

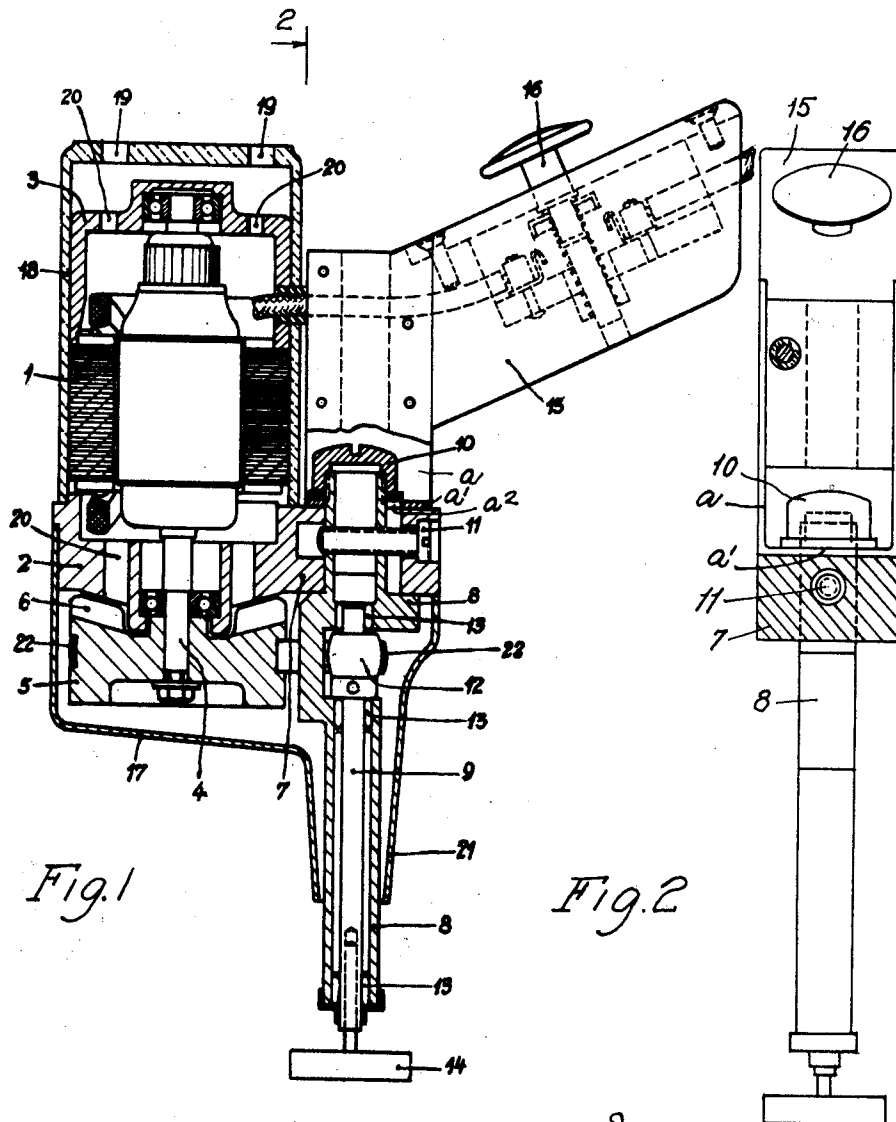
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PORTABLE ELECTRICAL TOOL

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PORTABLE ELECTRICAL TOOL

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The present invention relates to electrically driven hand directed machines and more particularly to an electrically driven hand grinding machine.

5 In order to enable small surfaces, for instance, of steel or other material, to be quickly and neatly finished, grinding wheels driven by compressed air are already employed in which the wheel spindle has a speed of 50,000 revolutions or more
10 per minute. As however, a source of compressed air is frequently not available, the use of these tools is limited.

The electric hand-motor grinding-machines hitherto generally used are indeed provided at
15 one part with gearing by which in a known construction the speed of the tool spindle is brought up to about 12,500 revolutions per minute. In this case, the motor is so heavy that the machine can only be held with both hands.
20 Consequently, its handling is very inconvenient. Furthermore, the grinding disc in order to have a sufficient peripheral speed must have a large diameter, so that small surfaces cannot be treated by it.

25 The object of the invention is to produce a small electrical machine which is equal to the compressed air tool in manipulation and capacity. According to the invention, the motor, whilst being of small diameter and weight, which
30 enables it to be conveniently held with one hand, has a high speed when running under no load of about 8,000–12,000 revolutions per minute, and is so geared to the tool spindle that this latter has a speed of 30,000 to 50,000 and more revolutions
35 per minute when running under no load, in order to attain a sufficient peripheral speed for a tool disc of small diameter.

An example of construction of the invention is shown in the drawing in which

40 Fig. 1 is a longitudinal sectional view, and

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, looking in the direction of the arrows, the lower casing cap being removed.

45 A small electric hand motor 1 of the usual cylindrical construction has a diameter of about 5 cm. and a length of about 8.5 cm. The motor shaft 4, mounted in the two bearing brackets 2 and 3, carries a belt pulley 5, which is constructed so as to act at the same time also as
50 a fan disc 6. The bearing bracket 2 has on its lower side an extension 7, in which is secured a holder or bearing sleeve or bracket 8 for a tool spindle 9 by means of a cap-nut 10 and an adjusting screw 11. The spindle 9 on which
55 a belt pulley 12 is fastened is mounted in three

needle roller-bearings 13 and carries a removable small grinding disc 14. On the rear side of the extension 7 is fastened a handle 15, in which is fitted a switch 16 for the current circuit of the motor 1, the base part a' of a U-shaped stirrup a secured to handle 15 being secured or connected to bearing bracket or sleeve 8 by means of nut 10 screwed on the threaded rear end of the bearing bracket, said bracket passing through an opening a^2 in the base part of the stirrup.
10 The handle is thus secured or directly connected to the spindle bearing bracket or sleeve at a point closely adjacent one end of the tool spindle and co-linear with the axis thereof whereby the distance between the working end of the tool
15 spindle and the point where the hand of the operator holds the machine (the handle) is reduced to a minimum; furthermore, the handle is arranged alongside of the motor. This arrangement provides a very compact well-balanced tool
20 which is easily handled and guided, notwithstanding the extremely high speeds at which both the motor and spindle rotate. Two casing caps 17 and 18 of insulating material enclose the machine. In the bottom of the cap 18, holes 19
25 are provided, and in the two bearing-brackets 2 and 3 are passages 20, which enable the motor 1 to be sufficiently cooled by the air drawn in by the fan 6. The cap 17 has a tubulure 21 surrounding the holder 8. The air from the fan
30 6 emerging from the tube 21 cools the tool spindle 9, and at the same time blows away the dust which arises when grinding.

The belt pulley 5 serves at the same time as a fly-wheel disc in order to compensate for variations in load on the motor in intermittent working. After slackening the cap-nut 10, the slot in which is accessible through an opening in the handle 15, the distance of the holder 8 from the motor shaft 4 can be altered by the screw 11,
40 in order to enable the tension of the belt 22 on the two belt pulleys 5 and 12 to be adjusted.

The motor has a speed when running without load of about 10,000–12,000 revolutions per minute, which is increased by the belt gearing to about 40,000 to 50,000 revolutions per minute. Consequently, even when using small grinding discs, a sufficiently high peripheral speed can be attained for instance of 20 metres per second.

The needle roller bearings 13 permit the holder 8 to be of small diameter, which is of advantage, for instance, in the internal grinding of small bores.

As will be seen from the drawing, the handle 15 is connected to the machine in the prolongation of the tool spindle 9; therefore, the tool can be
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conveniently directed by the hand to the place which is to be operated on. Owing to its small dimensions, the motor is of low weight, so that the weight of the complete machine including the conducting cable is considerably below 1,000 grams. The machine is therefore easy to handle. The motor can be easily connected by a cable to the electric lighting mains existing in any workshop. This cable is considerably lighter and more portable than the air-pipe which is necessary in known compressed air tools.

If desired, the machine can also be fastened by a supporting yoke or the like on the slide-rest of a lathe, or other alterations may be made. For example, a belt pulley drive can be provided at both ends of the motor shaft, and correspondingly the tool spindle is then fitted with two belt pulleys. It will be obvious that instead of the grinding disc other tools can be secured in the spindle. Further, one end of the motor shaft can be constructed as a holder for a milling cutter, drill or other tool which does not require such a high speed of rotation.

We declare that what we claim is:

1. An electrically driven hand directed machine comprising a casing, an electric motor mounted in said casing, a tool spindle mounted to rotate in said casing, a combined heavy belt pulley and fan connected to said motor shaft, a belt pulley on said spindle, and a driving belt connecting said pulleys.

2. An electrically driven hand directed machine comprising a casing, an electric motor mounted in said casing, a tool spindle rotatably mounted in said casing, gear means connecting said spindle and said motor, fan means mounted on said motor shaft, and a cover enclosing said fan means and having a tubular extension enshrouding said spindle so that the fan means directs a blast of air upon a tool connected to said spindle.

3. An electrically driven hand directed machine comprising a casing, an electric motor mounted in said casing, a spindle, a housing for said spindle adjustably secured to said casing, a pulley on the shaft of said motor, a pulley on said spindle, a belt connecting said pulleys, and means to secure said housing in the adjusted position to maintain the correct tension on said belt.

4. An electrically driven hand directed machine comprising a casing, an electric motor mounted in said casing, a tool spindle, a housing for said spindle, means for adjustably securing said housing to said casing, needle roller bearing means supporting said spindle in said housing, a belt pulley connected to said motor constructed to operate as a flywheel and fan simultaneously, a belt pulley on said spindle, a belt connecting said pulleys, and a cover enclosing said pulley and said spindle housing to direct a blast of air upon said tool spindle.

5. A portable electrically driven machine for performing grinding and similar operations at high speed and which is light enough and small enough to be supported and operated by one hand, said machine comprising a casing, an electric motor mounted in said casing and at one side thereof to rotate at 8,000 to 10,000 revolutions per minute when running light, a tool spindle rotatably mounted in said casing at the other side thereof, gear transmission means connecting said motor to said spindle to rotate said spindle at 30,000 to 50,000 revolutions per minute when running light, and a handle secured to said casing at a point colinear with the axis of said spindle and alongside of said motor.

6. A portable electrically driven machine for performing grinding and similar operations at high speed and which is light enough and small enough to be supported and operated by one hand, said machine comprising a casing, an electric motor mounted in said casing and at one side thereof to rotate at 8,000 to 10,000 revolutions per minute when running light, a tool spindle rotatably mounted in said casing at the other side thereof, and transmission means in said casing and connecting said motor to said spindle, said transmission means comprising a belt pulley on the motor shaft, a belt pulley on the said spindle, a driving belt connecting said pulleys to rotate said spindle at 30,000 to 50,000 revolutions per minute, and a handle secured to said casing and alongside of said motor at a point closely adjacent one end of said spindle and co-linear with the axis thereof.

7. A portable electrically driven machine for performing grinding and similar operations at high speed comprising a casing, an electric motor mounted in said casing, a tool spindle mounted in said casing and along side of said motor, means in said casing connecting said tool spindle to said motor, and a handle secured to said casing at a point closely adjacent one end of said tool spindle and co-linear with the axis thereof.

8. An electrically driven hand directed machine comprising a mounting, a tool spindle rotatably mounted therein, a handle secured to said mounting closely adjacent one end of said tool spindle and in alinement with the axis thereof, an electric motor mounted in said mounting alongside of said tool spindle and handle, and gear means connecting said motor and said tool spindle.

9. A portable electrically driven machine for performing grinding and similar operations at high speed comprising a tool spindle, mounting means including a handle for rotatably mounting said tool spindle, said handle being closely adjacent one end of said tool spindle and in alinement with the axis thereof, and an electric motor for rotating said tool spindle, said motor being secured to said mounting means at one side of and out of alinement with the axis of said tool spindle and handle.

10. An electrically driven hand directed machine comprising an electric motor, a spindle-bearing bracket, a tool spindle journaled in said bracket, a common mounting for said motor and said spindle-bearing bracket, gear means connecting said motor and said tool spindle, and a handle secured to said spindle-bearing bracket.

11. An electrically driven hand directed machine comprising a casing, an electric motor mounted therein, a motor bearing bracket provided with a lateral extension, a tool spindle, a bearing sleeve for said spindle secured to the extension of said motor bearing bracket, gear means connecting said motor and said spindle, and a handle secured to said spindle bearing sleeve.

12. A portable electrically driven machine for performing grinding and similar operations at high speed comprising a casing, an electric motor mounted therein, a tool spindle, a bearing sleeve for said spindle secured to said casing and by the side of said motor, means in said casing connecting said tool spindle to said motor, and a handle secured to said sleeve at a point adjacent one end of said tool spindle and co-linear with the axis thereof.

13. An electrically driven portable tool comprising a casing, a bearing sleeve extending from

said casing, a motor in said casing, a spindle driven by said motor and extending along said bearing sleeve, a cooling fan driven by said motor, and an enclosing sleeve arranged around said bearing sleeve for guiding the air from said fan along the bearing sleeve.

14. An electrically driven portable tool comprising a casing, a bearing sleeve extending from said casing, a motor in said casing, a spindle driven by said motor and extending along the

bearing sleeve, an enclosing member arranged around and spaced from the bearing sleeve so as to form an air passage, and a cooling fan driven by the motor and adapted to draw air through the motor and to discharge the same through the passage formed between said member and said sleeve.

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