

[54] **MULTIPLE TOOL DRIVING UNIT**

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[51] Int. Cl. **B25b 21/00**

[58] Field of Search.....173/26, 29, 46, 50, 51, 140; 279/1 DC; 74/15.2, 16, 665 GB, 665 Q

[56] **References Cited**

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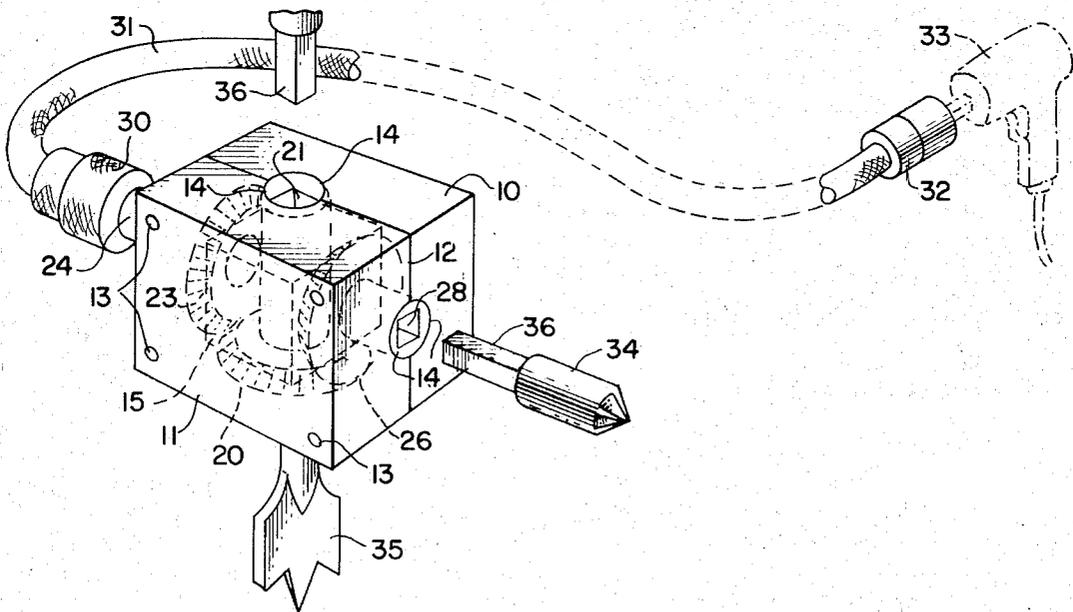
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[57] **ABSTRACT**

A compact multiple tool driving unit driven by a motor remote from, but permanently attached to it, so that a minimum of distance is required between it and the work to be performed. Alternatively, a separate portable power transmitting unit may be used, having an input connection allowing the unit to be driven by a portable hand drill or the like. The unit possesses a plurality of output or tool driving connections which are employed to drive drill bits, screwdrivers and other similar tools. Because of its compact construction, the device enables the user to perform a variety of different operations in tight places where present tools cannot operate, and also to perform a variety of different operations without the necessity of stopping to change tools.

11 Claims, 6 Drawing Figures



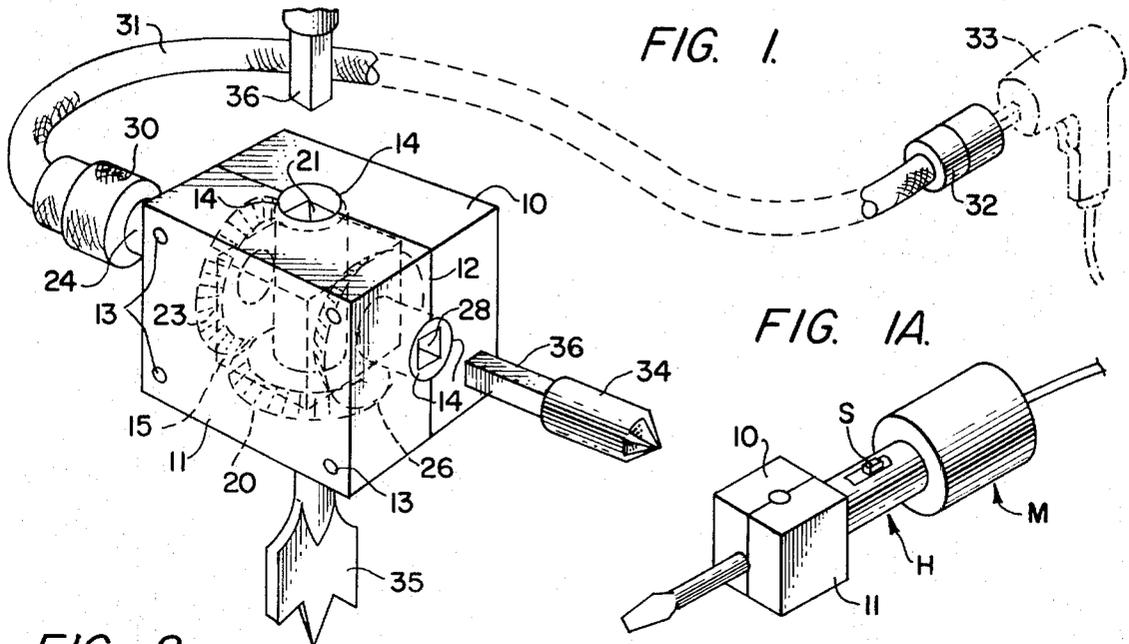


FIG. 2.

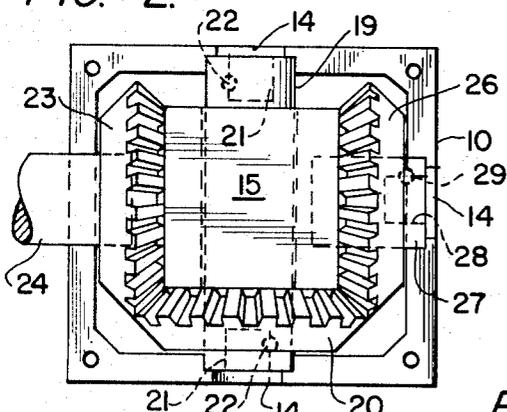


FIG. 5.

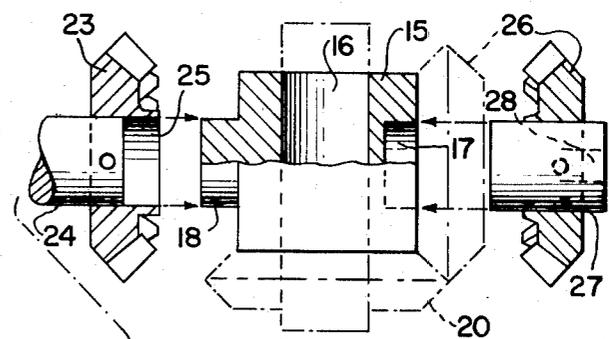


FIG. 3.

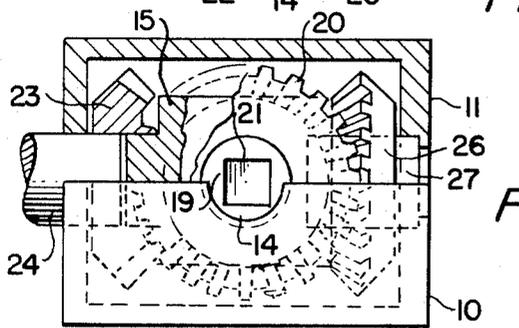
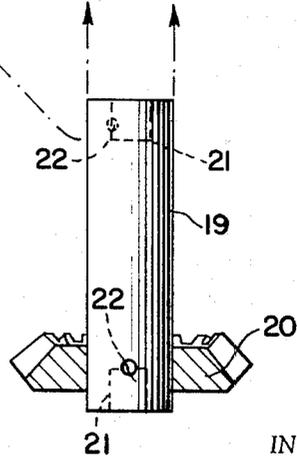
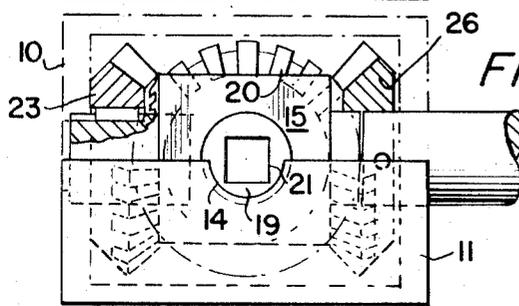


FIG. 4.



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MULTIPLE TOOL DRIVING UNIT

BACKGROUND OF THE INVENTION

A variety of portable power-driven tools are known in the prior art including some which make provision for driving different types of tools or attachments from a single power-driven chuck or holder. The commonly used electrically powered hand drill with a single drive chuck and a variety of tool forms to be individually and interchangeably driven by the chuck is a typical example of the prior art.

There is a distinct need in the art for a power-driven portable device or unit which will enable a user to employ a number of different types of tools selectively without the need for interrupting the operation of the power driving means and changing the individual tool attachments. By means of the invention, a user of the multiple tool driving unit may employ each of the tools selectively and in any desired sequence to perform different operations on wood or metal work without stopping the operation of the other tools carried by the portable unit. In this way, much time can be saved and the overall convenience of utilizing a number of tool components is rendered much more convenient. Furthermore, the compact size of the head of the unit permits work to be performed in areas where present tools are unable to operate.

The invention consists of a portable power transmitting unit which may either be driven by a remote motor and shaft permanently attached to the unit or may be coupled through a flexible drive shaft or the like with any convenient power source, such as a small motor or hand drill. The unit has simultaneously driven output connections for a variety of tools which may be individually utilized in connection with work while the other tools continue to be driven by the unit in non-active positions with respect to the work.

Other features and advantages of the invention will become apparent during the course of the following detailed description.

BRIEF DESCRIPTION OF DRAWING FIGURES

FIG. 1 is a partially exploded perspective view of a multiple tool driving unit embodying the invention showing a separate, portable power transmitting means.

FIG. 1A is a perspective view showing a multiple tool driving unit with a permanently attached motor and handle.

FIG. 2 is a side elevation of the unit with one-half of a split casing removed to show internal components.

FIG. 3 is a bottom plan view of the driving unit, partly in section and partly broken away.

FIG. 4 is a top plan view, partly in section and partly broken away.

FIG. 5 is an exploded side elevational view, partly in section, of a gear transmission separated from the casing of the unit.

DETAILED DESCRIPTION

Referring to the drawings in detail, wherein like numerals designate like parts throughout, the numerals 10 and 11 designate two separable halves or sections of a block-like rectangular casing constituting the body portion of the multi-tool portable driving unit. The two

casing sections are parted in the middle as indicated at 12, and are rigidly and detachably secured together in assembled relationship by screw 13 or the like. On the four sides of the rectangular casing intersected by the parting line or edges 12, each casing section is provided centrally with a semi-circular stepped recess 14, which registers with a like recess in the opposing casing section. This produces on the two-part assembled casing four right angular intersecting axis stepped bores whose axes lie in a common plane with the parting line 12. As will be further described, these four bores or openings in the casing serve as bearings for rotational parts of the apparatus and as access openings for tool components, to be described.

The driving unit additionally comprises an internal mechanism consisting of an anchor block 15 having a central through bore 16 between one pair of its end faces, a relatively shallow cylindrical recess 17 in another face, and a short cylindrical extension 18 coaxial with the recess 17 on the side of the block opposite the recess 17. The axis of the through bore 16 is perpendicular to the common axis of recess 17 and extension 18. The anchor block 15 is contained bodily inside of the two-part casing 10-11 when the device is assembled.

A cylindrical shaft 19 having a first mitre gear 20 attached near one end extends entirely through the bore 16 of block 15 and has its opposite ends journaled within an opposing pair of the stepped bores formed by the semi-circular recesses 14; see FIG. 2. The opposite ends of the shaft 19 have non-circular and preferably square socket openings 21 for tool attachments formed therein and these socket openings are preferably provided with conventional detent means 22 serving to hold the various tool attachments therein releasably and securely. As best shown in FIG. 2, access to the socket openings 21 is available through the bores in the casing which support the shaft 19.

A second mitre gear 23 on a right angular axis with respect to the gear 20 is disposed within the two-part casing at one side of the anchor block 15, the first mitre gear 20 being below the block 15 in FIG. 2. The second mitre gear is attached securely to a drive shaft 24 which is likewise journaled in one of the bores formed at one side of the two-part casing. The gears 23 and 20 are arranged in mesh, as shown. As shown in FIG. 5, the drive shaft 24 extends only partly through the bore 25 of mitre gear 23, and the latter telescopes over the extension 18 of the block 15, which forms a bearing support for the gear 23 within the casing.

A third mitre gear 26 in mesh with the gear 20 is arranged on the side of the block 15 opposite the gear 23 and within the outer casing. This third mitre gear is secured to a short cylindrical shaft 27 which projects axially for short distances on opposite sides of the gear 26. One end of the shaft 27 is journaled and supported in the recess 17 of the block 15 while its opposite end is journaled and supported in the adjacent stepped bore of the casing formed by the recesses 14. It may now be seen that the three mitre gears and their shafts are all adequately supported and journaled for free rotation on the internal block 15 and the surrounding exterior two-part casing. The short shaft 27 has an outer end non-circular and preferably square socket opening 28 for another tool attachment, to be described. The

socket opening 28 has a tool holding detent means 29. It is now apparent that three separate tool attachments can be simultaneously connected to the driving unit while power is being applied to the unit.

The unit derives its power through the shaft 24 which may be coupled through a conventional coupling 30 with a flexible drive shaft 31 of any convenient length having a second coupling 32 at its remote end connectable with the output rotary shaft of a power source 33, such as a small stationary motor or a portable electric hand drill or the like. Rotation of the drive shaft 24 by the means above-described and shown in FIG. 1 causes simultaneous rotation of the three mitre gears and the shaft means coupled therewith, namely, the shafts 19 and 27.

FIG. 1A shows a preferred arrangement wherein the casing 10, 11 is integral with a handle H provided with a variable speed on-off switch S connected to an electric motor M. Appropriate drive means such as that previously described and shown in FIGS. 2 and 5, for example, connects the motor to the internal mechanism in the casing.

Various tools may be driven by the unit in groups of three or in pairs, or singly, if preferred. Examples of tool attachments are shown in FIG. 1 including a screwdriver 34 and a wood boring tool 35. The various tools have square shanks 36 for socketing engagement within the openings 21 and 28. The tools are readily removable from the unit, interchangeable and replaceable. When three different tools are driven simultaneously by the unit, it is unnecessary for the user to cut off the power, stop and change tools during the performance of various operations. The ready portability of the compact unit renders it highly convenient and versatile. It is completely safe since the gears are totally enclosed in the two part casing. It is believed that the various features and advantages of the invention will be apparent to those skilled in the art without the necessity for further description herein.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. A tool driving unit comprising a separable exterior casing having opening means in plural walls thereof forming shaft bearings, an internal anchor member enclosed within said casing and having a shaft bore and coaxial bearing parts substantially at right angles to the shaft bore, a rotary shaft in said shaft bore of the anchor member including opposite end portions journaled within a pair of said opening means forming shaft bearings, a first mitre gear on said rotary shaft within said casing, a second mitre gear within said casing in mesh with the first mitre gear and having a journal con-

nection with one bearing part of said anchor member, a drive shaft connected with the second mitre gear and journaled in another of said opening means and adapted to be coupled with a rotary power driven element, a third mitre gear within said casing in mesh with the first mitre gear, a shaft carrying the third mitre gear and having a first end portion journaled in another opening means of the casing and a second end portion having a journal connection with the other bearing part of said anchor member, the shafts of the first and third mitre gears having end socket openings adapted to receive tool attachments through said opening means of the casing.

2. The structure of claim 1, and said separable exterior casing comprising a companion pair of casing sections having meeting edges, and said opening means forming shaft bearings comprising pairs of registering semi-circular recesses formed in said meeting edges.

3. The structure of claim 2, and said exterior casing being approximately cubical and said opening means formed in the walls of the casing which are divided by the meeting edges and the axes of the opening means lying in a common plane.

4. The structure of claim 1, and said internal anchor member comprising a block-like member and said shaft bore extending through opposite faces of the block-like member, said coaxial bearing parts comprising a recess in one face of the block-like member and a short bearing extension on an opposite face thereof.

5. The structure of claim 4, and said first, second and third mitre gears within the exterior casing disposed between three faces of said anchor member and three adjacent walls of said approximately cubical casing.

6. The structure of claim 5, and said opening means of the exterior casing forming shaft bearings constituting stepped bores in walls of the exterior casing, whereby shafts are journaled for rotation in one step of a bore and held against axial movement by a second step of the bore.

7. The structure of claim 1, and a flexible drive shaft coupled with said drive shaft connected with the second mitre gear, said flexible drive shaft extending to a remote power source.

8. The structure of claim 1, and said end socket openings are polygonal socket openings adapted to receive similarly shaped tool shanks releasably.

9. The structure of claim 8, and tool holding detent means in each socket opening.

10. The structure of claim 1, and a set of attachment tools for use with said driving unit having shanks removably engageable within the socket openings.

11. The structure of claim 1, including a handle, one end of which is attached to said exterior casing, an electric motor attached to the opposite end of said handle and a variable speed on-off switch on said handle and connected to said motor.

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