United States Patent

Koehler

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[54] **ROTARY HAMMER OR THE LIKE**

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[21] Appl. No.: **60,545**

[52] **U.S. Cl.** **173/48,** 173/109, 173/120, 173/123

[51] **Int. Cl.**.....**B25d 11/10,** E21c 7/06

[58] **Field of Search**.....173/47, 48, 109, 119, 120, 173/123

[56] **References Cited**

UNITED STATES PATENTS

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3,334,694	8/1967	Schnettler	173/123 X

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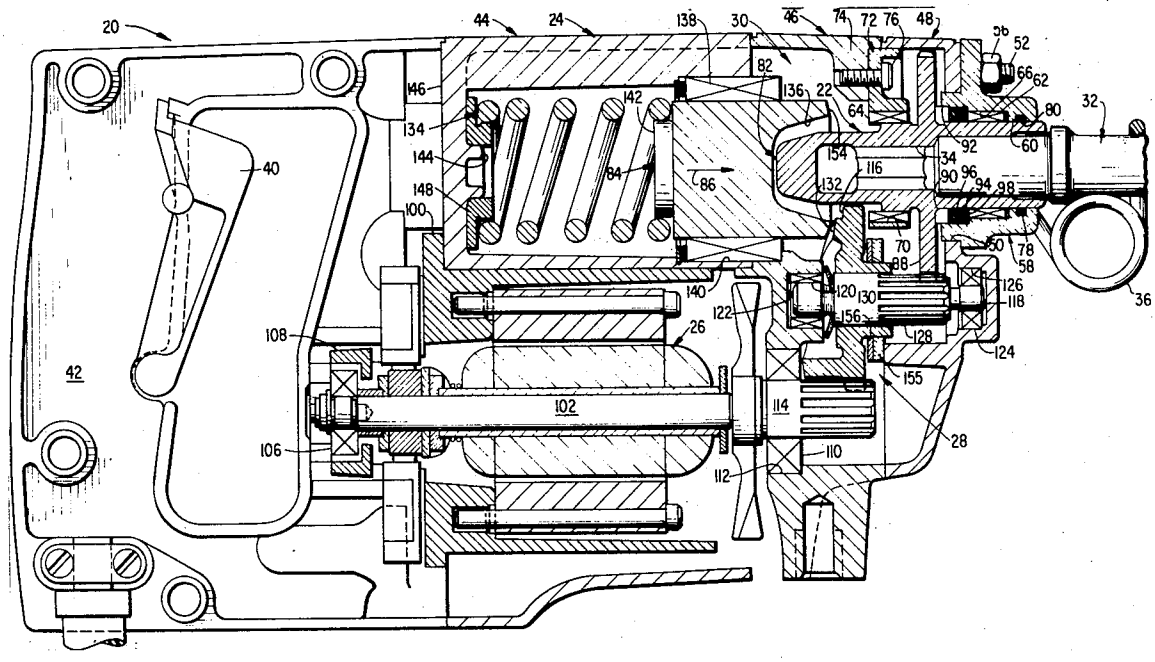
[57] **ABSTRACT**

A rotary hammer or the like including a holder for a tool, a power source, and a drive train through which rotary motion of the power source is transmitted to the tool holder. The hammer also includes mechanism which is operable to impart periodic axial impacts to a tool in the holder, when desired, and mechanism for disabling the impact imparting mechanism so that rotary motion only is applied to the tool.

12 Claims, 10 Drawing Figures



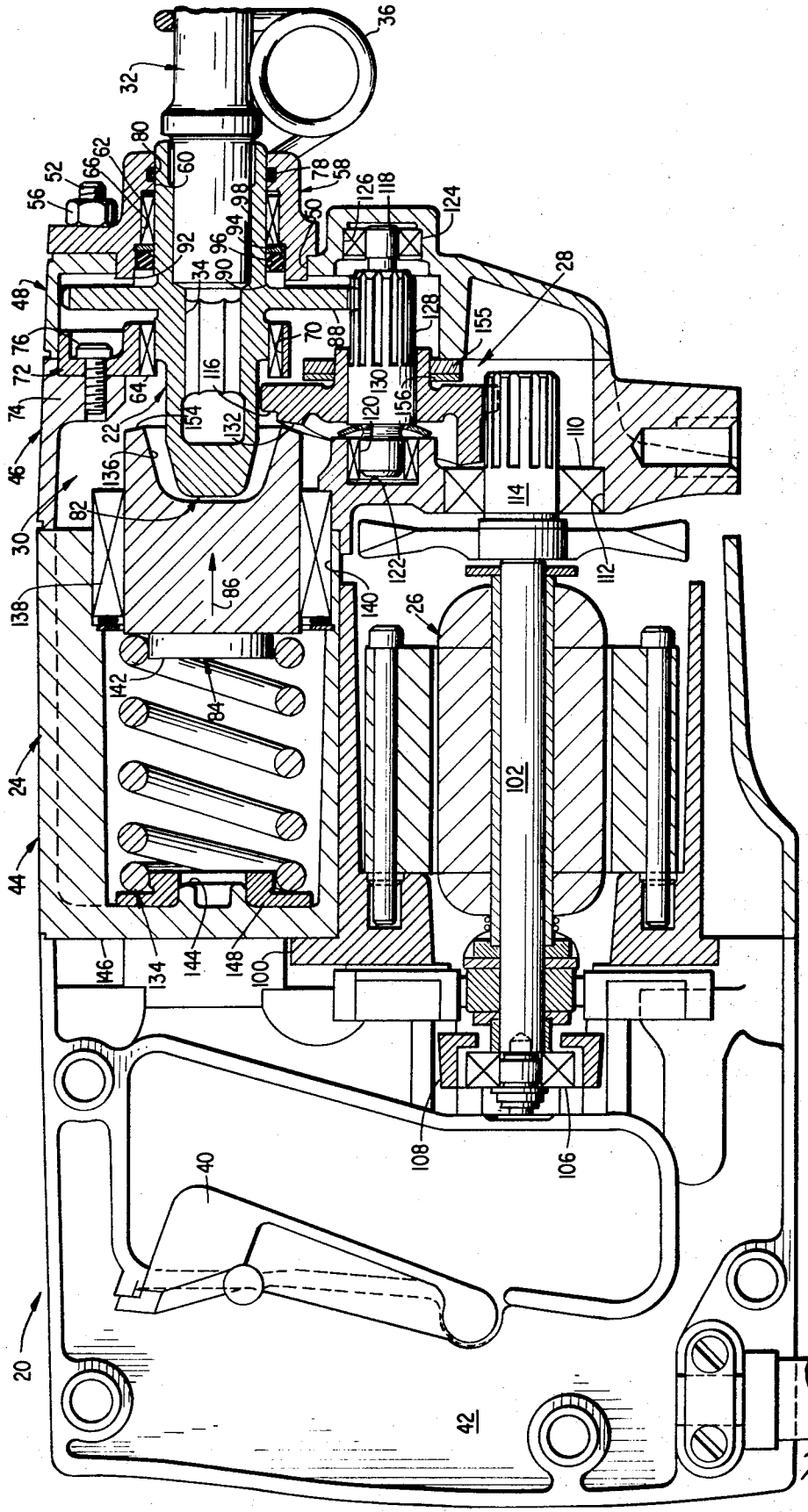


FIG. 1

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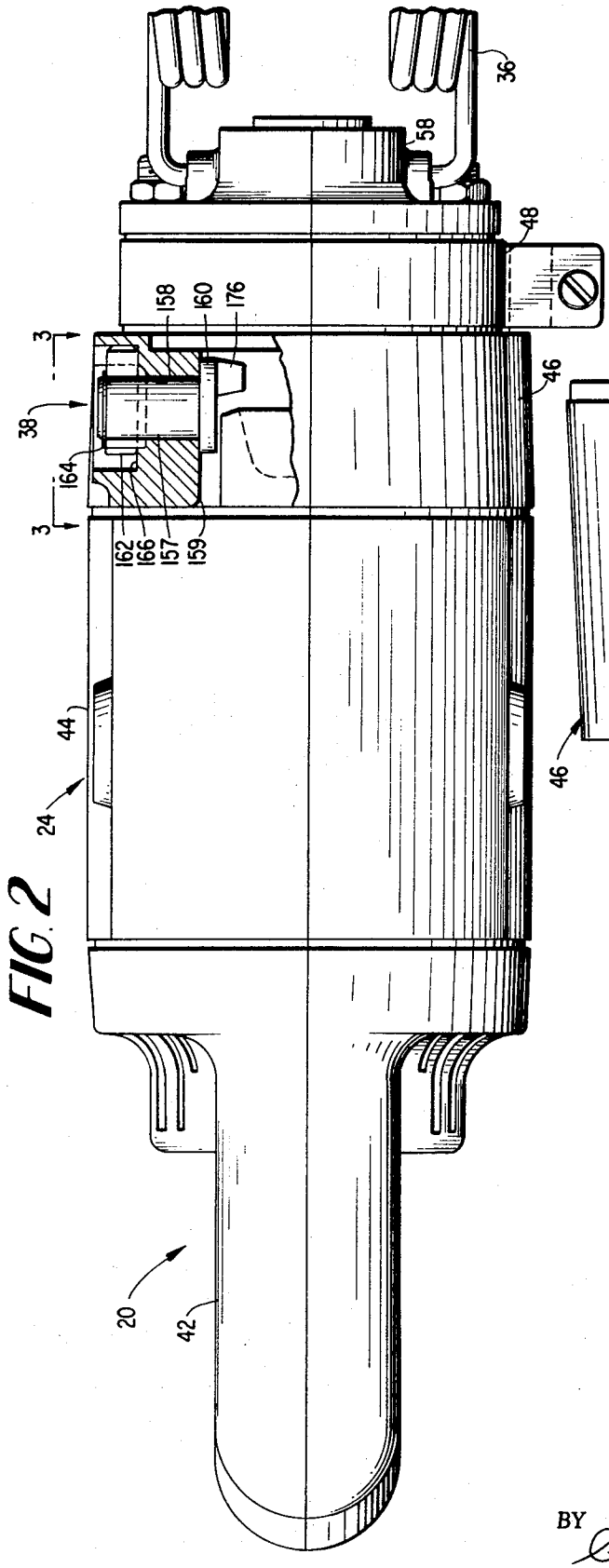

FIG. 2

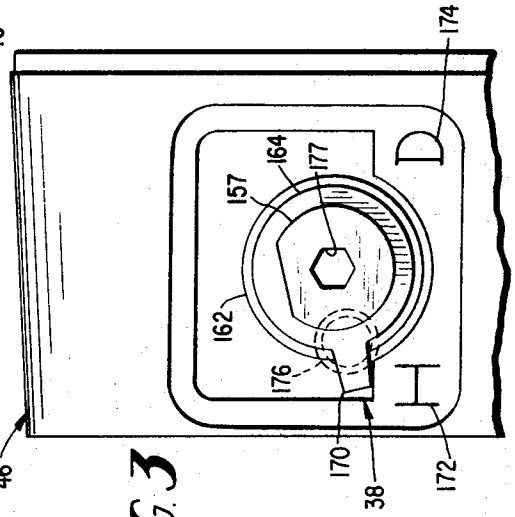

FIG. 3

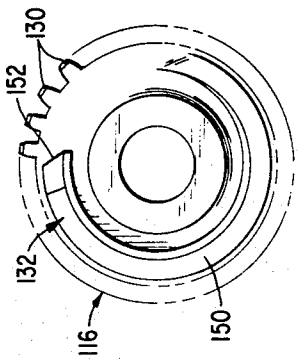

FIG. 4

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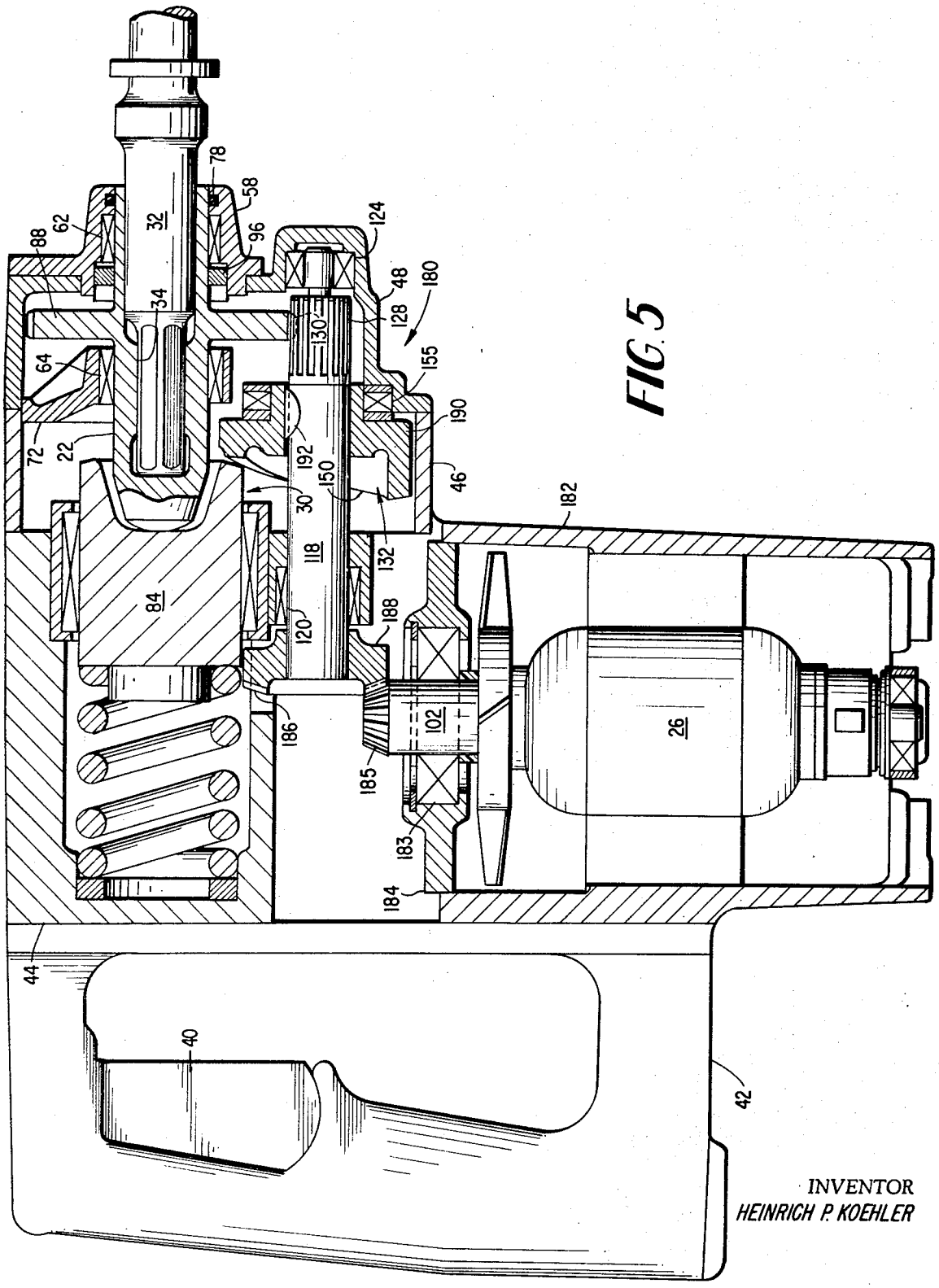

FIG. 5

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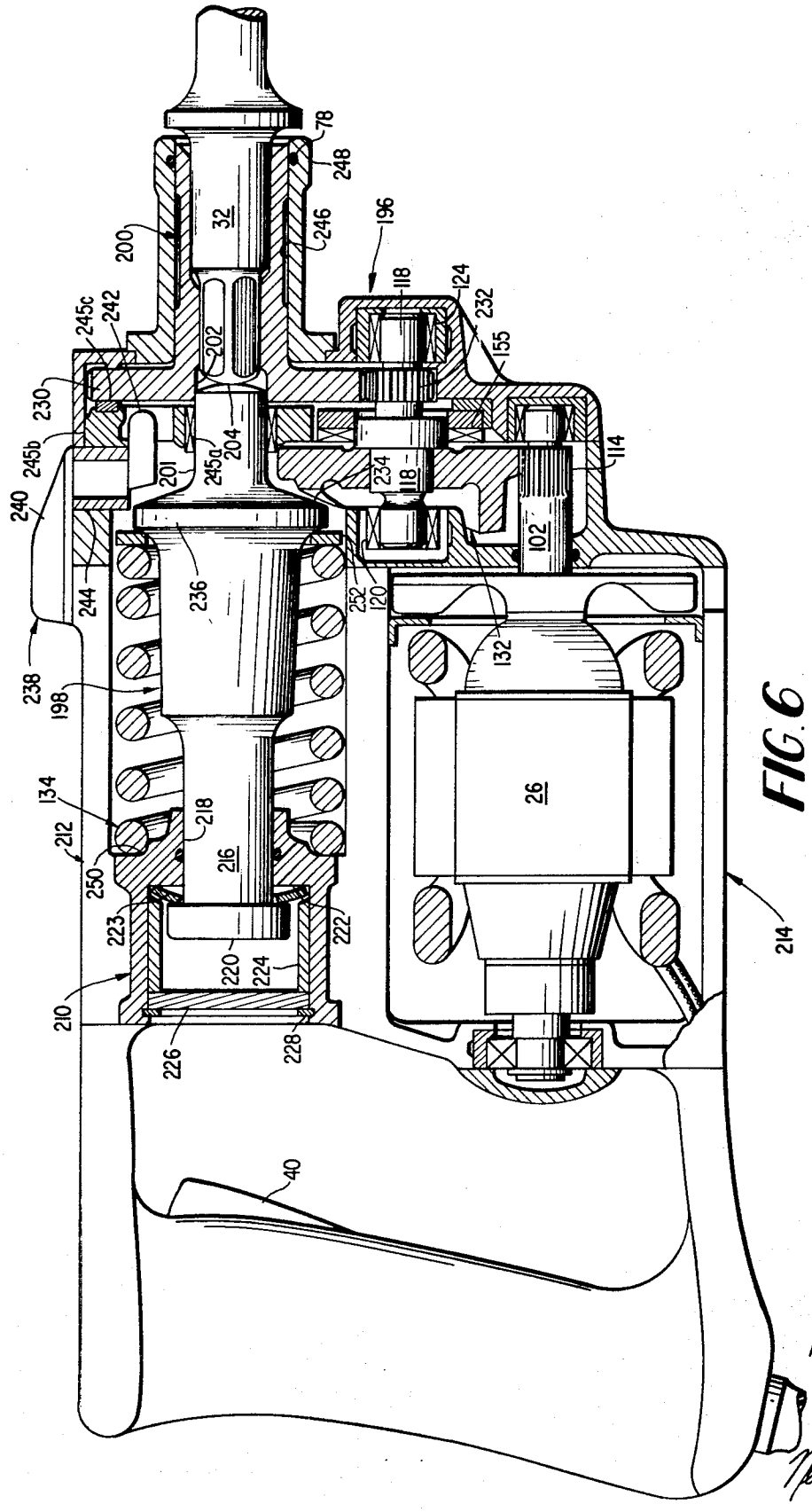

FIG. 6

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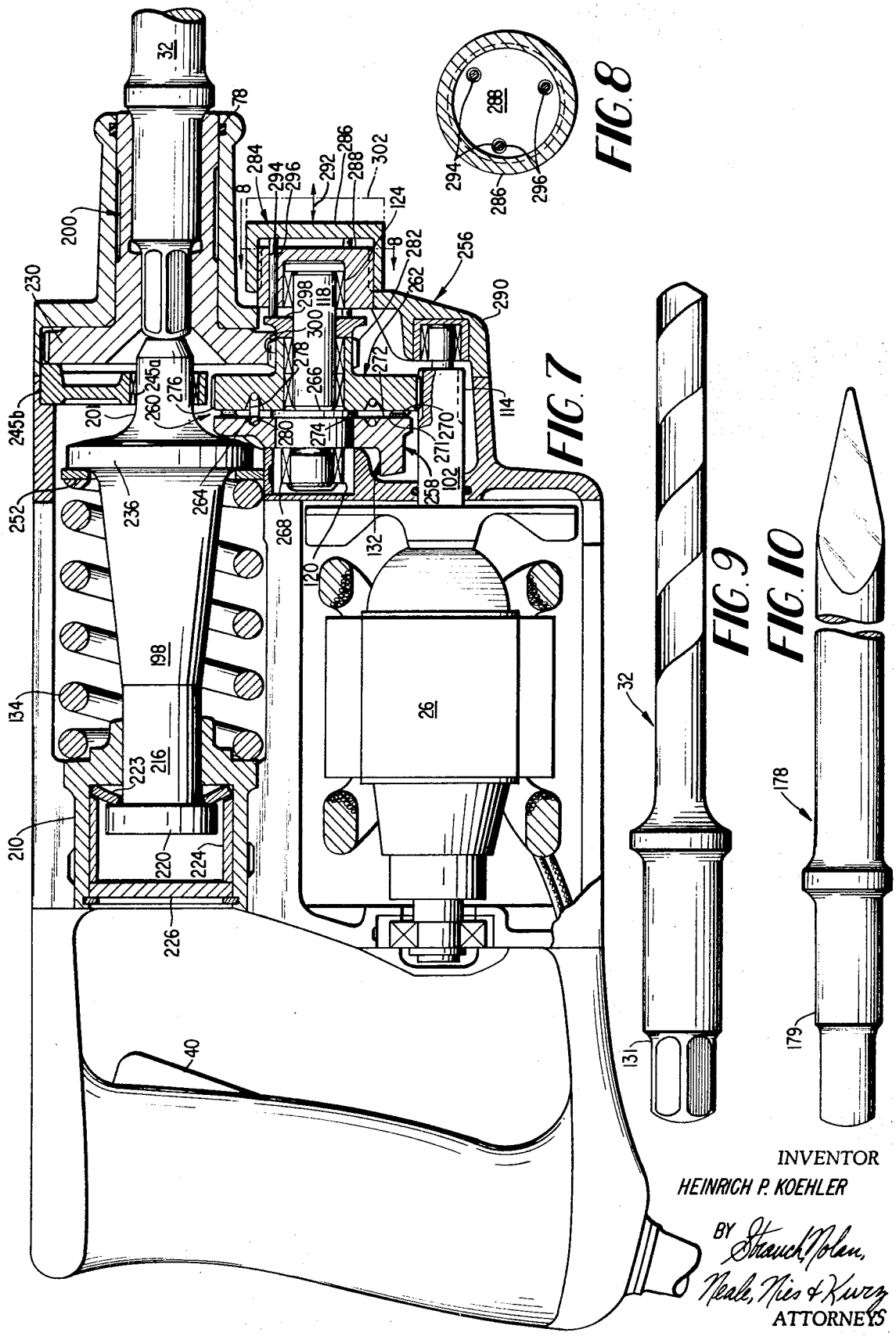

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ROTARY HAMMER OR THE LIKE

This invention relates to power driven devices and, more particularly, to power driven devices such as rotary hammers and the like.

By rotary hammer is meant a device in which a drill bit or other tool is rotated and also subjected to repeated axial impacts. Such devices are used for drilling holes in concrete, masonry, and the like and fan many other tasks.

To increase the versatility of rotary hammers, they may be equipped with a selector which can be manipulated to disable (i.e., make ineffective) the impact imparting mechanism of the hammer. In these circumstances rotary motion only will be imparted to the tool, and the hammer can accordingly be used as an ordinary drill.

Rotary hammers are also in some cases designed to accept tools so configured that the tool is not rotated, but only axially impacted. This further increases the versatility of the tool.

A number of rotary hammers have heretofore been proposed. Exemplary are those disclosed in U.S. Pat. Nos. 3,123,156 issued Mar. 3, 1964, to Gapstur for ROTARY AND PERCUSSIVE TOOL: 3,334,694 issued Aug. 8, 1967, to Schnettler for ROTARY HAMMER: and 3,395,765 issued Aug. 6, 1968, to Schnettler far SMALL ROTARY HAMMER.

One of the important and primary objects of the present invention resides in the provision of novel, improved power driven devices such as rotary hammers and the like.

A related important and primary object of the invention is the provision of novel, improved rotary hammers and the like which have advantages and features not possessed by heretofore proposed power driven devices of this type including those disclosed in the patents identified above.

In general the novel devices of the present invention include a rotatably mounted holder in which the shank end of the drill bit or other tool is secured and a motor for rotating the tool holder and accordingly the tool secured therein. The motor also rotates a cam engageable with a rectilinearly mounted driver positioned in striking relationship to the tool or tool holder and biased toward these components by a compression spring, for example. As the cam rotates, it first moves the driver away from the tool holder, compressing the driver biasing spring. The cam then releases the driver, and the spring expands, driving the driver against the tool or tool holder.

One of the important features of the novel power driven devices of the present invention as briefly described in the preceding paragraph is an improved arrangement for disabling or making ineffective the impact producing mechanism when rotary motion only is desired. In certain forms of the invention this is accomplished by locking the driver in a retracted position. Other forms of the invention employ a clutch in the drive train between the motor and the driver retracting cam, and the selector mechanism keeps the clutch input and output elements out of driving relationship when rotary motion only is wanted.

Another important feature of the present invention is a novel, improved arrangement for mounting the impact producing striker. In heretofore proposed rotary

hammers the striker is mounted in front and rear bearings typically located in two different sections of the hammer casing. Due to the difficulty of precisely aligning the front and rear bearings, such devices typically suffer from the consequences of misaligned bearings — vibration, excessive wear, etc.

As will be discussed in detail hereinafter, the problems appurtenant to such misalignment can be eliminated by the use of a novel arrangement in which the driver is foreshortened and mounted for rectilinear movement in a single bearing. This arrangement also permits the device to be made shorter and more compact, which is another decided advantage.

Other novel and important features, further objects, and additional advantages of the present invention will become apparent from the appended claims and as the ensuing detailed description and discussion proceeds in conjunction with the accompanying drawing, in which:

FIG. **1** is a section through a rotary hammer constructed in accord with the principles of the present invention;

FIG. **2** is a plan view of the rotary hammer of FIG. **1** with part of the hammer casing broken away to show the details of a selector incorporated in the hammer to control its mode of operation;

FIG. **3** is a partial side view of the rotary hammer of FIG. **1**, looking in the direction of arrows **3—3** of FIG. **2**;

FIG. **4** is an end view of a cam employed in the rotary hammer of FIG. **1**;

FIG. **5** is a view similar to FIG. **1** of a second form of rotary hammer **1**–in accord with the principles of the present invention;

FIG. **6** is a view similar to FIG. **1** of a third form of rotary hammer constructed in accord with the principles of the present invention;

FIG. **7** is a view similar to FIG. **1** of a fourth form of rotary hammer constructed in accord with the principles of the present invention;

FIG. **8** is a section through the rotary hammer of FIG. **7**, taken substantially along line **8—8** of the latter Figure;

FIG. **9** is a side view of a drill designed for use in rotary hammers of the type described herein; and

FIG. **10** is a side view of a tool designed for use in rotary hammers of the type described herein when axial impact on without rotation of the tool is wanted.

Referring now to the drawing, FIG. **1** depicts a rotary hammer **20** constructed in accord with the principles of the present invention. The major components of rotary hammer **20** include a closed type tool holder **22** rotatably mounted in a casing **247** an arrangement for rotating the tool holder including a motor **26** connected to the tool holder through a drive train identified generally by reference character **28**, mechanism **30** for imparting axial impacts to a tool **32** (See FIG. **9**) mounted in tool holder socket **34** and secured in place by a conventional spring type retainer **36**, and a selector mechanism **38** (See FIGS. **2** and **3**) for disabling the impact mechanism when rotation only of tool **32** is desired. The operation of rotary hammer **20** is controlled by a conventional trigger switch **40** mounted in the handle section **42** of casing **24**.

Many details of tool **20** such as the specific structure of motor **26** and switch **40** are conventional or are not

part of the present invention. Accordingly, they will be described herein only to the extent that they bear some relation to the present invention.

Referring again to FIG. 1, hammer casing 24 includes the handle section just mentioned, intermediate sections 44 and 46, and a forward or front end section 48 through which an aperture 50 is formed. The casing sections are fixed together as by conventional threaded fasteners which, for the most part, are not shown in the drawing.

Seated in the aperture 50 in casing front end section 48 and secured in place by fasteners 52 and nuts 56 is a nosepiece 58 through which an axial bore 60 is formed. Tool holder 22 is rotatably supported in nosepiece 58 and in the front end section 48 of tool casing 24 by spaced apart front and rear bearings 62 and 64. Front bearing 62 is seated in a recess 66 in nosepiece 58. Rear bearing 64 is pressed or otherwise fitted into a recess 70 formed in a bearing holder or support 72. The bearing support is fixed to a boss 74 extending inwardly from intermediate casing section 46 as by threaded fasteners 76.

An O-ring 78 is seated in a recess 80 in the forward portion of nosepiece 58. This keeps lubricant from leaking to the exterior of hammer 20 between the nose piece and tool holder 22.

From the foregoing it will be apparent that tool holder 22 is free to move forward in bearings 62 and 64 as the rear end 82 of the tool holder is struck by a driver 84 incorporated in impact producing mechanism 30 as the driver moves in the direction indicated by arrow 86 in FIG. 1. The forward movement of the tool holder is limited by the engagement of a gear 88 integrally formed on tool holder 22 with a washer 90. This washer is seated in a recess 92 in nose member 58 and is separated from a shoulder 94 at the forward end of the recess by an O-ring 96 and a washer 98. O-ring 96 is compressed during forward movement of the tool holder to cushion the impact of the tool holder against the nose piece 58 of the tool casing.

The motor 26 provided to rotate tool holder 22 is mounted in a support 100 fixed to the rearmost intermediate section 44 of hammer casing 24. The motor shaft 102 is rotatably supported at its end by a bearing 106 which is mounted in a bearing holder 108 located in the handle section 42 of the casing. The front end of shaft 102 is supported in a bearing 110 located in a recess 112 in intermediate casing section 46.

The input element of the drive train or mechanism 28 by which tool holder 22 is connected to motor shaft 102 is a pinion 114 on the front end of the motor shaft. This pinion meshes with a gear 116 fixed to an intermediate shaft 118. The rear end of the intermediate shaft is rotatably supported in a bearing 120, which is mounted in a recess 122 formed in intermediate casing section 46. The front end of the shaft is rotatably supported in a bearing 124, which is seated in a recess 126 in front end casing section 48.

Formed on intermediate shaft 118 adjacent gear 116 is a gear having teeth 128. These teeth mesh with the teeth 130 on gear 88. As mentioned, above, the latter gear is integral with tool holder 22. Accordingly, as shaft 102 rotates, the pinion 114 at its forward end rotates gear 116, which in turn rotates intermediate shaft 118; and the gear teeth formed on the latter rotate gear 88, and, consequently, tool holder 22.

The drill identified by reference character 32 and shown in its entirety in FIG. 9 is typical of the tools which will be employed when rotation of the tool is desired. Such tools are provided with a shank (identified by reference character 131 in FIG. 9) configured to match the socket 34 in tool holder 22. With such a tool secured in the socket, the tool is rotated by the tool holder 22 when the latter is rotated by gear 88 in the manner described in the preceding paragraph.

The impact imparting mechanism 30 referred to above is provided so that axial impacts may be applied to tool 32 at the same time that it is rotated by motor 26 through the drive-connecting mechanism 28 just described. In addition to the driver 84 mentioned above, the impact imparting mechanism includes a cam 132, which may be formed on the rear face of gear 116, and a compression spring 134.

Driver 84 is a short, relatively massive member having a recess 136 into which the closed end 82 of tool holder 22 extends. The driver is supported for rectilinear or back-and-forth movement in a bearing 138. The bearing is seated in a recess 140 at the forward end of casing section 44 and extends into casing section 46. As discussed above, this novel driver supporting arrangement eliminates a number of problems appurtenant to the driver mounting arrangements in heretofore proposed rotary hammers and the like.

Compression spring 134 is also mounted in intermediate casing section 44. The front end of the spring is supported by a boss 142 on the rear end of driver 84. The rear end of the spring is supported by a boss 144 extending forwardly from the rear wall 146 of intermediate casing section 44 and surrounded by a sleeve type spacer 148.

Referring now to FIG. 4, the cam 132 formed on gear 116 has an inclined face 150 which is flush with the rear face of the gear at its low point and terminates at its high point 152 in a sharp drop. As gear 116 rotates cam surface 150 engages the forward end 154 of driver 84, moving the driver toward the rear of hammer 20 and compressing spring 134. This continues until the high end 152 of the cam rides by the driver, releasing it for forward movement. At this point, compression spring 134 expands, driving driver 84 forwardly against the closed end 82 of tool holder 22 to impart an axial impact to the tool 32 secured therein.

As best shown in FIG. 1, a thrust bearing 155 separated from gear 116 by a spacer 156 is mounted in the front end of casing section 46. This bearing absorbs the reaction force exerted on gear 116 and therefore intermediate shaft 118 by spring 134 as cam 132 compresses the spring. Also, as tool holder 22 is impacted and moves forwardly in casing 24, the intermediate shaft tends to be moved in the same direction because of the frictional forces between the teeth 130 on gear 88 and the gear teeth 128 on the intermediate shaft. This force is also absorbed by thrust bearing 155.

As indicated above, it may in some instances be desirable to disable or make ineffective the impact imparting mechanism just described; i.e., to impart rotary motion only to a tool in tool holder 22. The previously mentioned selector mechanism 38 is provided for this purpose.

Referring now to FIGS. 2 and 3, the selector mechanism includes a shaft 157 rotatably seated in an aperture 158 through a boss 159 in intermediate casing

section 46. Shaft 157 is retained in place by a disk or plate 160 fixed to its inner end and by a selector member 162 fixed to its outer end as by a retainer 164. Selector 162 is seated in a recess 166 in casing section 46 and is provided with an integral indicator 170, which cooperates with indicia 172 and 174 on the casing to indicate whether the tool is adjusted to produce rotary motion of tool 32 plus axial impact or rotary motion only.

Referring now specifically to FIG. 2, an eccentric pin or stop 176 is fixed to the inner side of plate 160. With indicator 170 in the impact plus rotary movement or "H" position, stop 176 is located as shown in FIG. 2. With the stop in this position, driver 84 is alternately retracted by cam 132 and driven forward by spring 134, and tool holder 22 and the tool therein are rotated all in the manner described above. This produces continuous rotation of and periodic axial impacts on tool 32.

When rotary motion only is desired, the selector mechanism is rotated until indicator 170 is in the "D" position. As the selector is rotated, stop 176 engages the forward end 154 of driver 84, moving it toward the rear of hammer 20 against the biasing force of spring 134 and then maintaining it in this retracted position. Accordingly, driver 84 is prevented from moving forward and striking tool holder 22 as gear 116 rotates; and no axial impacts are imparted to the tool.

The selector mechanism 38 may be rotated between the H and D positions in any desired fashion. For example, a socket 177 for an Allen wrench may be provided in the outer end of shaft 157 for this purpose.

In addition to rotation plus hammering and rotation only, hammer 20 can be utilized to produce hammering only. For this mode of operation a tool having around shank such as the tool 178 shown in FIG. 10 is employed. The tool is retained in the hammer with shank 179 extending into socket 34 by retainer 36. Accordingly, axial impacts are imparted to the tool as tool holder 22 is struck by driver 84. However, as there is no drive connection between tool shank 179 and the tool holder, no rotary motion is imparted to the tool.

The principles of the present invention may of course be embodied in rotary hammers or the like differing considerably in appearance from the hammer 20 just described. One example is the hammer illustrated in FIG. 5 and identified by reference character 180. Turning now to this Figure, rotary hammer 180 has a number of features common to it and hammer 20. To the extent that the two hammers are alike, the components thereof are identified by the same reference characters.

There are a number of minor differences between hammers 180 and 20. These, however, are not critical in the practice of the present invention and will accordingly not be alluded to further.

The main difference between the two hammers is that the motor 26 of the latter is mounted in a depending casing section 182 with the axis of rotation of its shaft 102 intersecting the axis of rotation of intermediate shaft 118 at right angles and is supported at its upper end by a bearing 183 disposed in partition 184. Also, in this version of the invention, the pinion 114 on the motor output shaft is replaced with bevel gear teeth 185. These teeth mesh with teeth 186 on a bevel gear 188 fixed to the rear or handle end of intermediate shaft 118. Because of the relocation of the gear member, cam 132 is formed on a separate component 190 in this embodiment of the invention. The cam component is fixed to shaft 118 for rotation therewith as by a half moon key 192.

The operation of this hammer is essentially the same as that of hammer 20 as will be apparent to those skilled in the arts to which the present invention pertains.

Yet another rotary hammer embodying the principles of the present invention is illustrated in FIG. 6 and identified by reference character 196. Again, to the extent that this embodiment of the invention resembles those described above, the same reference characters have been employed to identify like components.

Rotary hammer 196 differs from hammer 20 primarily in the construction of driver 198, in the manner in which the driver is supported for rectilinear movement in the hammer casing, and in the substitution of an open type tool holder 200 for the closed type holder 22 employed in tool 20. Driver 198 is an elongated member having a relatively small diameter forward portion 201 which extends through an aperture 202 in the rear end of tool holder 200 and engages the shank end or head 204 of tool 32. An O-ring 206 disposed in a recess 208 communicating with aperture 202 keeps lubricant from leaking between the driver and the tool holder to the exterior of hammer 196.

As will be apparent from the foregoing, the forward end of driver 198 is supported from the tool holder. The rear end of the driver is rotatably supported in a member 210 fixed to intermediate section 212 of hammer casing 214. More specifically, as shown in FIG. 6, the rear portion 216 of the driver extends through a bore 218 in support member 210 and terminates in a head 220 on the opposite side of support member wall 222 from tool holder 200.

As in rotary hammer 20, provision is made in hammer 196 for cushioning the forward, impacting movement of driver 198. This mechanism takes the form of a Belleville spring 223 disposed between driver head 220 and driver support member wall 222 by a sleeve 224 in support 210. This sleeve is in turn retained in position by a spacer 226 and a retainer 228.

This embodiment of the invention operates in substantially the same manner as the rotary hammer 20 described above. Perhaps the most significant difference is that driver 198 impacts directly on tool 32 rather than on tool holder 200. Accordingly, the tool holder may be axially fixed in hammer casing 214 and the sliding movement between the gear 230 integral with the tool holder and the gear rotating pinion 232 fixed to intermediate shaft 118 thus eliminated. This may, in some applications of the invention, contribute to extended service life.

Also, in this version of the invention, the surface 150 of cam 132 does not engage the forward end of the driver. Instead, it cooperates with a surface 234 formed on the forward or tool side of annular driver flange 236.

A further difference between the rotary hammers 196 and 20 is in the details of the selector mechanism 238 employed in the former. In mechanism 238, shaft 157 is retained in place by a selector knob 240 on the exterior side of casing section 212 and by a stop 242 on

the inner side of the casing section **212** and is surrounded by a sleeve type bearing **244**. Selector knob **240** replaces the socket **177** of selector mechanism **38**, and stop **242** serves the same function as the stop **176** of the earlier described selector mechanism.

Also, in this embodiment of the invention, the front end of driver **198** is rotatably supported in a bearing **245***a* which is mounted in a bearing holder **245***b* fixed to casing section **212**. As discussed above in conjunction with the embodiment of FIG. **1**, this type of arrangement has the advantage that problems resulting from misalignment between the driver and the tool holder are minimized, if not eliminated.

In this embodiment, bearing holder **245***b* keeps tool holder **200** from moving toward the handle end of the tool. A second bearing **245***c* also mounted in holder **245***b* provides a wear surface between the bearing holder and the tool holder.

There are also a number of constructional features of lesser importance which differ in rotary hammers **20** and **196**. For example, in the latter hammer, tool holder **200** is mounted in a bore **246** extending through nose member **248** rather than in bearings in separate casing members as in hammer **20**. Also, compression spring **134** is supported at its rear end by a ledge **250** in driver support member wall **222** and atits front end by diver flange **236** from which it is separated by spacer **252**. There are also some differences in the manner in which the motor **26** is supported in the tool casing, in the support arrangement for intermediate shaft **118**, and in the details of the components such as pinion **232**, for example. However, these differences are again not critical to the practice of the present invention; and it is, accordingly, not considered essential to describe them herein.

FIG. **7** of the drawing illustrates a rotary hammer **256** which is similar to hammer **196**, but differs in the manner in which the selection is made between hammering plus rotation of the tool or rotation only. Specifically, in rotary hammer **256**, the cam **132** provided to retract driver **198** toward the rear or tool end of the hammer is formed on the output member **258** of a clutch **260** which also includes input member **262** and clutch spring **264**. Clutch output member **258** is mounted on intermediate shaft **118** between retainer **266** and bearing **268** and is free to rotate about the intermediate shaft, but is prevented from moving axially relative to the shaft.

Clutch input member **262** is secured to the shaft as by a key (not shown) which allows it to slide along but compels it to rotate with the shaft. Cooperating, engageable, drive elements or teeth **270** and **271** of conventional configuration are formed on the apposed faces **272** and **274** of the output and input members, respectively.

Clutch input element **262** also has around its periphery gear teeth **276** which mesh with the teeth of the pinion **114** at the end of motor shaft **102**. Accordingly, with clutch elements **270** and **271** engaged, the motor output shaft rotates clutch input element **262**. The latter drive clutch output member **258**, causing cam **132** to retract driver **198** in substantially the same member as the corresponding cam component does in rotary hammer **196**.

As shown in FIG. **7**, compression type clutch spring **264** is mounted in recesses **278** and **280** formed in the apposed faces **274** and **272** of the clutch input and output members. Accordingly, the clutch spring tends to bias these members apart to disengage the driving elements **270** and **271**. With these elements disengaged there is no driving connection between the clutch elements; and, accordingly, there is no retraction of hammer **198** by the cam **132** on clutch output element **258**. Therefore, with the clutch elements disengaged, there are no axial impacts on tool **32**, but only rotation of the latter. This is produced from motor **26** through pinion **114**, clutch input member **262**, a pinion **282** fixed to the clutch input member for rotation therewith, ad the gear **230** on tool holder **200**.

The mode of action (rotation or rotation plus axial impact) is selected by manipulation of selector mechanism **284**. As shown in FIGS. **7** and **8**, this mechanism includes a selector knob **286** threaded on a boss **288** at the forward end of casing section **290**. Accordingly, as nob **286** is rotated, it moves toward and away from clutch input member **262** as indicated by the doubleheaded arrow **292** in FIG. **7**.

Abutting the inner side of knob **286** and extending loosely through holes **294** in boss are pins **296**. A pressure member **298** abuts the inner ends of these pins. Pressure member **298** is dimensioned to abut the hub **300** of clutch input member **262**.

With knob **286** of the selector mechanism positioned as shown in FIG. **7**, pressure member **298** displaces clutch input member **262** to the left as shown in this figure to a degree sufficient to engage the drive elements **271** on this member with the drive elements **270** on the output member. Accordingly, both rotary motion of and axial impacts on tool **32** are produced. For rotary motion only knob **286** is backed off to the position shown in dotted lines and identified by reference character **302** in FIG. **7**. This retracts pressure plate **298**, allowing clutch spring **264** to move clutch input element **262** to the right as shown in FIG. **7** and disengage drive elements **270** and **271**. As discussed above, only rotational movement of tool **32** is produced with the clutch drive elements disengaged.

Rotary hammer **256** may also have various features discussed above in conjunction with the embodiments of FIGS. **114 6**. One example is the arrangement for supporting the front end of driver **198** discussed above in conjunction with the embodiment of FIG. **6**.

As will be apparent from the foregoing to those skilled in the arts to which the present invention pertains, many modifications may be made in the exemplary embodiments discussed above without exceeding the scope of the invention. To the extent that such modifications are within the scope of the appended claims, they are fully intended to be covered therein.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description; and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

I claim:

1. A rotary hammer or like device having one configuration in which it is operative to rotate and axially impact a tool and a second configuration in which only rotation is imparted to the tool, comprising a tool receiving holder; means for rotating a tool received in said holder; and means for imparting axial impacts to the tool comprising a rectilinearly moveable driver; means biasing said driver toward said tool holder and an axially movable cam means mounted for rotation about an axis parallel to the axis of reciprocation of the driver and engageable therewith for retracting the driver relative to said tool receiving holder and then releasing said driver for movement toward said tool under the influence of said biasing means to impart an impact thereto; and means selectively adjustable to maintain said driver out of engagement with said cam means to keep axial impacts from being imparted to said holder, whereby there is rotation only of said holder and a tool secured therein.

2. The device of claim **1**, wherein said selectively adjustable means comprises a bipositional member effective in one position to lock said driver in a retracted position relative to said tool and tool receiving holder, said member being disposed out of the path of movement of said driver in the other position thereof.

3. The device of claim **2**, including a casing surrounding the tool receiving holder, the means for rotating the holder and the imparting mechanism and wherein the selectively adjustable means comprises a shaft rotatably supported in and extending through said casing, said bipositional member being fixed eccentrically to the inner end of said shaft.

4. A rotary hammer or like device comprising a tool receiving holder; means for rotating said holder and thereby rotating a tool received therein; and means for imparting axial impacts to said tool including an axially immovable, cylindrical bearing, an impact imparting driver slidable in and supported solely by said bearing and having a recess in the end thereof facing the tool holder into which said holder can extend, and means for alternately retracting said driver out of and moving it into engagement with said tool receiving holder to produce an axial impact thereon.

5. The device of claim **4**, including a casing surrounding said tool receiving holder, the means for rotating the holder, and the driver retracting means; a support for the drive supporting bearing formed in said casing; and a compression spring disposed between said casing and said driver to bias said driver toward said tool receiving holder.

6. A rotary hammer or like device, comprising a tool receiving holder; a tool received in said holder for rotation therewith; means for rotating said holder and thereby said tool; a driver mounted for rectilinear movement in a path extending in the same direction as the longitudinal axis of said tool, said driver being positioned to impart axial impacts to said tool upon movement toward said holder and said tool; an axially fixed, rotatable cam means disposed to one side of said driver and said tool holder which is engageable with the end of the driver nearest the tool and tool receiving holder for alternately displacing said driver away from said holder and releasing said driver for movement toward said tool and said tool receiving holder under the influence of said biasing means as it rotates; and means for rotating said cam.

7. The device of claim **6**, wherein the means for displacing the driver comprises a casing surrounding said tool receiving holder, the means for rotating said holder, and the impact imparting mechanism; a cam; means mounting said cam for rotary movement in said casing; and means for rotating said cam.

8. The device of claim **7**, wherein the cam is incorporated in a component having gear means formed thereon and wherein the means for rotating the cam includes a motor having an output shaft, there being a second gear means on said output shaft meshing with the gear means on the component in which the cam is incorporated.

9. The device of claim **8**, wherein there are third and fourth intermeshing gear means formed on the member in which the cam is incorporated and the tool receiving holder, respectively, thereby drive-connecting said tool receiving holder to said motor.

10. The device of claim **7**, wherein the means mounting said cam for rotation in said casing comprises a rotatable shaft about which said cam is free to rotate and wherein the means for rotating said cam comprises a gear means fixed to said shaft for rotation therewith; a motor having an output shaft; a second gear means on said shaft meshing with the first-mentioned gear means; and cooperating, engageable drive elements on said first-mentioned gear means and said cam, whereby said cam is drive-connected to said motor for rotation thereby when said cooperating drive elements are engaged.

11. The device of claim **10**, together with means biasing said drive elements out of engagement and means for maintaining said elements in driving engagement despite the force exerted by said biasing means.

12. The device of claim **7**, wherein the means mounting said cam is a shaft rotatably mounted in said casing to which the cam is rotatably fixed and wherein the means for rotating the cam includes a motor having an output shaft disposed with its axis of rotation at right angles to the axis of rotation of the cam mounting shaft, there being meshing bevel gear means on said motor output shaft and on said cam supporting shaft.

13. A rotary hammer or like device, comprising a tool receiving holder; means for rotating said holder to thereby impart rotary movement to a tool received in said holder; and means for imparting axial impacts to the tool including a rectilinearly movable driver, resilient means biasing said driver toward said holder, a cam, means mounting said cam for rotation about an axis parallel to the axis of rotation of said driver, means for retracting said driver relative to said tool receiving holder and then releasing said driver for movement toward said tool holder under the influence of said biasing means; and means for rotating said cam means which includes a motor having a rotatable output shaft disposed with its axis of rotation at right angles to the axis of rotation of the cam means and means drive-connecting said motor output shaft to said cam means.

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