Nov. 30, 1948. J. A. RAVELLA 2,455,270

AUTOMATIC STRIKING TOOL

Filed Sept. 19, 1945 2 Sheets-Sheet 1

Fig. 1

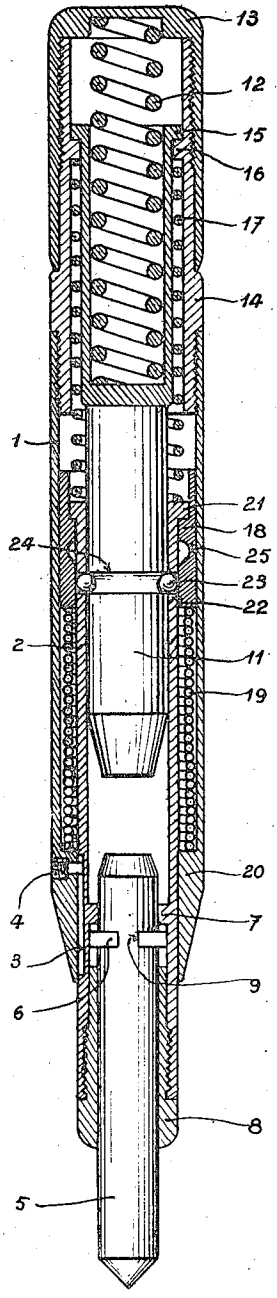


Fig. 2

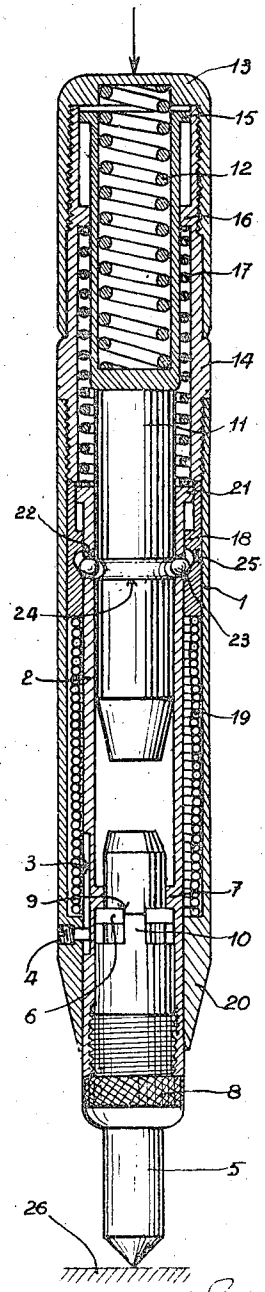
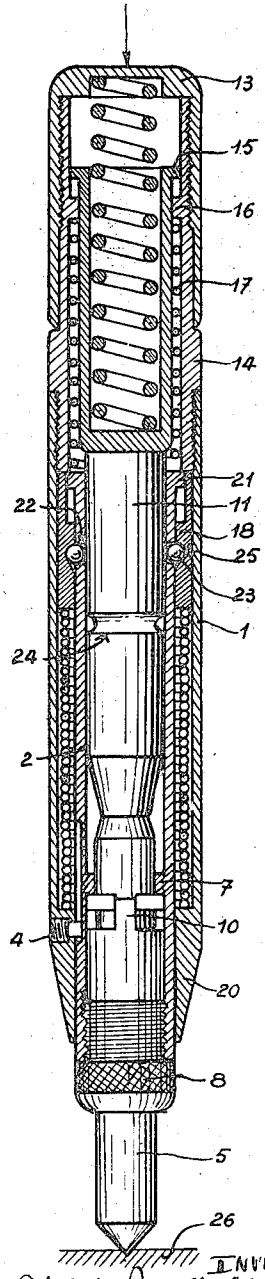


Fig. 3



INVENTOR
Jean Adolphe Ravella (deceased)
Valentine Ravella (Executor)
By Alexander Mowell
ATTORNEYS

Nov. 30, 1948. J. A. RAVELLA 2,455,270

AUTOMATIC STRIKING TOOL

Filed Sept. 19, 1945 2 Sheets-Sheet 2

Fig. 4

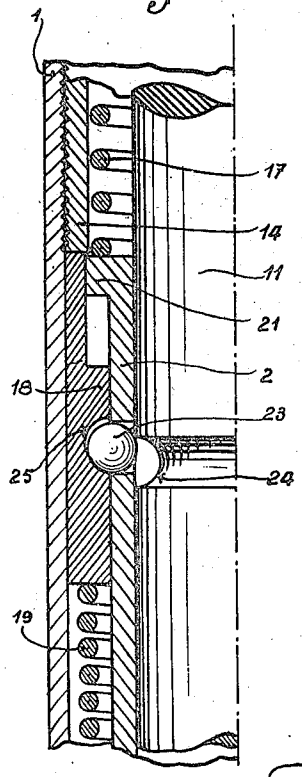


Fig. 5

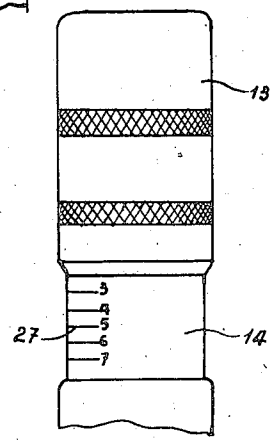
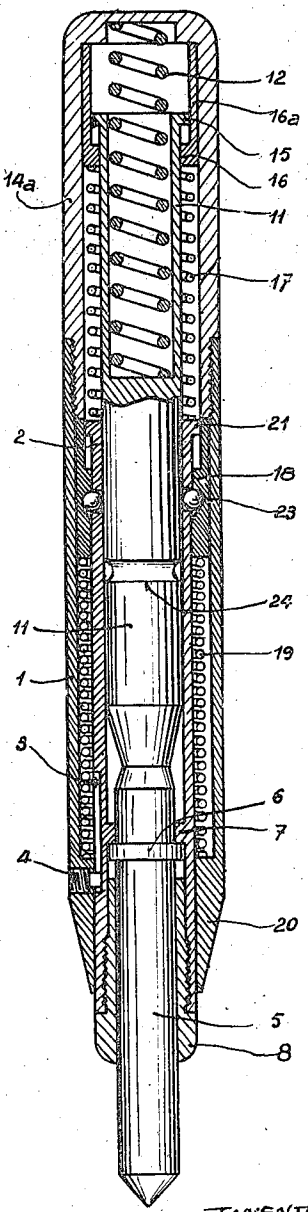


Fig. 6



INVENTOR:-
Jean Adolphe Ravella (deceased)
Valentine Anda (Executor)
By Alexander Towell
ATTORNEYS

Patented Nov. 30, 1948

2,455,270

UNITED STATES PATENT OFFICE

2,455,270

AUTOMATIC STRIKING TOOL

Jean Adolphe Ravella, deceased, late of Lyon, France, by Valentine Auda, executrix, Lyon, France, assignor to Société à responsabilité limitée "Mermet & Virthner," Villeurbonne (Rhone), France, a French company

Application September 19, 1945, Serial No. 617,281
In France February 26, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires February 26, 1963

14 Claims. (Cl. 81—52.35)

1

This invention refers to a tool comprising an inner spring loaded hammer so disposed that by pressing this tool against an object a blow is delivered on a striking head forming the working end of the tool. This striking head may be, for instance, a conical center-point adapted to strike a center-mark, an engraving punch, a hollow punch or any other type of elementary tool acting under the action of a blow.

The known automatic tools of the kind above referred to generally comprise a movable outer part, such as the handle proper or a part thereof, which may be lowered with respect to the other portions of the tool against the action of an inner spring resting against an inner movable hammer retained by appropriate pawls. When the spring is sufficiently compressed, the pawls are automatically disengaged and the hammer strikes the striking head of the tool.

A first object of the invention is to provide an automatic tool of the kind above referred to which will comprise no pivoted pawl able to wear off too rapidly and difficult to house within a handle of normal design.

Another object of the invention is an automatic striking tool for hand purposes, wherein the hammer may be heavy enough to deliver a strong blow under the action of a spring of average strength, which the operator may compress without exerting an exaggerated effort.

A further object of the invention is an automatic tool of the kind above referred to, wherein the hammer is retained against the action of the spring by balls movable in holes in a fixed wall having a lesser thickness than the diameter of the balls, such balls co-acting with depressions provided in the hammer and in a slidable retaining part, in such a way that in the free state the balls are maintained in the depressions of the hammer by the plain portion of the retaining part, while at the end of the stroke of the movable handle the retaining part is moved, whereby the balls may penetrate into its depressions and become disengaged from the hammer which is thus freed.

In the annexed drawings:

Fig. 1 is a general longitudinal section of an automatic striking tool according to this invention, in the free state.

Fig. 2 is a similar section showing the parts when the handle has been depressed but before the hammer is freed.

Fig. 3 similarly shows the parts when the blow has been delivered.

2

Fig. 4 is an enlarged detailed section showing a ball when the hammer becomes free.

Fig. 5 is a partial view illustrating the upper end of the tool with the scale indicating the adjustment of the striking spring.

Fig. 6 shows in longitudinal section a modified construction.

The tool illustrated in Figs. 1 to 5 comprises an outer body or handle 1 which houses a slidable socket 2 provided with a longitudinal groove 3 co-operating with the end of a screw 4 fixed to handle 1. Groove 3 is limited in length and screw 4 therefore acts as a slidable key limiting the longitudinal motion of socket 2 with respect to handle 1.

The lower end of socket 2 is open and is adapted to receive removable points or punches, such as the conical center point 5, such points or punches being provided with a shoulder 6 retained with a given amount of longitudinal play between an inner shoulder 7 of socket 2 and an end ring 8. Point 5 is passed through ring 8, as shown. It is also to be noted that shoulder 6 is discontinuous and comprises a notch 9 which is engaged by a projection 10 of ring 8 in such a way that point 5 is prevented from rotating with respect to ring 8 when ring 8 is screwed up.

The hammer 11 is a cylindrical body sliding within the upper portion of socket 2 and adapted to strike the upper end of center point 5. The upper end of hammer 11 above socket 2 is hollow and houses the lower end of a strong striking spring 12 the upper end of which abuts against a cap 13 screwed on the upper end of a sleeve 14, itself screwed on the upper end of body 1. As shown, the upper edge of hammer 11 is turned outwardly as indicated at 15 and its downward stroke is limited by an inner shoulder 16 provided within sleeve 14.

Another spring 17, of much less strength than spring 12, abuts against the upper end of socket 2 and under shoulder 16, thus tending to lower socket 2 with respect to body 1 or vice versa, this motion being limited by screw 4 and groove 3 as above explained.

There is disposed between socket 2 and body 1 a slidable ring 18 resting on a light spring 19 which in turn rests on an inner shoulder forming the lower part 20 of body 1. The lower part of ring 18 has an inner diameter substantially equal to the outer diameter of socket 2, while its upper part is somewhat larger and accommodates the flanged upper end 21 of socket 2.

The wall of socket 2 is provided with a number of holes 22 adapted to house balls 23 which,

being larger in diameter than the thickness of this wall, project inwardly into a circular groove 24 provided in hammer 11, when the tool is at rest (position of Fig. 1). It is to be noted that balls 23 are radially retained by the slidable ring 18. Hammer 11 is thus longitudinally keyed with respect to socket 2. But ring 18 is also provided with an internal groove 25 which is normally situated above balls 23, and when ring 18 is lowered against the action of spring 19, groove 25 comes in front of balls 23 which become free to move radially, whereby hammer 11 is freed.

The operation is as follows:

When the tool is not in use (Fig. 1) the striking spring 12 maintains the flanged upper edge 15 of hammer 11 against the inner shoulder 16 of sleeve 14. Spring 17 has lowered socket 2 with respect to body 1. Ring 18 is maintained by spring 19 at its uppermost position for which its lower internal diameter abuts against the flanged upper end of socket 2. Groove 25 is thus well above balls 23 which act as keys inserted between socket 2 and hammer 11 to prevent any respective longitudinal motion of these parts. It will be noted that the upward movement of body 1 with respect to socket 2 is limited by the flanged upper end 15 of hammer 11 which abuts against shoulder 16 as above explained. Point 5 is at any intermediate position between the extreme positions determined by the longitudinal play of shoulder 6 between ring 8 and shoulder 7.

Point 5 is placed on an appropriate piece of work 26 (Fig. 2) and the handle of the tool is lowered, such handle being formed of body 1 with sleeve 14 and cap 13. Shoulder 6 of point 5 comes into contact with shoulder 7 and springs 17 and 12 are thereafter simultaneously compressed, the first one between shoulder 16 and the flanged upper end 21 of socket 2, the second one between cap 13 and hammer 11, the latter being longitudinally keyed by balls 23 with socket 2 which acts as a fixed ball supporting partition, since it rests on the work.

The lower end of sleeve 14 comes into contact with the upper end of ring 18 (Fig. 2) and lowers the same against the action of spring 19. Groove 25 thus moves towards balls 23 until the latter may penetrate into the same under the action of the edges of groove 24 (Fig. 2 shows the parts just before this moment). Hammer 11 then becomes free to move under the action of spring 12 and it delivers a strong blow on the upper end of point 5 which penetrates into the work 26 (Figs. 3 and 4).

It will be observed that owing to the axial play of the shoulder 6 of point 5 between shoulder 7 and ring 8, the blow is not transmitted to socket 2. Point 5 is quite independent from the other parts of the tool and the operator does not feel the blow.

When the handle is permitted to raise again, balls 23 are at first retained in groove 25 by the ungrooved portion of hammer 11 and they axially connect ring 18 and socket 2 with each other. Ring 18 therefore does not move while body 1 and sleeve 14 are raised by the combined action of springs 12 and 17. Spring 19 remains in the compressed state.

When the shoulder 16 of sleeve 14 comes into contact with the flanged end 15 of hammer 11, spring 12 is rendered inactive and hammer 11 is raised by spring 17 together with sleeve 14.

When screw 4 reaches the upper end of groove 3, the circular groove 24 of hammer 11 comes in front of balls 23. The latter are forced into groove 24 by the oblique edge of the internal groove 25 of ring 18, which is thus freed and resumes its initial position under the action of spring 17. Hammer 11 is again locked with socket 2 and the parts are in the position of Fig. 1.

The blow delivered by hammer 11 may be varied by screwing or unscrewing cap 13 on sleeve 14, the latter being preferably provided with graduations 27 (Fig. 5). Spring 12 may also be changed at will by removing said cap.

Owing to the small radial dimension of the ball-lock, it is possible to house the same within a normal tool handle without having to reduce the diameter of the hammer and consequently its mass. The improved tool besides comprises no pivoted pawl liable to become ineffective under the action of wear; balls 23 remain spheric and the ball-lock operates satisfactorily even after prolonged use.

Instead of the conical center point 5, the tool described may receive punches, for instance engraving punches for jewelry or for marking mechanical parts, without the need of an ordinary hammer. Due to projection 10 (Figs. 2 and 3) the punch used is prevented from rotating and its position with respect to screw 4 remains invariable, which is essential in the case of an engraving punch. Point 5 may also be replaced by any elementary tool actuatable by a blow, for example, by a hollow-punch, a chisel, etc. The improved tool may even be used as a hammer, for instance for nailing, point 5 being in such a case replaced by a flat-ended rod which is pressed against the nail head.

In the modified construction of Fig. 6, sleeve 14 and cap 13 of Figs. 1 to 6 are formed of one and the same part 14*a*. Shoulder 16 is formed at the lower end of a sleeve 16*a* loose within part 14*a*, said sleeve receiving the upward pressure of spring 17. The operation remains the same, but during the upward stroke of the handle spring 12 must become wholly unloaded before sleeve 16*a* may begin to raise under the action of spring 17 and to lift hammer 11. The length of spring 12 in the free state has therefore to be exactly determined and the force of the blow can only be varied by changing said spring 12.

It is claimed:

1. An automatic striking tool of the character described comprising a body having abutments at its upper and lower ends; a striking head vertically slidable at the lower end of said body; a vertical member resting on said striking head and vertically slidable therewith in said body, said member having holes; balls in the holes of said member, said balls being larger in diameter than the thickness of said member; a hammer adapted to vertically slide against one face of said member and to strike said striking head, said hammer having a groove adapted to co-act with said balls at the uppermost position of said hammer to longitudinally lock said hammer to said member; a ball-retaining part slidable against the face of said member opposed to said hammer, said ball-retaining part having depressions adapted to co-act with said balls at the lowermost position of said ball-retaining part to unlock said hammer from said member; spring means interposed between the member and the abutment at the upper end of said body and adapted to act downwardly on said hammer when said body is lowered with respect to said striking head; other spring means interposed between the abutment at the lower end of the body and the ball-retain-

ing part to maintain said ball-retaining part at its uppermost position in which same prevents said balls from freeing said hammer under the action of said first-named spring means; and means on the body to lower said ball-retaining part against the action of said second-named spring means to cause the depressions of said part to co-act with said balls at the end of the downward stroke of said body with respect to said striking head; and means for yieldably urging the hammer into contact with the striking head.

2. In an automatic striking tool as claimed in claim 1, said member being tubular and said hammer being formed as a cylinder slidable therein.

3. In an automatic striking tool as claimed in claim 1, said ball-retaining part being tubular, said member being also tubular and slidable in said tubular ball-retaining part, and said hammer being formed as a cylinder slidable in said tubular member.

4. In an automatic striking tool as claimed in claim 1, said body being hollow, said ball-retaining part being tubular and slidable longitudinally in said body, said member being also tubular and slidable in said tubular ball-retaining part, and said hammer being formed as a cylinder slidable in said tubular member.

5. An automatic striking tool of the character described comprising a tubular body; a member longitudinally slidable in said tubular body, said member having a circular row of holes and being spaced from said body in the vicinity of said row of holes; balls in the holes of said member, said balls being larger in diameter than the thickness of said member; a slidable striking head at the lower end of said member; a cylindrical hammer slidable in said member, said hammer having a circular groove adapted to receive said balls at the uppermost position of said hammer within said member to lock said hammer to said member; a tubular ball-retaining part slidable in the annular space between said member and said body to urge said balls into said groove, said part having an inner circular groove adapted to co-act with said balls at the lowermost position of said part with respect to said member to unlock said cylindrical hammer from said member; a cap at the upper end of said tubular body; spring means interposed between said cap and said cylindrical hammer and adapted to act downwardly on said hammer when said body is lowered with respect to said member; other spring means interposed between the lower end of said tubular body and said ball-retaining part to yieldably maintain said part at its uppermost position in which it prevents said balls from freeing said hammer under the action of said first-named spring means; and means on the body to lower said ball-retaining part against the action of said other spring means to cause the inner groove of said part to co-act with said balls at the end of the downward stroke of said tubular body with respect to said member.

6. In an automatic striking tool as claimed in claim 5, said means to lower said tubular ball-retaining part consisting of an inner abutment formed on said tubular body.

7. In an automatic striking tool as claimed in claim 5, said cylindrical hammer being outwardly flanged at its upper end and said tubular body being formed with an inner shoulder co-acting with the flanged end of said hammer to limit the downward motion of said hammer with respect to said tubular body under the action of said first-named spring means when said body is in the vicinity of its uppermost position with respect to said tubular member.

8. In an automatic striking tool as claimed in claim 5 said cylindrical hammer being outwardly flanged at its upper end; said tubular body being formed with an inner shoulder co-acting with the flanged end of said hammer to limit the downward motion of said hammer with respect to said tubular body under the action of said first-named spring means when said body is in the vicinity of its uppermost position with respect to said tubular member; and said cap being adjustable longitudinally on said tubular body to permit of adjusting the blow of said hammer on said striking head.

9. An automatic striking tool of the character described comprising a tubular body; a tubular member longitudinally slidable in said tubular body, said member having a circular row of holes and being spaced from said body in the vicinity of said row of holes; balls in the holes of said tubular member, said balls being larger in diameter than the thickness of said tubular member; a striking head axially slidable within the lower end of said tubular member; means to limit the sliding movement of said striking head with respect to said tubular member; a cylindrical hammer slidable in said tubular member, said hammer having a circular groove adapted to receive said balls at the uppermost position of said hammer within said tubular member to lock said hammer to said member; a tubular ball-retaining part slidable in the annular space between said tubular member and said body to urge said balls into said groove, said part having an inner circular groove adapted to co-act with said balls at the lowermost position of said part with respect to said tubular member to unlock said cylindical hammer from said member; a cap at the upper end of said tubular body; spring means interposed between said cap and said cylindrical hammer and adapted to act downwardly on said hammer when said body is lowered with respect to said tubular member; other spring means interposed between the lower end of said tubular body and said tubular ball-retaining part to yieldably maintain said part at its uppermost position in which it prevents said balls from freeing said hammer under the action of said first-named spring means; and means on the body to lower said tubular ball-retaining part against the action of said other spring means to cause the inner groove of said part to co-act with said balls at the end of the downward stroke of said tubular body with respect to said tubular member.

10. In an automatic striking tool as claimed in claim 9, means on the member adapted to prevent said striking head from rotating with respect to said tubular member.

11. In an automatic striking tool as claimed in claim 9, means to prevent said tubular member from rotating with respect to said body.

12. In an automatic striking tool as claimed in claim 11, said cylindrical hammer being outwardly flanged at its upper end and said tubular body being formed with an inner shoulder co-acting with the flanged end of said hammer to limit the downward motion of said hammer with respect to said tubular body under the action of said first-named spring means when said body is in the vicinity of its uppermost position with respect to said tubular member.

13. In an automatic striking tool as claimed in claim 11 said cylindrical hammer being outwardly flanged at its upper end; said tubular body being

formed with an inner shoulder co-acting with the flanged end of said hammer to limit the downward motion of said hammer with respect to said tubular body under the action of said first-named spring means when said body is in the vicinity of its uppermost position with respect to said tubular member; and said cap being adjustable longitudinally on said tubular body to permit adjustment of the force of the blow of said hammer on said striking head.

14. An automatic striking tool of the character described comprising a tubular body; a tubular member longitudinally slidable in said tubular body, said member having a circular row of holes and being spaced from said body in the vicinity of said row of holes; balls in the holes of said tubular member, said balls being larger in diameter than the thickness of said member; a striking head at the lower end of said tubular member; a cylindrical hammer slidable in said tubular member, said hammer having a circular groove adapted to receive said balls at the uppermost position of said hammer within said tubular member to lock said hammer to said member; a tubular ball-retaining part slidable in the annular space between said tubular member and said body to urge said balls into said groove, said part having an inner circular groove adapted to co-act with said balls at the lowermost position of said part with respect to said tubular member to unlock said cylindrical hammer from said member; a cap at the upper end of said tubular body; spring means interposed between said cap and said cylindrical hammer and adapted to act downwardly on said hammer when said body is lowered with respect to said tubular member; other

spring means interposed between the lower end of said tubular body and said tubular ball-retaining part to elastically maintain said part at its uppermost position in which it prevents said balls from freeing said hammer under the action of said first-named spring means; means on the body to lower said tubular ball-retaining part against the action of said other spring means to cause the inner groove of said part to co-act with said balls at the end of the downward stroke of said tubular body with respect to said tubular member; further spring means interposed between said tubular member and said tubular body to return said body to its uppermost position with respect to said member; and means on the body and member to limit the respective longitudinal motion of said tubular body and of said tubular member.

VALENTINE AUDA.

Executrix of the Estate of Jean Adolphe Ravella, Deceased.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
947,391	Michael	Jan. 25, 1910
1,572,046	Seiler	Feb. 9, 1926
2,384,707	Sweet	Sept. 11, 1945

FOREIGN PATENTS

Number	Country	Date
514,924	France	Nov. 19, 1920