May 3, 1949. B. F. SCHMIDT 2,469,277

POWER CONVERSION ATTACHMENT

Filed Aug. 21, 1944 2 Sheets-Sheet 1

Fig. 1

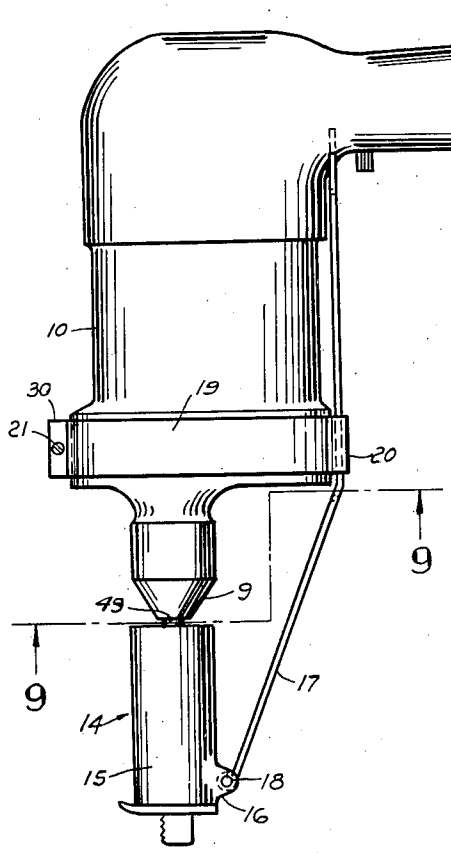


Fig. 2

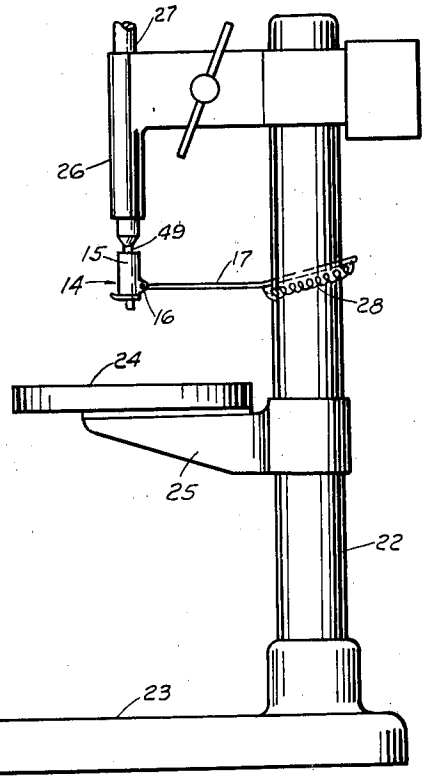
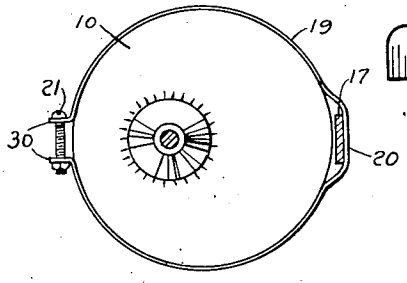


Fig. 9



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Filed Aug. 21, 1944

2 Sheets-Sheet 2

Fig. 3

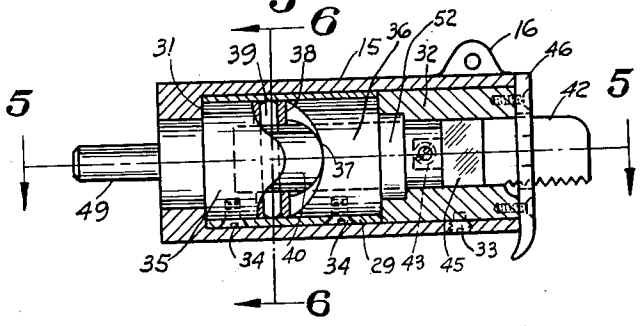


Fig. 4

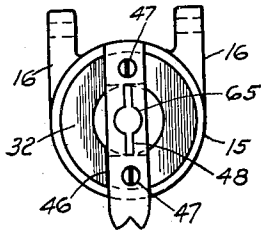


Fig. 5

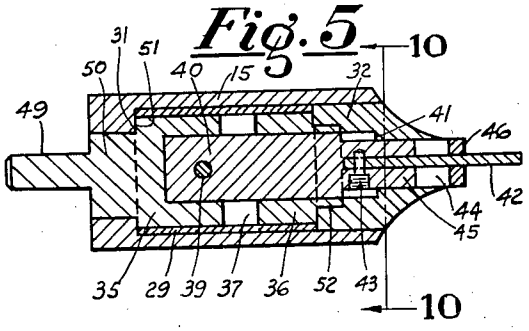


Fig. 6

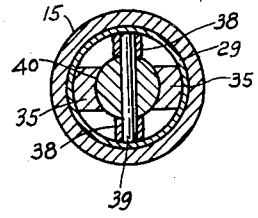


Fig. 7

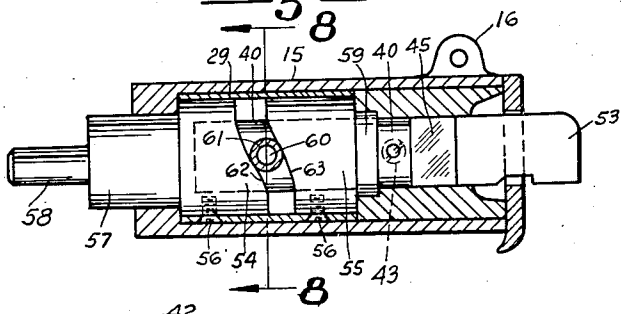
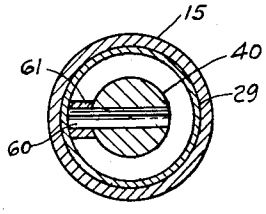


Fig. 8



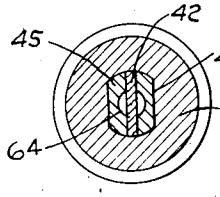


Fig. 10

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POWER CONVERSION ATTACHMENT

Benjamin F. Schmidt, Los Angeles, Calif.

Application August 21, 1944, Serial No. 550,361

5 Claims. (Cl. 74—57)

1

My invention relates to a power conversion attachment, and more particularly to an attachment for converting rotary motion to reciprocal motion that may be attached to an electric portable drive, a stationary drill press driving mechanism, an air driven motor, etc.

An object of the invention is to provide such an attachment that will reciprocate a saw, a file, a chipper, a nibbler, a puncher, or the like.

Another object is to provide such an attachment that will drive the tool at least the speed of the motor, and in one form of the invention, the tool is reciprocated twice for each revolution of the drive shaft.

My invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes embodiments of the present invention, which are given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is an elevational view of a portable electric motor with an embodiment of my present attachment connected therewith.

Fig. 2 is a reduced vertical elevational view illustrating an embodiment of my attachment which has been connected with a stationary drill press.

Fig. 3 is an enlarged, longitudinal section through my said attachment.

Fig. 4 is an end view, looking at the right end of my said attachment.

Fig. 5 is a longitudinal section, taken on the line 5—5 of Fig. 3.

Fig. 6 is a transverse section, taken on the line 6—6 of Fig. 3.

Fig. 7 is a longitudinal section of a modified construction of my invention.

Fig. 8 is a section taken on the line 8—8 of Fig. 7.

Fig. 9 is a section on the offset line 9—9 of Fig. 1.

Fig. 10 is a section taken on the line 10—10 of Fig. 5.

Referring more in detail to the drawings, the reference number 10 generally designates a portable electric motor provided with a handle 12, as generally used for a portable electric drill.

2

A drive shaft 49 of my attachment 14 is connected to be driven by a chuck 9 of the portable electric motor. Housing 15 of the attachment has lugs 16 to which a brace rod 17 is attached as by bending the end of the rod 17 around a pin 18 in the lugs 16. A clamping band 19 around the housing of the motor 10 is looped over the rod 17, as shown at 20, and has its ends 30 drawn together by a bolt 21. The brace rod 17 prevents the housing 15 from following the turning movements of the shaft 49.

Fig. 2 illustrates a conventional drill press standard 22 on a base 23. A platform 24 is mounted on the standard 22 by a bracket 25. A stationary adjustable head bearing 26 carries a driving shaft 27 to which my attachment 14 is connected. The housing 15 thereof is held against rotation by the brace rod 17, which, in this arrangement, is held at the side of the standard 22 by means of a coil spring 28 that passes around the opposite side of the standard 22. This is believed clear without further illustration.

My present attachment comprises a sleeve 29 mounted to rotate within the housing 15. The sleeve 29 endwise abuts against a shoulder 31 in the housing 15, and at the opposite end against a hollow plug 32 that is fastened within the housing 15 by screw means 33. Bolts 34 fasten opposed cam members 35 and 36 within the sleeve 29 at opposed points along the inner extent thereof. A cam-shaped race 37 is provided between the cam members 35 and 36.

Since both sides are shaped as shown in Fig. 3, a double cam is provided. Traveling within the cam race 37 are rollers 38 mounted upon a pin 39 that extends diametrically through and outwardly from a tool shank 40. The tool shank reciprocates longitudinally within the cam members 35 and 36 and within the plug 32. A tool 42 is anchored in a reduced end 45 of the shank 40 by means of a screw 43. The plug 32 has an irregularly shaped (flat-sided) opening 44 (see Fig. 10) whereby to prevent rotation of the shank 40 within the device. The tool 42 may be a saw (as shown), a chipper, a nibbler, a file, or any other reciprocating tool.

A guide or shoe 46 preferably of hardened material, is bolted at the front end of the plug 32, as shown at 47. The guide 46 has a slot 48 through which the tool 42 reciprocates.

The cam member 35 has a rearwardly extending, integral spindle 49 for connecting in the chuck 9 of the driving means. The member 35

has a reduced portion 50 to provide a shoulder 51 for engaging the shoulder 31 in the housing 15, in order to maintain the member 35 in position. The cam member 36 has a bearing portion 52 for the reciprocating shank 40.

The form shown in Figs. 3 to 6 effects reciprocation of the tool 42 forward and backward twice, for each revolution of the spindle 49, whereas the form shown in Figs. 7 and 8 effects reciprocation of the tool forward and backward once for each revolution of the driving chuck (not shown in the said figures).

In Fig. 7 a nibbler 53 is fastened in the reduced end 45 of the shank 40 by means of a screw 43, as before. Sleeve 29 in the housing 15 fastens cam members 54 and 55. These members are bolted in the sleeve 29, as shown at 56. The member 54 has a reduced portion 57, and an integral spindle 58 for driving the device. The member 55 has a bearing member 59 for the reciprocating shank 40. The cam members 54 and 55 are the same on the half that is not shown as they are on the half visible in Fig. 7, in order to provide a single cam. The shank 40 has a radial pin 60 that carries a roller 61, which travels in the race provided by the opposed low inclined cam faces 62 and 63 of the cam members 54 and 55 respectively.

The slot for the tool 42 in the outer end of the reduced end 45 preferably has a circular center opening 64 to receive a circular file, if desired. A similar round opening 65 is also provided centrally of the slot 48 in the guide 46. The low inclined faces 62 and 63 provide greater power than the more steeply inclined cam race 37.

In the use of my present device, the spindle 49, or 58, is inserted in the chuck of a suitable driving means. Sheet I of the drawing illustrates two forms of driving means, to wit, portable and stationary. The device illustrated in Figs. 3 to 6 will actuate the tool 42 forward and backward twice for each revolution of the spindle 49, while the device illustrated in Figs. 7 and 8 only operates the tool 53 forward and backward once for each revolution of the spindle 58.

In each form, the flat-sided, reduced end portion 45 fits in the plug 32, which is correspondingly flat-sided on the interior thereof. This relationship prevents the tool from following the rotary movements of the cam members.

The sleeve 29 fastens the two cam members together, whereby they rotate with the spindle on one of the members. Rotation of the cam members causes the rollers in the form shown in Figs. 3 to 6 and the roller in the form shown in Figs. 7 and 8, to follow the race provided by the cam faces. The shank 40 is thereby caused to reciprocate through the intermediary of the pins 39 upon which the rollers 38 are mounted (or through the intermediary of the pin 60 upon which the roller 61 is mounted). The reduced ends 52 and 59 afford bearings for the reciprocating shanks.

It is believed clear that the tools may be changed by unscrewing the screw 43, removing the tool from the shank and replacing the tool with another, either flat or round, since the end 45 has both flat and round end-slots.

While I have illustrated and described what I now regard as the preferred embodiments of my invention, the constructions are, of course, subject to modifications without departing from the spirit and scope of my invention. I, therefore, do not wish to restrict myself to the particular

forms of construction illustrated and described, but desire to avail myself of all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a device of the character referred to, the combination of: a housing, a hollow cylindrical body rotatable within said housing, a pair of cylindrical members secured within said body in spaced relation to each other and having opposed faces co-operating to form a cam track, one of said members having an axially extending shank for attachment to a source of rotative power and an axial socket, and the other of said members having an axial bore, a tool holding shank extending through the axial bore of said second named member and into the socket of said first named member and being slidable relatively to said members, rollers radially journaled on said shank and extending into the cam track between said members, and means in the housing co-operating with said tool holding shank to insure rectilinear movement thereof during the rotative movement of said members.

2. In a device of the character referred to, the combination of: a housing, a pair of cylindrical members in said housing and each having opposed faces co-operating to form a circumferential cam track and having axial bores, a cylindrical unit rotatable within said housing and connecting said members in spaced relation, a tool holding shank slidably disposed in the bores of said members and provided with roller means extending into said cam track, said shank having a non-circular portion, and a body in said housing having an opening corresponding to the non-circular portion of said shank to guide said shank and maintain the same against rotation.

3. In a device of the character referred to, a stationary housing, a hollow cylindrical member mounted for rotation therein, said member being provided with a pair of internal opposed faces co-operating to form a cam track having a uniform rise and fall, a tool carrying member snugly mounted centrally of said hollow member for reciprocating movement relative thereto, said tool carrying member being held against rotation by said stationary housing, a pin projecting through said tool carrying member to provide diametrically arranged projections, and means journaled on said pin projections and extending into said cam track, said means operable by the rotative movement of said cylindrical member to reciprocate said tool carrying member.

4. In a device of the class described, a pair of axially arranged cylindrical members having their opposed faces defining a circumferential cam track, said cylindrical members being formed with an axial bore, one of said members terminating in an outwardly extending driving spindle and the other of said members having at its outer end a reduced portion defined by an annular shoulder, a sleeve enclosing said cylindrical members, means for securing the cylindrical members to said sleeve, a housing for enclosing said sleeve and cylindrical members, a tubular plug fixed in said housing and abutting one end of one of said cylindrical members to provide a stop to prevent axial movement of said members, said plug being formed with a central bore having annular shoulders defining an annular recess, said recess being adapted to receive and seat the reduced end portion of the adjacent cylindrical member, said bore including flattened wall por-

tions between one of said shoulders and the outer end portion, and a tool driving shank element arranged to reciprocate within said cylindrical members and the outer recess of said plug, said shank element having at one end portion cross pins radially projecting at diametrically opposite points for simultaneously guided movement in said cam track and having its opposite end reduced to provide flattened outer walls and a tool engaging portion, said flattened outer walls being adapted for sliding engagement with the flattened wall portions of said tubular plug whereby said shank element is restrained against rotation.

5. In a device of the class described, a pair of axially arranged cylindrical members having their opposed faces defining a circumferential cam track, said cylindrical members being formed with an axial bore, one of said members terminating in an outwardly extending driving spindle and the other of said members having at its outer end a reduced portion defined by an annular shoulder, a sleeve enclosing said cylindrical members, means for securing the cylindrical members to said sleeve, a housing for enclosing said sleeve and cylindrical members, a tubular plug fixed in said housing and abutting one end of one of said cylindrical members to provide a stop to prevent axial movement of said member, said plug being formed with a central bore having annular shoulders defining inner and outer annular recesses, the inner of said recesses being adapted to receive and seat the reduced end portion of the adjacent cylindrical member, said

bore including flattened wall portions between one of said shoulders and the outer end portion, and a tool driving shank element arranged to reciprocate within said tubular members and the outer recess of said plug, said shank element having at one end portion cross pins radially projecting at diametrically opposite points for simultaneously guided movement in said cam track and having its opposite end reduced to provide flattened outer walls and a tool engaging portion, said flattened outer walls being adapted for sliding engagement with the flattened wall portions of said tubular plug whereby said shank element is restrained against rotation, said outer recess in said plug forming a continuation of the axial bore in the cylindrical members to provide a longitudinally extending enclosure for reception and movement of the shank element.

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