

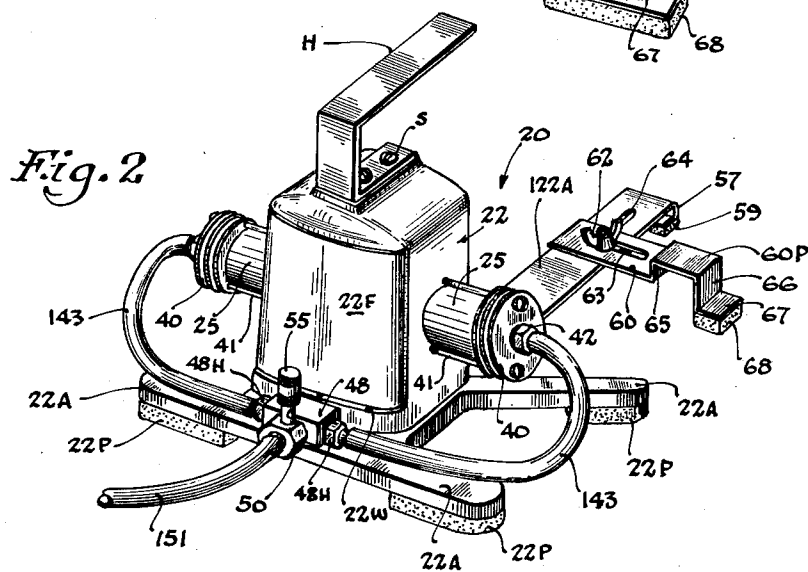
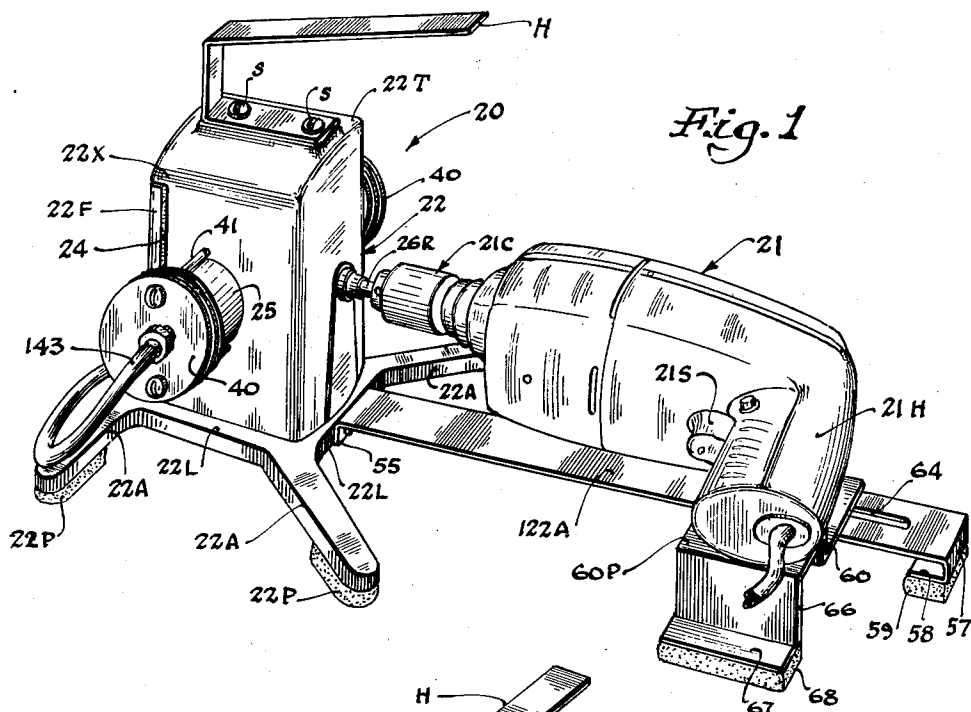
Aug. 21, 1956

E. W. WILBER
AIR COMPRESSORS

2,759,665

Filed Oct. 28, 1954

3 Sheets-Sheet 1



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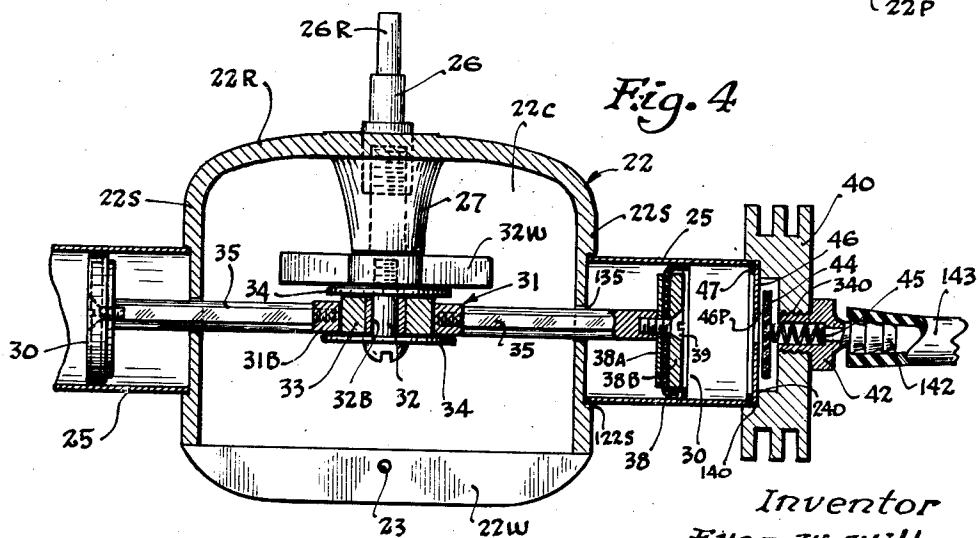
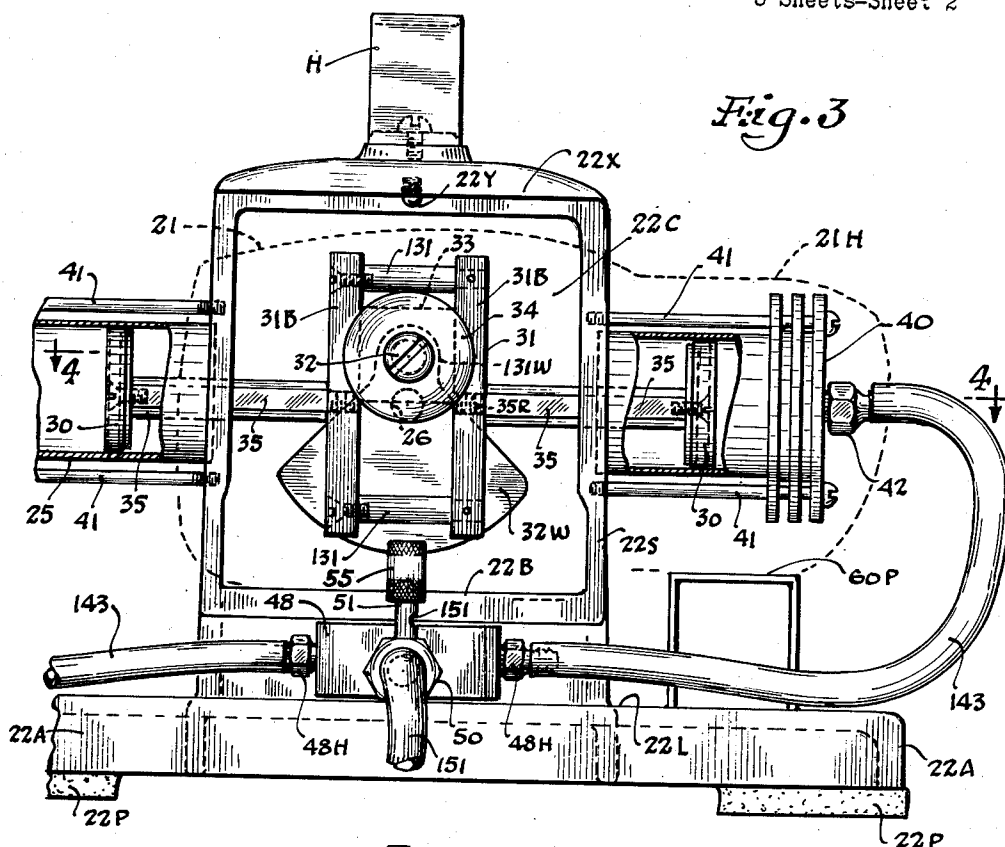
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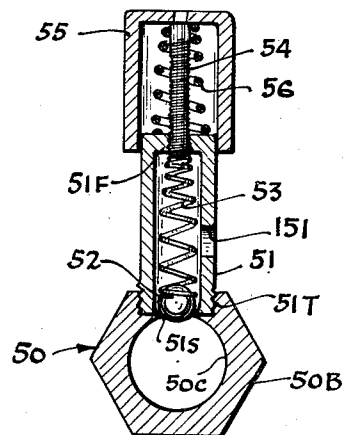
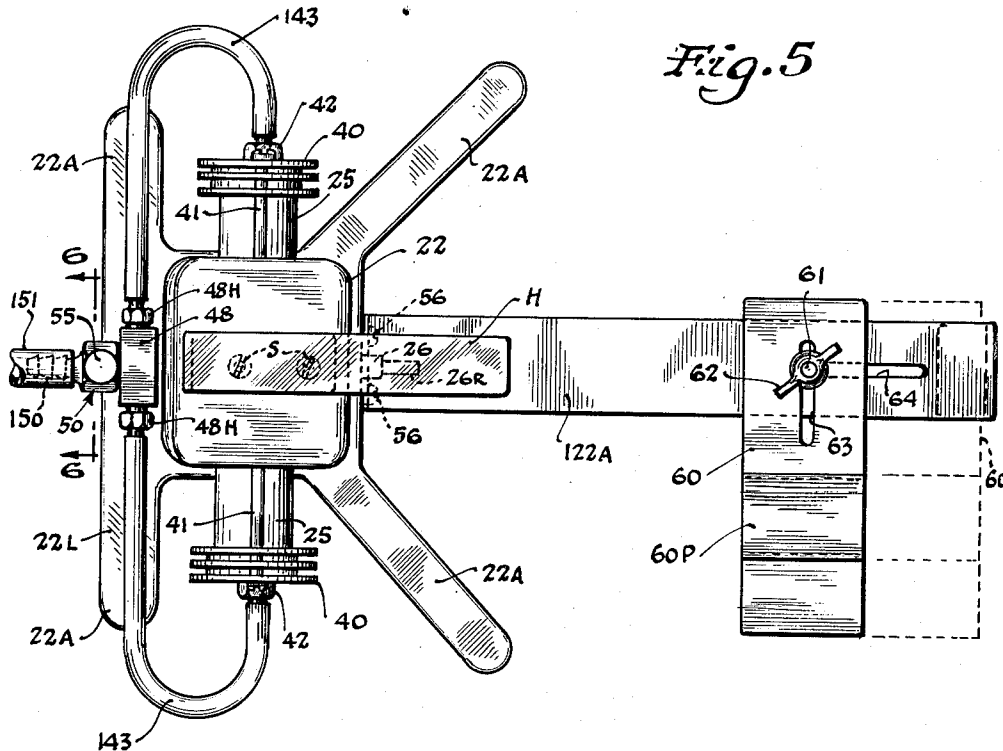
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AIR COMPRESSORS

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3 Claims. (Cl. 230—235)

This invention relates to air compressors, and particularly to relatively small air compressors adapted to be driven from portable electric drills removably associated therewith as a power source.

Most air compressors are, of course, relatively large in size and have the drive motors permanently associated therewith. There are situations, however, where a relatively small compressor may serve with considerable advantage and utility as a source of compressed air, particularly for domestic uses or in small shops. In most homes and shops, portable electric drills are available, and it is the primary object of the present invention to afford an air compressor that may readily be associated with and driven by such portable electric drills. More specifically, it is an object of the present invention to afford such an air compressor that may be driven by portable electric drills of many different sizes and designs, and a related object is to accomplish this in such a way that the torque reaction of the drill will be absorbed in such a way that the drill as well as the compressor are protected against undue physical strain due to vibration.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principle thereof and what I now consider to be the best mode in which I have contemplated applying that principle. Other embodiments of the invention embodying the same or equivalent principle may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a rear perspective view of an air compressor embodying the features of the invention and having a portable electric drill operatively associated therewith in a driving relation;

Fig. 2 is a front perspective view of the compressor shown in Fig. 1;

Fig. 3 is a front elevational view of the compressor with the removable front closure plate removed;

Fig. 4 is a plan section taken substantially along the line 4—4 of Fig. 3;

Fig. 5 is a plan view of the compressor; and

Fig. 6 is an enlarged vertical sectional view of the control valve, the view being taken along the line 6—6 of Fig. 5.

For purposes of disclosure, the invention is herein illustrated as embodied in a relatively small compressor 20 that is adapted to be driven by a portable electric drill such as the drill 21 shown in full lines in Fig. 1 and in dotted outline in Fig. 3 of the drawings. The compressor 20 comprises an upstanding hollow housing 22 having a base afforded by a plurality of upwardly extending arms 22A, and these arms 22A are provided with resilient pads 22P on the lower faces of their outer ends, such pads preferably being made from a material such as sponge

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rubber so as to provide a resilient support for the compressor 20.

The housing 22 has a vertical rear side wall 22R and forwardly extending vertical side walls 22S, and at its upper end the housing is closed by a top wall 22T. The side walls 22R and 22S extend downwardly and are joined to a flanged ledge 22L which affords the desired rigid connection between the housing 22 and the arms 22A.

Above the level of the ledges 22L, the housing has a bottom wall 22B, and thus a housing or drive chamber 22C is provided within which mechanism for driving the moving compressor elements may be housed. This chamber 22C is adapted to be closed by a removable front wall 22F that has a pin at its lower edge adapted to enter a bore 23 that is afforded in a horizontally projecting surface 22W, Figs. 2 and 4. The removable front wall 22F has its locating pin extended into the hole 23 and the upper edge of the wall 22 is pushed rearwardly beneath an overhanging ledge 22X that is formed as an extension of the top wall 22T, Figs. 1 and 3. A ball detent 22Y carried in the overhanging ledge 22X cooperates with a suitable recess in the front wall 22F to hold the same in position. Along the vertical side edges of the removable front wall 22F, a pair of resilient porous air filter members 24 made from sponge rubber, felt or the like are provided so that an air filter is afforded along each side of the wall 22F for entry of air into the chamber 22C. On the top wall 22T, a handle H is provided, this handle being somewhat U-shaped in character, so that one arm affords the handle and the other arm rests on the top of the wall 22H and is secured thereto by means of screws S.

The side walls 22S of the housing 22 serve as a mounting for oppositely extending cylinders 25, and these cylinders are arranged on a common axis that intersects the axis of a horizontal drive shaft 26 that extends through the rear wall 22R of the housing. The shaft 26 is rotatably supported in a bearing hub 27 that is formed on the wall 22R and extends into the housing for a considerable distance, and the shaft 26 has a reduced outer end 26R that is adapted to be gripped by the chuck 21C of a portable electric drill such as the drill 21.

The inner end of the shaft 26 has drive mechanism mounted thereon and associated therewith for imparting reciprocating movement to pistons 30 that are mounted in the respective cylinders 25. Such drive mechanism, as herein shown, comprises a drive yoke 31 associated with a counter balanced eccentric drive that includes an eccentrically located drive pin 32 and a segmental counter-balancing weight 32W. The weight 32W is fixed on the inner end of the shaft 26 and has the drive pin 32 threaded into a radially projecting narrow portion 132W, as shown in Figs. 3 and 4. The drive pin 32 extends through a bearing 32B that is located in a transmission block 33 that is slidable between bars 31B of the yoke 31. These bars 31B are held in spaced parallel relation by end spacers 131, and upon rotation of the shaft 26, the block 33 moves up and down in the guideway afforded by the bars 31B and serves to reciprocate the yoke 31. The block 33 is held in place or in the proper relation with respect to the yoke 31 by a pair of washers 34 mounted on the drive pin 32 so as to project laterally in both directions and in effect overlie the opposite faces of the bars 31B, as shown in Figs. 3 and 4.

The yoke 31 has piston rods 35 extended in opposite directions from the midpoints of the respective bars 31B, and these piston rods 35 have reduced ends 35R that are threaded into the bars 31B. At their other or remote ends, the piston rods 35 have the pistons 30 fixed thereon, and in the form of the invention herein illustrated, these pistons are of the type that serve also as inlet valves

for the cylinders. Thus, each piston 30 comprises a cup washer 33 having clamping plates 38A and 38B on opposite sides thereof, and fastening screws 39 extend through the two plates and the cup washer to afford the necessary piston structure.

Each of the cylinders 25 is secured in position on the related wall 22S by means including a piston head 40 and clamping bolts 41. The outer faces of the side walls 22S are formed with shallow cylindrical sockets 122S within which the sleeve that affords the cylinder 25 may be positioned and located, and this locating socket 122S is concentric with a clearance bore 135 through which the piston 35 extends from the chamber 22C into the cylinder 25.

The cylinder head 40 in each instance is provided with a locating counterbore 140, into which the outer end of the cylinder 25 may extend, and this locating bore 140 has a counter bored portion 240 that is of a smaller diameter and serves as a valve chamber. Beyond the counterbored chamber 240, a threaded outlet opening 340 is formed, and an outlet fitting 42 is threaded into the opening 340 and has a projecting hose mounting stem 142 upon which an air discharge hose 143 may be fixed.

The valve chamber 240 has a valve disk 44 located therein, as shown in Fig. 4, and this disk is urged to the left in Fig. 4 by means of an expansive spring 45 that is housed within the fitting 42, and the valve disk 44 is thus urged into a closing relationship with a relatively small outlet port 46P that is formed in a closure plate 46 that is somewhat in the nature of a washer. This closure plate 46 is located in the mounting socket 140 and between the end of the cylinder 25 and the disk end plate 46, a sealing washer 47 of resilient material is preferably positioned to fully seal the outer end of the cylinder wall. The clamping bolts 41 extend through openings in the projecting outer edges of the cylinder head 40, and these bolts extend in a parallel relation along the opposite outer sides of the cylinder 25 and are threaded into the side wall 22S of the housing.

The discharge ends of the air hoses 143 are extended as shown in Figs. 2, 3 and 5 to opposite sides of a mounting block 48 that is fixed on the forward ledge 22L, and this block 48 has hose receiving fittings 48H whereby such connection of the hoses 143 may be readily accomplished. The mounting block 48 on its forward side has a pressure-control valve 50 associated therewith. This control valve 50 has a valve body 50B having a forward hose receiving portion 150 whereby an outlet hose 151 may be associated with the control valve 50. The valve body 50B has an internal chamber 50C that is associated or connected with the two fittings 48H so as to receive compressed air therefrom, and at its upper side, a valve cage 51 in the form of a vertical tube is afforded. This tube 51 is threaded downwardly into the housing 50B as at 51T, and in forming the threaded socket for such connection, a circular valve seat 51S is formed opening into the chamber 50C, as shown in Fig. 6. Within the tubular member that affords the valve cage 51, a valve member in the form of a ball 52 is located so that it may move downwardly into engagement with the seat 51S, and the valve member 52 is pressed downwardly toward a seated or closed relation by a variably adjustable coil spring 53 located within the valve cage 51. The valve cage 51 has a lateral discharge opening 151, so that when the valve member 52 is unseated, the escaping air may pass about the valve 52 and out the opening 151.

At its upper end, the valve cage 51 has an inturned flange 51F that is threaded, and a threaded bolt 54 extends downwardly through this threaded opening and engages the upper end of the spring 53. Thus, by rotation of the adjusting screw 54, the valve spring 53 may be adjusted, and such an adjustment is preserved by affording a resilient endwise pressure on the screw 54.

In the present instance, the screw has a cup-shaped head 55 fixed thereto and extended downwardly beyond the upper end of the housing 51, and an expansive coil spring 56 is housed within this cup-shaped head 55 so as to act between the screw and the upper flange 51F. This serves to maintain adjustment of the valve.

The housing 20 is supported on a suitable work surface by the arms 22A, and a supplemental arm 122A is afforded so as to project rearwardly from the rear ledge 22L, as shown in Figs. 1 and 5, directly beneath and parallel to an extension of the axis of the shaft 26, and this supplemental arm 122A serves as a support from the drill 21 that is to drive the compressor. The arm 122A is preferably made separately so as to facilitate manufacture and packing of the compressor. Thus, the arm 122A as shown herein is made from sheet metal and has a down-turned flange 55 at what may be termed its forward end, this flange 55 being disposed against the flange of the rear ledged portion 22L, and being fixed thereto by means such as screws 56. At its other or rear end, the arm 122A is bent downwardly as at 57 and then forwardly as at 58, Figs. 1 and 2, and beneath the portion 58, a resilient pad 59 made from material such as sponge rubber is secured. Near its rear end, the arm 122A has a lateral arm 60 associated therewith, and this lateral arm 60 is arranged to function as a support for the handle 21H of a portable drill 21 to absorb the reaction torque that is incident to the driving of the compressor. Thus, the arm 60 rests on the upper face of the arm 122A and is secured thereto by means of a bolt 61 and a thumb nut 62 that extend through slots 63 and 64 that are formed longitudinally in the arm 60 and the arm 122A. The arm 60 has a slightly elevated platform 60P formed thereon near its outer end, and this is accomplished by bending the sheet metal of the arm upwardly as at 65, then horizontally as at 60P in Fig. 2, and then downwardly as at 66, and at the lower end of the portion 66, an outwardly projecting foot 67 is provided. A resilient cushion 68 is secured to the lower face of the foot 67.

With the arrangement that is thus shown, the platform 60P may be disposed beneath the end portion of the handle 21H of a drill 21, regardless of the size, shape or length of the drill, and this may be accomplished by shifting the position of the arm 60 as, for example, to the dotted line position shown in Fig. 5. Moreover, if the drill is of such a character as to drive its chuck in a direction opposite to the normal or customary direction, the arm 60 may be disposed so as to extend in the opposite direction from the arm 122A. After the platform 60P has been adjusted in accordance with the size and other characteristics of the tool that is to be used, the tool 21 may be put in place and the chuck 21C thereof may be tightened upon the reduced end 26R of the drive shaft 26. The switch 21S of the tool is, of course, located in an accessible position, and the tool 21 may be started so as to operate the compressor 20. The desired output pressure of the compressor may then be adjusted by means of the adjusting cap 55 of the valve 50, and the compressor is then operative to produce a reasonably large volume of compressed air at the desired pressure that has been thus determined.

From the foregoing description it will be apparent that the present invention affords an air compressor unit that is simple in its structure and operation and reliable in use, and it will also be apparent that the air compressor of the present invention enables portable electric drills of different sizes and types to be effectually associated with the compressor to afford the desired driving power. When a portable electric drill is thus associated with the compressor of the present invention, it will be apparent that the clamping of the chuck of the drill on the projecting drive shaft of the compressor serves to hold the drill in the desired endwise position, and the engagement of the handle of the drill with the lateral supporting arm

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or platform enables the reaction torque to be absorbed in an effective manner. Furthermore, the simplicity of association of the drill with the compressor is obviously meritorious in that the drill is, in effect, self-aligning with respect to the drive shaft of the compressor.

It will also be apparent that the air compressor of the present invention is adapted for convenient use in homes and workshops for charging compressed air containers such as garden and lawn sprays, for charging compressed air tanks of the kind carried as an emergency air source in automobiles, or for the operation of paint sprays and other air operated tools.

Thus, while I have illustrated and described the preferred embodiment of my invention, it is to be understood that this is capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In an air compressor adapted to be driven by a gun-type portable power drill, a frame having compressing means thereon including a projecting drive shaft to which the driving chuck of such a drill may be drivingly coupled, an elongated plate attached to the said frame below the projecting drive shaft and disposed in parallel relation to such shaft to support such a drill on its side in position to drive the shaft as aforesaid, and a rest plate for the handle of the drill adjustably connected to said elongated plate and disposed at a side thereof to resist the torque of such drill.

2. In an air compressor or the like adapted to be driven by a gun-type portable power drill, a drive housing for the compressor including in one wall thereof a projecting compressor drive shaft adapted to be drivingly coupled with the chuck of a drill that is to drive the shaft, an elongated plate attached to the said wall of the housing below said shaft and disposed at right angles to

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such wall to support the drill on its side in position to have the chuck thereof coupled as aforesaid, a resilient pad at the end of said plate away from the housing to afford traction and absorb vibrations of the drill during use, a rest plate for the handle of the drill disposed at one side of said elongated plate to resist the torque of the tool, and means enabling the rest plate to be adjustably positioned along the elongated plate and to be adjustably positioned toward and away from the elongated plate to accommodate drills of different sizes, and a resilient pad on the end of the rest plate away from said elongated plate to afford additional traction and absorption of vibrations during operation of the drill.

3. In an air compressor or the like adapted to be driven by a gun-type portable power drill, a drive housing for the compressor including in one wall thereof a projecting compressor drive shaft adapted to be coupled with the chuck of a drill that is to drive the compressor, an elongated plate attached to the said wall of the housing below the shaft and disposed at right angles to such wall to support the drill on its side in position to have the chuck thereof coupled as aforesaid, a rest plate for the handle of the drill adapted to be disposed on one side or another of the elongated plate to resist the torque of the drill, openings formed in the respective plates at right angles to one another to enable the rest plate to be adjusted relative to the elongated plate and to be disposed on one side or the other thereof, and means passed through said openings to hold the rest plate in adjusted position.

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