March 1, 1955 G. STEUKERS 2,703,029

AXIAL IMPACT TYPE PERCUSSIVE TOOL

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FIG.1.

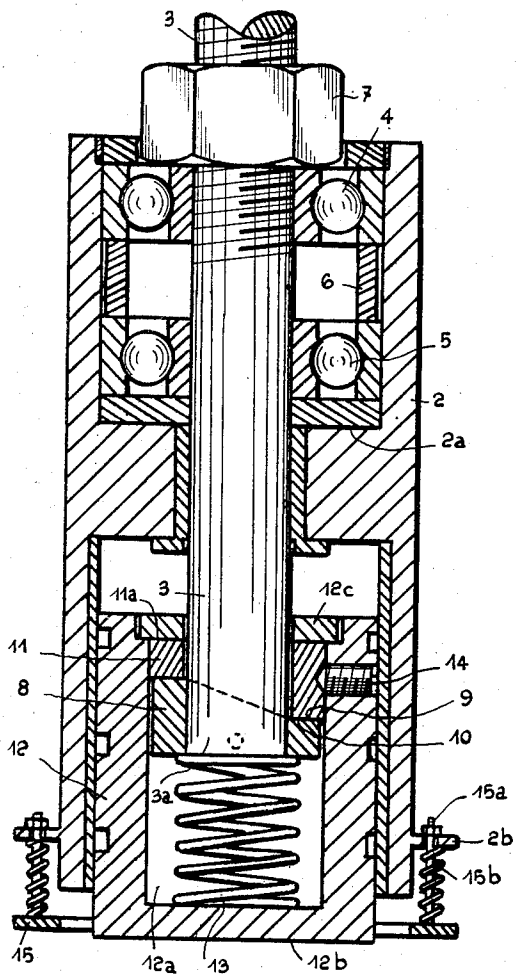
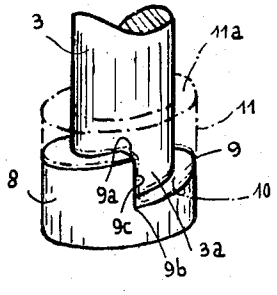


FIG.2.



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AXIAL IMPACT TYPE PERCUSSIVE TOOL

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Claims priority, application Belgium December 8, 1952

7 Claims. (Cl. 81—52.35)

Certain operations, such as the straightening or reshaping of vehicle body plates which have been bent, are effected by means of a hammer and a holding up tool, i, e. the operator holds the hammer in his hand and with it strikes the plate to be bent which is supported by a holding up tool of suitable shape. The use of this hammer does not permit rapid work.

Other operations such as making holes in walls, driving in nails and the like also require a hammer. Up to the present time the hammer has been actuated by hand for lack of mechanical apparatus easy to handle and reliable and rapid in operation.

The present invention concerns apparatus for this purpose according to the invention, means are provided for transforming rotary movement of a driving shaft into rectilinear reciprocating movement of the tool.

According to a further feature of the invention, these means consist of a rotating element rigid with the tool and provided with a helicoidal surface co-operating with a similar surface provided on a hollow cylinder against which an abutment rigid with the tool to be driven is made to bear. In addition, the helicoidal surface forms only one turn, of which the two extremities are connected by a surface situated in a radial longitudinal plane.

According to a further feature, the rotating element and the hollow cylinder are accommodated in a cavity in the tool, which cavity also accommodates a spring tending to force the tool out of a casing in which it is guided; the cavity is closed by a ring against which the hollow cylinder bears.

Lastly, a collar is provided which is attached to the casing, by means of rods sliding in eyes, in such a manner that the collar is nearly flush with a flat surface of the tool when the latter has reached the end of its forward movement.

Further details will appear in the course of the following description with reference to the accompanying drawings which illustrate one embodiment of the invention, chosen by way of example and in which:

Fig. 1 is a diagrammatic view, in axial longitudinal section, of a hammer provided with means according to the invention, and

Fig. 2 is a view in perspective of part of the rotating element, and the hollow cylinder.

In Fig. 1 a driving shaft **3** enters a casing **2** acting as a guide. Centering is effected by means of bearings **4** and **5** separated by a distance piece **6** and held against a shoulder **2***a* by a nut **7**.

The shaft **3** rotated by driving means not shown in the drawing has keyed to its end **3***a* an element **8** of which the upper surface **9** is of helicoidal shape as shown in Fig. 2. This surface is limited to one turn of which the two extremities **9***a* and **9***b* are connected by a radial surface **9***c*. This surface **9** comes into contact with an identical helicoidal surface **10** provided on a hollow cylinder **11** (shown in dot-dash lines in Fig. 2) of which the base **11***a* is perpendicular to the longitudinal axis. The rotating element **8** and the cylinder **11** are accommodated in a cavity **12***a* of a tool **12** which in the present case ends in a flat surface **12***b*. The tool is at all times subjected to the action of a spring **13**. The cavity **12***a* is closed by a ring **12***c* on which rests the base **11***a* of the hollow cylinder **11** fixed by means of a pin **14**. The rotation of the shaft **3** causes the surface **9** of the element **8** to move over the surface **10** of the cylinder **11** sliding on the said shaft; the ring **12***c* is pushed away

and the tool moves inside the casing and compresses the spring **13**.

When the element **8** has made one rotation it resumes its initial position, i. e. the surfaces **9** and **10** abruptly return to the position shown in Fig. 2. The tool **12** pushed away by the spring **13** delivers a blow which can be utilised for doing certain work.

In Fig. 1, the tool ends in a flat surface **12***b* and the apparatus constitutes a hammer. In this case, for certain uses such as the straightening or reshaping of bent plates a collar **15** is provided which is attached to the casing **2** by means of rods **15***a* provided with springs **15***b* and sliding in eyes **2***b*. This collar **15**, which is situated not quite so far forward as the surface **12***b* when the tool is in its extreme forward position, is made to bear against the plate to be struck, thus making it easy to keep the tool in the correct working position.

It is clear that the tool may be given different shape from that described above, without departure from the scope of the invention; for instance it may be provided with a point for making holes.

What I claim is:

1. An apparatus comprising a casing, a tool and a rotating shaft in said casing, driving means for rotating said shaft, a rotating element at the end of said shaft, said rotating element being a cylinder carried at the end of said rotating shaft and provided with a helicoidal surface, said surface consisting of a single turn of which the two extremities are directly connected by a surface situated in a radial plane, a member rigid with said tool and cooperating with said surface on said cylinder so as to impart a rectilinear reciprocating movement to said tool, said member rigid with said tool being a hollow cylinder fixed to said tool and ending in a helicoidal surface coming into contact with that of the rotating cylinder on said shaft, the helicoidal surface on said hollow cylinder having the same shape as that of said rotating cylinder, said rotating shaft axially passing through said hollow cylinder, said hollow cylinder being provided at the end opposite the helicoidal surface with a base perpendicular to the longitudinal axis of the apparatus.

2. An apparatus comprising a casing, a tool and a rotating shaft in said casing, driving means for rotating said shaft, a rotating element at the end of said shaft, said rotating element being a cylinder carried at the end of said rotating shaft and provided with a helicoidal surface, said surface consisting of a single turn of which the two extremities are directly connected by a surface situated in a radial plane, a member rigid with said tool and cooperating with said surface on said cylinder so as to impart a rectilinear reciprocating movement to said tool, said member rigid with said tool being a hollow cylinder fixed to said tool and ending in a helicoidal surface coming into contact with that of the rotating cylinder on said shaft, the helicoidal surface on said hollow cylinder having the same shape as that of said rotating cylinder, said rotating shaft axially passing through said hollow cylinder, said hollow cylinder being provided at the end opposite the helicoidal surface with a base perpendicular to the longitudinal axis of the apparatus, said hollow cylinder being accommodated in a cavity in the tool and said rotating cylinder being also accommodated in this cavity and being permanently subjected to the action of a helical spring.

3. An apparatus comprising a casing, a tool and a rotating shaft in said casing, driving means for rotating said shaft, a rotating element at the end of said shaft, said rotating element being a cylinder carried at the end of said rotating shaft and provided with a helicoidal surface, said surface consisting of a single turn of which the two extremities are directly connected by a surface situated in a radial plane, a member rigid with said tool and cooperating with said surface on said cylinder so as to impart a rectilinear reciprocating movement to said tool, said member rigid with said tool being a hollow cylinder fixed to said tool and ending in a helicoidal surface coming into contact with that of the rotating cylinder on said shaft, the helicoidal surface on said hollow cylinder having the same shape as that of said rotating cylinder, said rotating shaft axially passing through said hol-

low cylinder, said hollow cylinder being provided at the end opposite the helicoidal surface with a base perpendicular to the longitudinal axis of the apparatus, said hollow cylinder being accommodated in a cavity in the tool and said rotating cylinder being also accommodated in this cavity and being permanently subjected to the action of a helical spring, said cavity in the tool being closed by a ring which is rigid with the tool, and through which said rotating shaft passes and against which said hollow cylinder bears.

4. An apparatus comprising a casing, a tool and a rotating shaft in said casing, driving means for rotating said shaft, a rotating element at the end of said shaft, said rotating element being a cylinder carried at the end of said rotating shaft and provided with a helicoidal surface, said surface consisting of a single turn of which the two extremities are directly connected by a surface situated in a radial plane, a member rigid with said tool and cooperating with said surface on said cylinder so as to impart a rectilinear reciprocating movement to said tool, said member rigid with said tool being a hollow cylinder fixed to said tool and ending in a helicoidal surface coming into contact with that of the rotating cylinder on said shaft, the helicoidal surface on said hollow cylinder having the same shape as that of said rotating cylinder, said rotating shaft axially passing through said hollow cylinder, said hollow cylinder being provided at the end opposite the helicoidal surface with a base perpendicular to the longitudinal axis of the apparatus, said hollow cylinder being accommodated in a cavity in the tool and said rotating cylinder being also accommodated in this cavity and being permanently subjected to the action of a helical spring, said cavity in the tool being closed by a ring which is rigid with the tool, and through which said rotating shaft passes and against which said hollow cylinder bears, said cavity being accommodated in said cylindrical casing serving as a guide for the tool.

5. An apparatus comprising a casing, a tool and a rotating shaft in said casing, driving means for rotating said shaft, a rotating element at the end of said shaft, said rotating element being a cylinder carried at the end of said rotating shaft and provided with a helicoidal surface, said surface consisting of a single turn of which the two extremities are directly connected by a surface situated in a radial plane, a member rigid with said tool and cooperating with said surface on said cylinder so as to impart a rectilinear reciprocating movement to said tool, said member rigid with said tool being a hollow cylinder fixed to said tool and ending in a helicoidal surface coming into contact with that of the rotating cylinder on said shaft, the helicoidal surface on said hollow cylinder having the same shape as that of said rotating cylinder, said rotating shaft axially passing through said hollow cylinder, said hollow cylinder being provided at the end opposite the helicoidal surface with a base perpendicular to the longitudinal axis of the apparatus, said hollow cylinder being accommodated in a cavity in the tool and said rotating cylinder being also accommodated in this cavity and being permanently subjected to the action of a helical spring, said cavity in the tool being closed by a ring which is rigid with the tool, and through which said rotating shaft passes and against which said hollow cylinder bears, said cavity being accommodated in said cylindrical casing serving as a guide for the tool, said tool ending in a flat surface.

6. An apparatus comprising a casing, a tool and a rotating shaft in said casing, driving means for rotating said shaft, a rotating element at the end of said shaft, said rotating element being a cylinder carried at the end of said rotating shaft and provided with a helicoidal surface, said surface consisting of a single turn of which the two extremities are directly connected by a surface situated in a radial plane, a member rigid with said tool and cooperating with said surface on said cylinder so as to impart a rectilinear reciprocating movement to said tool, said member rigid with said tool being a hollow cylinder fixed to said tool and ending in a helicoidal surface coming into contact with that of the rotating cylinder on said shaft, the helicoidal surface on said hollow cylinder having the same shape as that of said rotating cylinder, said rotating shaft axially passing through said hollow cylinder, said hollow cylinder being provided at the end opposite the helicoidal surface with a base perpendicular to the longitudinal axis of the apparatus, said hollow cylinder being accommodated in a cavity in the tool and said rotating cylinder being also accommodated in this cavity and being permanently subjected to the action of a helical spring, said cavity in the tool being closed by a ring which is rigid with the tool, and through which said rotating shaft passes and against which said hollow cylinder bears, said cavity being accommodated in said cylindrical casing serving as a guide for the tool, said tool ending in a flat surface, said casing having eyes through which rods pass, each of which is surrounded by a spring and which carry a collar adapted to bear against the surface on which the tool is to operate.

7. An apparatus comprising a casing, a tool and a rotating shaft in said casing, driving means for rotating said shaft, a rotating element at the end of said shaft, said rotating element being a cylinder carried at the end of said rotating shaft and provided with a helicoidal surface, said surface consisting of a single turn of which the two extremities are directly connected by a surface situated in a radial plane, a member rigid with said tool and cooperating with said surface on said cylinder so as to impart a rectilinear reciprocating movement to said tool, said member rigid with said tool being a hollow cylinder fixed to said tool and ending in a helicoidal surface coming into contact with that of the rotating cylinder on said shaft, the helicoidal surface on said hollow cylinder having the same shape as that of said rotating cylinder, said rotating shaft axially passing through said hollow cylinder, said hollow cylinder being provided at the end opposite the helicoidal surface with a base perpendicular to the longitudinal axis of the apparatus, said hollow cylinder being accommodated in a cavity in the tool and said rotating cylinder being also accommodated in this cavity and being permanently subjected to the action of a helical spring, said cavity in the tool being closed by a ring which is rigid with the tool, and through which said rotating shaft passes and against which said hollow cylinder bears, said cavity being accommodated in said cylindrical casing serving as a guide for the tool, said tool ending in a flat surface, said casing having eyes through which rods pass, each of which is surrounded by a spring and which carry a collar adapted to bear against the surface on which the tool is to operate, said collar being disposed at such a distance from the end of said casing that the flat bottom of said tool projects a little beyond the collar when said tool is at the end of its movement.

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