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(54) AN IMPACT TOOL

(71) We, LICENTIA PATENT VERWALTUNGS G.m.b.H., of 1 Theodor-Stern-Kai, 6 Frankfurt/Main 70, Federal Republic of Germany, a German body corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to an impact tool, such as a hammer drill which has an eccentric driven by electric motor via an intermediate shaft and gearing, the eccentric actuating a drive piston housed in a cylinder liner, the piston acting periodically on a freely floating impact body, also located in the cylinder liner, through a compressible medium.

The invention seeks to provide a hammer drill of this type with the minimum amount of expense in as compact, sturdy and light a manner as possible and in particular in a manner which is suitable for easy maintenance.

According to the invention, there is provided an impact tool comprising an eccentric which is driven by an electric motor via an intermediate shaft and gearing in which a drive piston actuated by the eccentric and housed in a cylinder liner and a freely floating impact body also located in the cylinder liner and acted on periodically by the piston through a compressible medium, and a plastics casing part accommodating the electric drive motor and integral with a handle part, the plastics casing part having a metal sleeve which forms a centering cylinder for the cylinder liner, bearings for the shaft of the eccentric and a bore for the intermediate shaft mounting.

Rotary impact hammers are known which have a casing part comprising an integral cast or molded element which mounts the drive shaft of the motor and the crank shaft and forms an angular bearing at the end of the drive shaft of the motor close to the crank shaft and in which the stator sheathing of the electric motor is held radi-

ally by the moulded piece (German Auslegeschrift No. 2 416 191).

In fact, a rotary impact hammer of this type offers certain advantages in assembly, in that it may proceed relatively rapidly, yet the axial expanse of the cast piece results in the hammer having a considerable length owing to the crossbar which is required for mounting the crank shaft on the one hand and on the other hand the crossbars tend towards flexural waves excited by the crank shaft which may result in premature breakage of the crossbars and/or failure of the bearings. Moreover, the drive motor also has to be insulated because of the metallic composition of the casing part and this makes additional expense necessary. Finally, the handle embodies a component which is separate from the casing part which has to be screwed on to the casing part or released therefrom depending on whether the hammer is assembled or dismantled. This necessity also causes additional costs.

In comparison to rotary blow hammers of this type, the casing part in accordance with the invention embodies a combination of plastics and metal, in which the metal sleeve is surrounded on all sides by the plastics casing and the handle is a component part of the casing part. Besides a construction which is comparatively more economical and compact, in dismantling the hammer drill its electrical part is not dismantled, the armature of the drive motor located below the intermediate shaft remains in the casing.

It has proved to be advantageous to injection mould the metal sleeve into the casing part. According to a further idea of the invention, the metal sleeve may be formed in such a way that the eccentric shaft runs at an angle of inclination to a plane passing through the longitudinal axis of the casing. This measure achieves a particularly compact and thus light construction of the hammer drill.

The invention will now be described in

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greater detail, by way of example, with reference to the drawings, in which:—

Fig. 1 shows a longitudinal section through the casing,

5 Fig. 2 shows a view along the section line A—B of Fig. 1,

Fig. 3 shows a front view of the casing,

Fig. 4 shows a section along the line C—D of Fig. 1,

10 Fig. 5 shows a complete casing in side view and partially in section.

As may be seen from Figures 1 and 2 in particular, the casing part comprising a suitable plastics and accommodating the drive motor not drawn here forms an integral unit together with the handle part 2, said unit forming the entire casing. A metallic sleeve 3 is moulded into this unit, this sleeve being surrounded on all sides by plastics. The metal sleeve 3 contains a centering cylinder 5 for the cylinder liner which is not shown here and accommodates the working piston and the impact body. The centering cylinder is provided for this purpose with guide extensions 6 at the handle end around its periphery. Moreover, the metal sleeve 3 has a bore 7 for the intermediate shaft mounting and bearing mountings 8, 9 for the eccentric shaft and moreover delimits a space 10 for accommodating a cross gear, for example in the shape of a mitre wheel gearing (Figure 4).

The eccentric shaft, the intermediate shaft and the mitre gearing are visible from Fig. 5 and characterized there by the reference numbers 11, 12 and 13.

The metal sleeve 3 and its bearing mountings 8, 9 for the eccentric shaft 11 are so constructed that the eccentric shaft runs at an inclined angle to a plane through the longitudinal axis of the casing. The mounting 9 of the eccentric shaft is constructed as a whole such that the space 10 surrounding the cross and mitre gearing is separated in lubricant tight manner from the crank chamber 14. Moreover, an opening 15 is provided in the upper side of the casing through which the crank chamber 14 is accessible. This opening is closed by a plastics lid 16.

The handle shell is designated 17 and seals off the switch chamber and a chamber accommodating commutator of the motor and the bush holders located in the handle part 2.

15 In terms of space, a grease chamber 19 for the lubricant supply of the mitre wheel gearing is arranged adjacent the cylindrical wall 18 encircling the intermediate shaft 12 (Fig. 3).

The intermediate shaft 12 is set in rotation by the drive motor 20 by means of a toothed wheel combination not shown and drives the eccentric shaft 11 via the mitre gearing 13. An eccentric 24 is joined to the eccentric shaft 11, the eccentric actuating the working piston 21 located in the cylinder liner 23. The freely floating impact body 22 is influenced by the working piston 21 by means of air as a medium so that it performs a motion to and fro and acts on the tool either indirectly or directly.

WHAT WE CLAIM IS:—

1. An impact tool comprising an eccentric which is driven by an electric motor via an intermediate shaft and gearing in which a drive piston actuated by the eccentric and housed in a cylinder liner and a freely floating impact body also located in the cylinder liner and acted on periodically by the piston through a compressible medium, and a plastics casing part accommodating the electric drive motor and integral with a handle part, the plastics casing part having a metal sleeve which forms a centering cylinder for the cylinder liner, bearings for the shaft of the eccentric and a bore for the intermediate shaft mounting. 75
2. A tool according to claim 1, wherein the metal sleeve is injection moulded into the casing part. 80
3. A tool according to claim 1 or 2, wherein the eccentric shaft runs at an angle to a plane passing through the longitudinal axis of the casing. 85
4. A tool according to any one of claims 1 to 3, wherein the metal sleeve is provided with a first chamber for gearing between the intermediate shaft and the eccentric and a second chamber for the eccentric itself, the two chambers being separated in a lubricant tight manner. 90
5. A tool according to claim 4, wherein an opening is provided in the casing for access to the crank chamber. 95
6. A tool according to any one of claims 1 to 5, wherein a grease chamber for the lubricant supply to the gearing is disposed adjacent a cylindrical wall encircling the intermediate shaft. 100
7. An impact tool substantially as described herein with reference to the drawings. 110

For the Applicants:
J. F. WILLIAMS & CO.,
Chartered Patent Agents,
34 Tavistock Street,
London, WC2E 7PB.

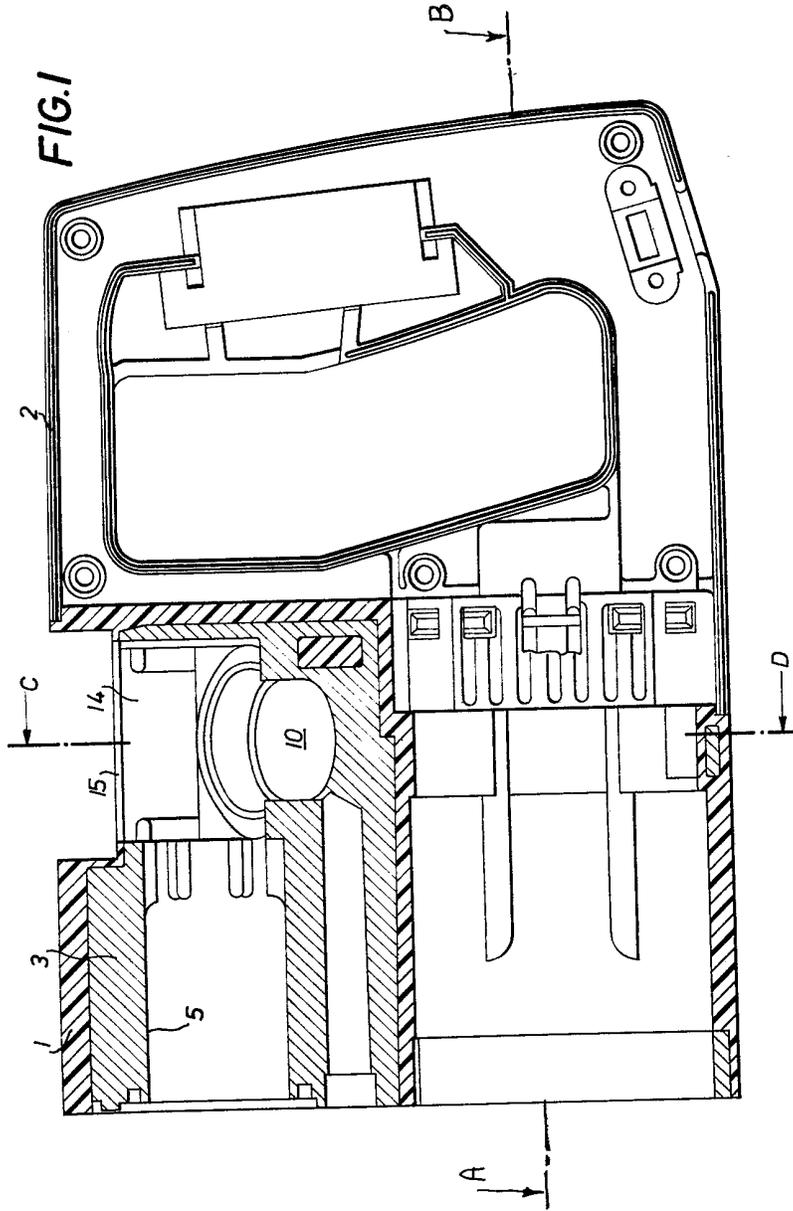
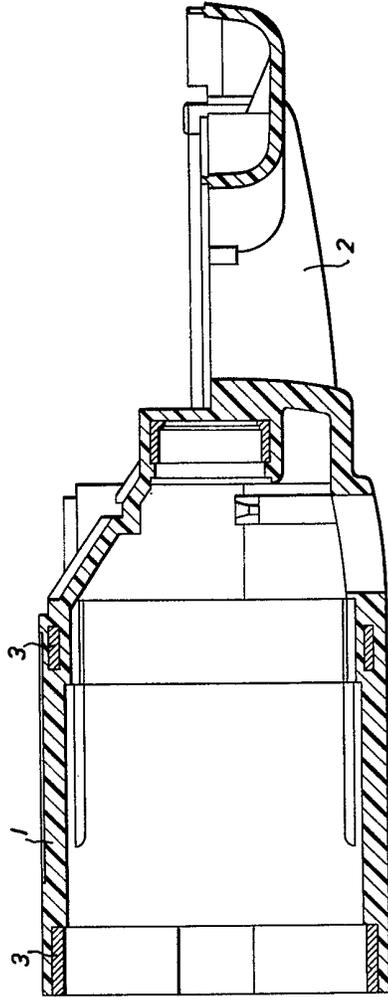


FIG. 2



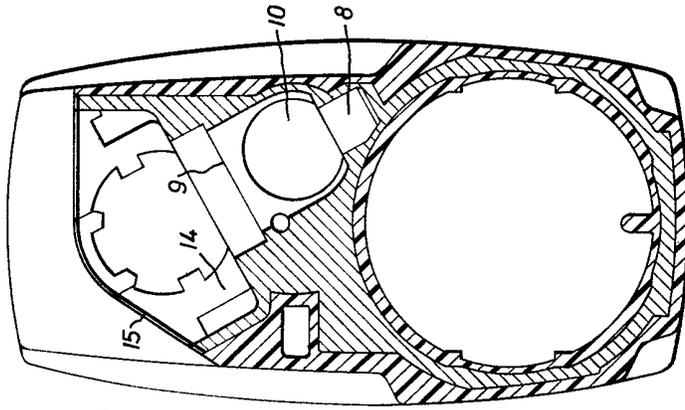


FIG. 4
C-D

FIG. 3

