Nov. 14, 1939. H. H. KUEHNE 2,179,724

NUT OR SCREW SETTING ATTACHMENT FOR ELECTRIC TOOLS

Filed Nov. 3, 1937

Fig. 1

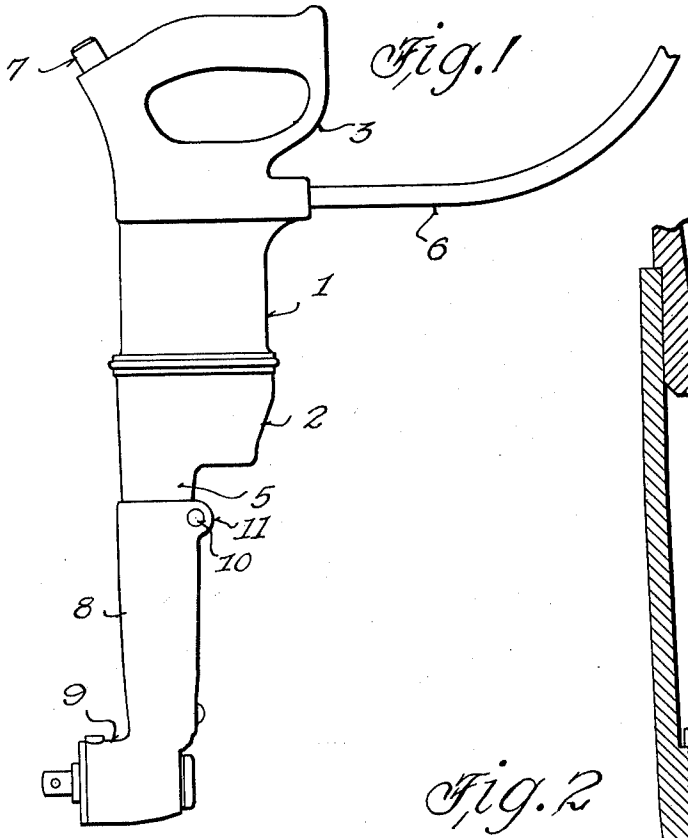


Fig. 2

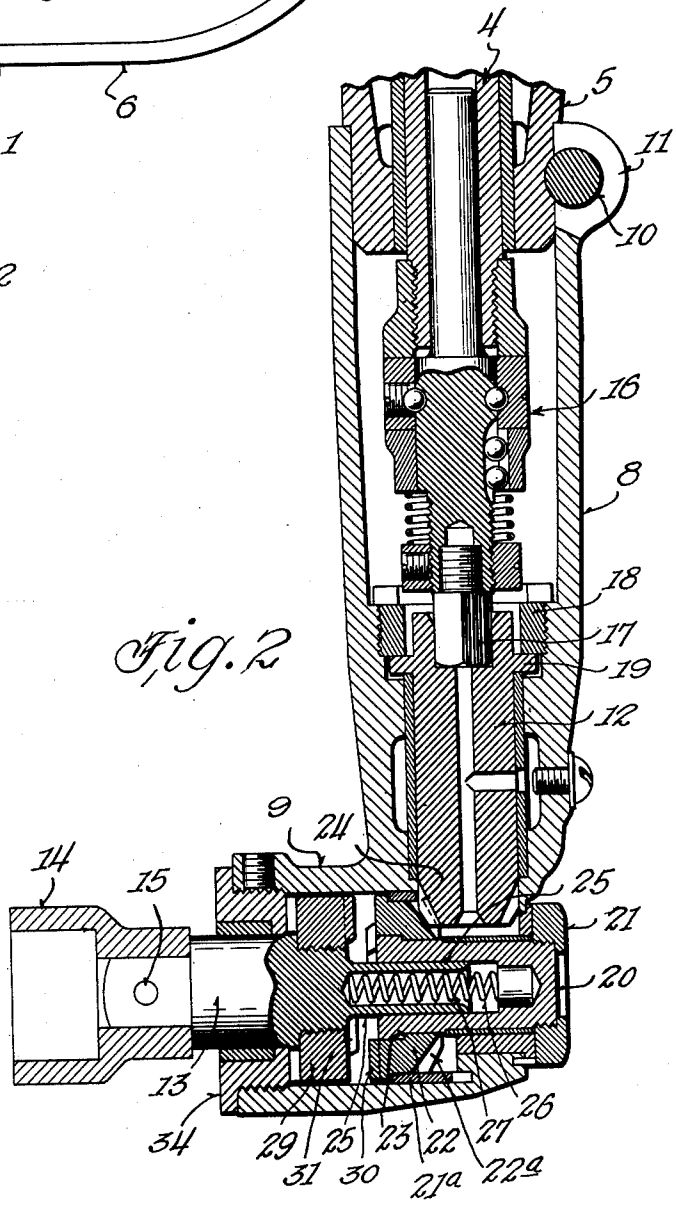


Fig. 3

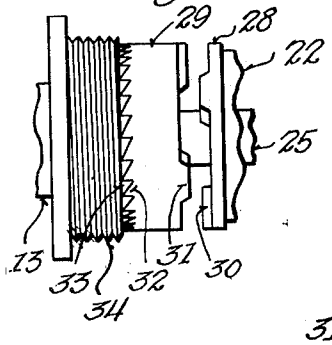
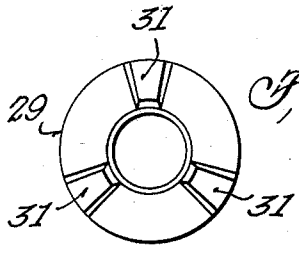


Fig. 4



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NUT OR SCREW SETTING ATTACHMENT FOR ELECTRIC TOOLS

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2 Claims. (Cl. 81—57)

This invention relates to nut and screw driving attachments for electrically motor driven portable tools.

The invention has particular reference to an attachment having a combined power and ratchet clutch combination whereby the increased leverage afforded by the manual turning of the entire tool through its handle equipment may be employed to impart a final set to the screw or nut being driven after the power clutch releases without putting any of the load on the tool motor or stopping its rotation.

The general purpose and object of my invention is to provide an attachment so compact in construction that it takes up relatively little room in the direction in which the tool is applied to the work so that the tool may be used in confined quarters as frequently encountered in motor vehicle, railway car, building, and other constructions.

Another object of the invention is to provide an angular attachment, that is, an attachment in which the work driving spindle is in transverse relation to the axis of the tool spindle and extends to one side thereof so that the tool may reach work in places precluding engagement in axial alinement therewith.

A further object of the invention is to provide a bevel gear connection between the attachment spindle and its driving element so that the attachment spindle and its power and ratchet clutch combination may be confined to one side of the attachment to reduce its overall dimensions at the work engaging portion of the device.

The invention consists further in the features hereinafter described and claimed.

In the accompanying drawing—

Fig. 1 is a side elevational view of an electrically motor driven portable tool provided with my improved attachment;

Fig. 2 is a longitudinal sectional view with parts in elevation on a larger scale of the attachment and the adjacent portion of the electric tool;

Fig. 3 is an elevational view of the power and ratchet clutch assembly; and

Fig. 4 is a face view of one of the members of the clutch assembly.

In the drawing, 1 indicates the motor case of the tool, 2 indicates the gear case, and 3 indicates the handle section as in electrically motor driven portable tools of the type depicted in Fig. 1. The parts referred to are secured together in the assembled relation shown, the electric motor (not shown) being housed in the motor case 1.

The spindle 4 of the tool, shown in Fig. 2, is journaled in the gear case 2 and projects exteriorly of the tool at its front end through a tubular extension 5 on the gear case 2 as in tools of the character illustrated. The spindle 4 is offset laterally from the armature shaft (not shown) of the motor and has a reducing gear connection therewith, also not shown. This is common practice in these tools and the arrangement is well understood.

The cable for connecting the tool to a source of electric current supply is shown at 6. The switch for controlling the supply of current to the tool motor is located in the tool casing and has an operable member 7 mounted in the handle section 3 and accessible from the exterior thereof as indicated in Fig. 1. In the tool shown, the handle member 3 is at the rear end of the tool and may be of the closed grip type.

The attachment or device of my invention comprises an outer casing formed to provide a body section 8 and a transverse end section 9. The latter is rigidly secured to the body section 8 being preferably case integral therewith and extends to one side only of the body section as shown in Fig. 2. The purpose of this arrangement will presently appear.

The attachment is detachably secured to the tool casing through its section 8, the latter being open at its inner end to receive and fit about the gear case projection 5. A bolt 10 is shown for clamping the section 8 on the projection 5, the section 8 being slotted at its inner end as at 11 so that the bolt may tightly clamp the section 8 on the projection 5.

Journaled in the section 8 is a shaft element 12, and journaled in the section 9 is a spindle element 13. These elements, like the housing sections 8 and 9, are in right angular relation, the element 12 driving the element 13 through a bevel gear connection to be presently referred to. The element 13 extends out of the section 9 and is equipped at its outer end with a nut driving socket 14 as shown. This part is releasably connected to the spindle 13 by a spring biased detent 15 as in devices of this character so that sockets for different nut sizes may be used with the spindle 13 within the capacity of the tool. A nut engaging socket may be formed directly in the outer end of the spindle element 13 in which case a smaller size nut can be driven than provided for by the attachable sockets. For driving screws, a fixture having a screw driving blade would be connected to the spindle 13.

The shaft 12 is connected to the tool spindle 4

for rotation thereby through an arbor 16. The latter has screw threaded connection at one end with the tool spindle 4 and is provided with a non-circular portion 17 at its other end for entry into a similarly shaped recess at the inner end of the shaft 12 as shown. The shaft 12 is held in place in the housing section 8 by a co-operating ring nut 18 and a flange 19 shown in Fig. 2.

A non-rotatable cylindrical support 20 is fixed in the housing section 9 by a nut 21. The support 20 is arranged in the section 9 in crossing relation to the shaft 12 and provides a mounting for a ring-like member 22. The latter co-acts with a positioning shoulder 23 on the support 20 and is held in operative relation to the shaft 12 by the nut 21 and a spacer element 21*a*. The member 22 is provided with bevel gear teeth 22*a* which mesh with bevel gear teeth 24 on the end of the shaft 12 where said shaft extends into the housing section 9.

The spindle element 13 is slidably and rotatably mounted in the housing section 9 and has a tubular extension 25 extending into an axial bore 26 in the support 20. The extension 25 receives a coiled spring 27 which as shown in Fig. 2 normally urges the spindle element 13 outwardly to separate the co-acting clutch members of the power clutch and to engage the teeth of the ratchet clutch to be now described.

The power clutch comprises a pair of co-operable clutch members 28, 29 interposed between the gear element 22 and the spindle element 13. In the embodiment shown, the clutch member 28 and the gear element 22 are one part. The clutch member 29 is carried by the spindle element 13. The clutch members have co-acting clutch teeth 30, 31 on their opposed surfaces, both sets of teeth having inclined side faces to provide for slippage between the clutch members when the resistance offered by the screw or nut when set is greater than the applied torque of the tool motor.

The ratchet clutch is interposed between the spindle element 13 and the casing section 9. This is accomplished by providing co-operating ratchet teeth 32, 33 on the clutch member 29 and a clamp member 34 which closes the outer end of the section 9 and is screwed into the same. The spindle element 13 extends through and is journaled in this clamp member, the latter being fixed against rotation when in final position by a set screw as shown.

The device shown and described operates as follows. The parts are normally in the positions shown in Fig. 2, the spring 27 maintaining the power clutch disengaged and the ratchet clutch engaged. Hence, the entire tool by its handle equipment may be turned manually to give a final set to the screw or nut following its tightening by the power clutch. This affords increased leverage for tightening the work without stopping the rotation of the tool motor or putting any of the load thereon. This is essential in an electrically motor driven tool for any resistance placed on the motor to stop its rotation would likely burn out the motor or otherwise damage it. With the leverage of the entire tool available for this final tightening of the work, tools of lesser power, and consequently less cost, may be used for setting larger screws and nuts.

To engage the power clutch, the tool after being applied to the work is pressed against the same. This compresses the spring 27 and engages the clutch members 28, 29 causing the tool spindle 4 to rotate the attachment spindle 13. It is to be understood that the tool motor is set in operation before the tool is engaged with the work, and is maintained in operation as long as the tool is used in a nut or screw setting operation. In this way the full power of the tool motor is available for rapidly setting the screws or nuts by power and a number of screws or nuts may be quickly set in succession. As soon as the screw or nut is set by the motor, the power clutch automatically slips when the resistance offered by the work overcomes the applied torque of the motor. The operator then releases the pressure of the tool against the work and the spring 27 expands separating the power clutch and engaging the ratchet clutch. This connects the spindle element 13 with the tool casing and final tightening of the work may be made by hand as hereinbefore mentioned. The ratchet teeth are set to turn the work in the direction to set same, while slipping in the opposite direction so that the tool may be reversely turned to set the teeth to new leverage positions as may be required in the use of the tool.

The bevel gear drive affords a compact construction because a connection may be made intermediate the ends of the spindle element 13, without extending the spindle or the gear mounting out of its housing section 9 beyond the section 8. This confines the projection of the attachment to one side only of the section 8 and thus the tool may be used in confined and awkwardly positioned quarters. Also, the section 9 projects only a relatively slight distance from the casing section 8 and the tool is well adaptable for close quarters as frequently found in automobile, railway, vehicle and other construction work. In the tool shown, the attachment is positioned for reaching overhead work. The attachment may be turned about the axis of the tool spindle for reaching work in other positions. The member 34 holds the spindle element 13 in the housing 9 when the attachment is removed from a drill.

The details of construction and arrangement of parts shown and described may be variously changed and modified without departing from the spirit and scope of my invention, except as pointed out in the annexed claims.

I claim as my invention:

1. A screw or nut driving device of the character described, comprising an outer casing having a body section and a connected transverse section, the latter extending to one side of the body section, a shaft journaled in the body section and having bevel gear teeth at its end extending into the transverse section, a support fixed against rotation in the transverse section in crossing relation to said shaft, a spindle slidably and rotatably mounted in the transverse section and having a portion extending into said support, a power clutch in the transverse section and having co-operable clutch members connectible on pressing the device against the work, one clutch member being rotatably mounted on and about said support and having exteriorly of said support clutch teeth on one face and bevel gear teeth on the opposite face in mesh with the gear teeth of the shaft, the other clutch member being fixed to the spindle and having clutch teeth on its face opposed to the first named clutch member and ratchet teeth on the opposite face, means fixed to the transverse section and having ratchet teeth for co-operation with the ratchet teeth on the last named clutch member, and a spring means disposed within the support and acting on the

spindle for normally separating the members of the power clutch and engaging the teeth of the ratchet clutch.

2. A screw or nut driving device of the character described, comprising an outer casing having a body section and a connected transverse section, the latter extending to one side only of the body section, a shaft journaled in the body section and having bevel gear teeth at its end adjacent the transverse section, a member fixed to and closing the outer end of the transverse section, a second member fixed to and closing the opposite end of said transverse section and having a portion providing a support within the transverse section between said members, a spindle extending through and slidably and rotatably mounted in said first mentioned closure member, said spindle being engageable with the work at its outer end and having a portion extending into said support, a power clutch in the transverse section and having co-operable clutch members, one rotatably mounted on said support and having bevel gear teeth on one face in mesh with the gear teeth of the shaft and clutch teeth on the opposite face, the other clutch member being fixed to the spindle and having clutch teeth on its face opposed to the first named clutch member and ratchet teeth on its opposite face, said first mentioned closure member having ratchet teeth engageable with the ratchet teeth on the last named clutch member, and spring means housed within the support and acting on the spindle for normally separating the members of the power clutch and engaging the teeth of the ratchet clutch.

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