, motor means in said casing, and separate drive means from said motor means for simultaneously actuating said striker means and for rotating said cylinder, whereby said tool element is given combined rotary and hammering action.

6. A rotary-hammer device comprising, a casing, a cylinder rotatably mounted in the casing, a nose assembly non-rotatably mounted on said casing adjacent one end of said cylinder, said nose assembly having a rotary tool holder associated therewith, said tool holder including a generally cylindrical member having a guide ring mounted therein, which guide ring has a multi-sided inner surface, a tool driving member mounted in said one end of the cylinder for rotation therewith, said tool driving member having a central, axial, multi-sided bore, an elongated tool element received by said tool holder, said tool element having a multi-sided configuration intermediate the length thereof adapted for mating engagement with said guide ring, whereby said tool element is non-rotatably held in the tool holder for limited reciprocating movement therein, said tool element including a shank portion adapted to extend axially through said bore and into said one end of the cylinder, which shank portion has a circular cross-section adapting it to pass freely through said bore, striker means in said cylinder mounted for reciprocal movement therein and adapted for imparting a hammer-like action to said shank portion extending through said bore in the tool driving member, motor means in said casing, and separate drive means from said motor means for simultaneously actuating said motor means and for rotating said cylinder, whereby said tool element is given hammering action only.

7. A rotary-hammer device comprising, a casing, a cylinder rotatably mounted in the casing, a nose assembly non-rotatably mounted on said casing adjacent one end of said cylinder, said nose assembly including a generally cylindrical rotary tool holder extending axially of the cylinder, which tool holder includes an annular bearing surface in substantial spaced relation from said one end of the cylinder, a tool driving member mounted in said one end of the cylinder for rotation therewith, said tool driving member having a central, axial, multi-sided bore, an elongated tool element axially disposed in said tool holder for rotation therein, said tool element being in guiding engagement with said annular bearing surface and having a shank portion adapted to be received in said bore, which shank portion terminates in said bore and which shank portion has means for mating engagement with said bore for rotation of the tool element with the

tool driving member, striker means in said cylinder mounted for reciprocal movement therein, motor means in said casing, and separate drive means from said motor means for simultaneously actuating said striker means and for rotating said cylinder, whereby said tool element is given rotary action only.

8. The rotary-hammer according to claim 2 wherein said annular bearing surface is tapered for cooperating with complementary shaped means on the tool element for releasably gripping the tool element when the same reaches its outermost limit of travel in the tool holder.

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