March 30, 1948. M. J. FLYNN 2,438,744

TOOL FOR SETTING BUSHINGS OR INSERTS

Filed Feb. 12, 1944

FIG. 7.

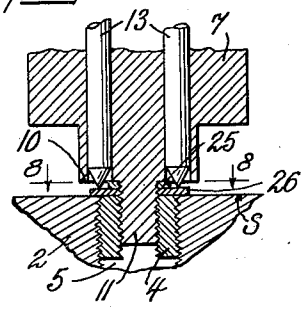


FIG. 1.

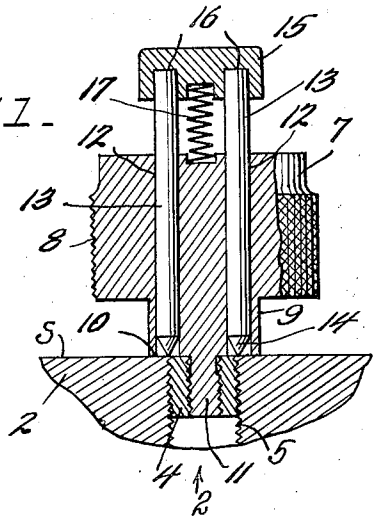
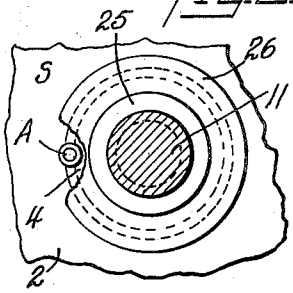


FIG. 8.



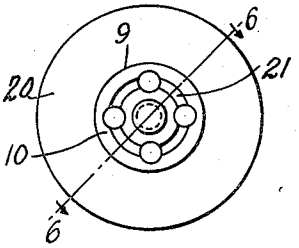


FIG. 5.

FIG. 2.

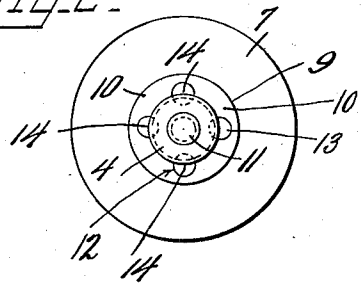


FIG. 6.

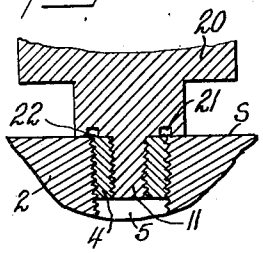


FIG. 4.

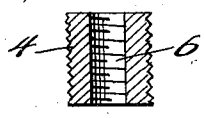
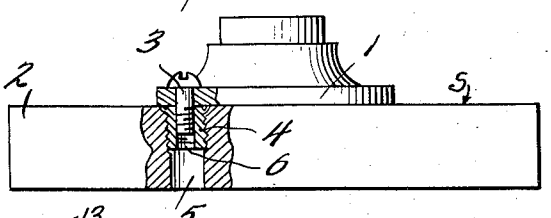


FIG. 3.



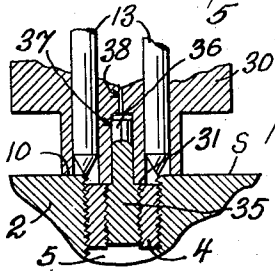


FIG. 9.

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TOOL FOR SETTING BUSHINGS OR INSERTS

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7 Claims. (Cl. 81—10)

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This invention relates to improvements in tools for setting bushings and it is the general object of the invention to provide a tool by which the bushing can be placed correctly for setting and then punched to hold it in the part into which it has been inserted.

It has been found difficult to secure attachments to aluminum or magnesium by screws directly engaging the latter due to the fact that screw threads in such metals are easily mutilated. It is found that if a screw is threaded into and then unscrewed from a tapped hole in such soft metals the threads suffer rapid deterioration such as prevents a fit of requisite tightness. It has been the practice heretofore to overcome this difficulty by inserting hard metal bushings into the soft metal base and then secure the attachments to the bushings. As heretofore practiced, however, this operation has been tedious and time consuming owing to the difficulty of maintaining the top surface of the bushing flush with the adjacent surface of the base while the bushing is being fastened to the base.

It is an important object of my present invention to provide a tool having a threaded stem projecting from a shoulder so arranged that the bushing can be threaded on the stem up to the shoulder. The tool is then rotated to thread the bushing into the tapped hole of the soft base metal. When the shoulder of the tool engages the surface of the base metal the top of the bushing will be flush with the surface of the base. A set of punches are then depressed to upset adjacent parts of the base metal and bushing to hold the latter in place. The punching operation is performed while the bushing is held in correct position with respect to the base metal.

It is another object of the invention to provide means by which the punches will normally be in inoperative position where they will not interfere with threading the bushing into the base metal. This feature of my invention may include a spring actuated cap which yields under a hammer blow to cause all of the punches to have the upsetting operation at the same time. After the bushing has thus been secured to the base metal the punches are raised by the spring to permit turning the tool in a reverse direction without scratching the base metal.

When the upset metal left by the punching operation projects appreciably above the surface of the base or bushing it may interfere with turning of the tool. It is another object of my invention to provide means which prevent the upset metal from interfering with the tool as it is turned reversely for removal.

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With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein four forms of the invention are shown,

Fig. 1 is a vertical section through a tool made according to the preferred form of my present invention showing the bushing and a part of the adjacent metal into which the bushing is threaded,

Fig. 2 is a bottom plan view of the tool and bushing looking in the direction of arrow 2, Fig. 1.

Fig. 3 shows a base of soft metal and a fitting or attachment held thereto by means of a screw threaded into a bushing which has been set in position by the use of my improved tool,

Fig. 4 is a vertical section through the bushing,

Fig. 5 is a view similar to Fig. 2 but with the bushing removed and showing the first modification of the invention,

Fig. 6 is a section on line 6—6, Fig. 5,

Fig. 7 is a view similar to Fig. 1 but showing the second modification in which a washer is employed to space the tool from the base,

Fig. 8 is a horizontal section on line 8—8, Fig. 7, and

Fig. 9 is a view similar to Fig. 1 but showing the third modification.

Referring to Fig. 3, I have shown an attachment 1 which may be of any desired form and a base 2 to which the attachment is to be secured. The base is a soft metal such as aluminum or magnesium or any one of the soft alloys. By means of a screw 3 threaded into a bushing 4 the fitting or attachment 1 can be held tightly against the top surface S of the base 2. The base has a hole 5 therein, the upper part at least of which is threaded to receive the bushing. The bushing has a threaded bore 6 to receive the screw 3. The purpose of Fig. 3 is merely to illustrate the manner in which the bushing is used. The base 2 is of such structure that repeated threading and unthreading of a screw in a hole tapped therein would soon destroy the threads of the tapped hole. A bushing of harder metal must therefore be secured in the position in the base, after which the attachment 1 can be secured to the bushing and removed therefrom as many times as desired without destroying the threaded hole in the base 2.

My invention relates to improved means for

setting the bushing with respect to the base 2, and permits the bushing first to be threaded into the base metal and then secured to the base by a punching operation. In carrying the preferred form of my invention into effect I provide a tool body 7 having an outer knurled surface 8. Extending downwardly from the body 7 is a shank 9 the diameter of which will always be larger than the diameter of the hole 5 in the base 2. The bottom of the shank 9 has a surface or shoulder 10 to engage surface S of base 2 and surface 10 is perpendicular to the axis of the tool.

Extending downwardly from the shank 9 is a reduced stem 11 having external threads to fit the internal threads 6 of the bushing. The stem 11 is concentric with the axis of the tool and may be of any length sufficient to hold the bushing.

Passing vertically through the body 7 are bores 12, four being shown in the present instance. These bores are located at equal distances from the axis of the tool and extend upwardly from the surface 10 through the top of body 7. Located within each bore is a punch 13 having a sharpened lower end 14 for a purpose to be described. A cap 15 is fitted over and secured to the upper ends 16 of the punches 13 and is recessed to receive the upper end of a light compression spring 17 the lower end of which is located in a depression of body 7. The spring tends normally to raise the cap so that the sharpened points 14 of the punches do not extend below the surface 10. The pointed ends 14 of the punches lie on a circle of substantially the same radius as that of the tapped hole in the base 2.

In the use of the tool the bushing is first threaded on to the stem 11 until the upper end thereof engages the surface 10, after which the tool is turned to thread the bushing into the tapped hole 5 on the base 2. The tool is turned until the shoulder 10 engages the top surface S of the base, thus insuring alignment of the top surface of the bushing with the adjacent surface of the base. By a light hammer blow on the cap 15 the punches are then depressed, thereby upsetting adjacent parts of the bushing and base to hold the bushing securely in the base. The tool is then turned in the reverse direction and the stem 11 unthreaded from the bushing, the latter remaining in the base 2.

In the use of the tool as already set forth small burrs are likely to be upset in both the base 2 and the bushing 4 which might interfere with unthreading of the stem 11 from the bushing. When these burrs are small little or no difficulty is experienced in removing the tool, but when they are large enough to project above the level of surface 10 an appreciable amount they may interfere with the reverse turning of the tool necessary to remove it from the bushing. I have set forth herein three modifications of the general arrangement shown in Fig. 1 to adapt the tool for use when the burrs are of considerable size.

The first modification is shown in Figs. 5 and 6 wherein all the parts of the tool are as already described, but I add a small concentric groove 21 which is cut in upwardly in body 20 from surface 10. The center of the groove is located at the same distance from the axis of the tool as the points 14 of the punches. Any burr which may form at point 22, see Fig. 6, as a result of the punching operation will therefore be in the groove and will not interfere with the turning of the tool 20 when it is removed from the bushing.

In the second modification, shown in Figs. 7 and 8, the tool remains the same as shown in Fig. 1, but a flexible washer is used to space surface 10 above the top surface of the base 2. In this second modification I surround the upper part of the stem 11 with a small washer 25 of less diameter than the bore 5 so that it will not interfere with the plungers 13, and below washer 25 I place a second washer 26 of a flexible material such as cork of a diameter preferably larger than that of bore 5. When this second form of the invention is used the bushing is threaded on the stem 11 until it establishes a snug fit with the washer 26, after which the tool is turned to insert the bushing into the bore 5 until the bottom of washer 26 engages the top surface S of the base 2. The plungers 13 are then depressed and pass through the soft cork washer 26 to provide the usual upset deformations in the base and bushing. Since the washers space surface 10 above the base and bushing, the tool can be turned in a reverse direction and be unthreaded from the bushing without interference on the part of the upset areas raised by the punches. In Fig. 8 one such upset area, similar to 22 in Fig. 6, is indicated at A.

In the third modification, shown in Fig. 9, the body of the tool 30 is altered to provide a shoulder 31 which extends downwardly a slight distance below surface 10. In Fig. 9 this distance is somewhat exaggerated for clarity. In the use of this third form of the invention the bushing is threaded on to the stem 35 until it engages the shoulder 31. The bushing is then threaded into the bore 5 until surface 10 strikes the top of the base 2, thereby locating the top surface of the bushing slightly below the top of the base. When the plungers 13 are depressed the burr or upset on the top of base 2 has a tendency to move down into the space lying above the bushing, and any burr raised on the bushing projects upwardly into this space an insufficient amount to reach the surface 10. The tool may therefore be turned in a reverse direction after the punching operation without danger of intereference on the part of the upset areas.

In Fig. 9 I show a feature of the tool which can utilized in the other forms if desired. The stem 35 is made as a separate part and has a shank 36 driven upwardly into a bore 37 opening downwardly from the bottom of the tool through the shoulder 31. The shank 36 is smaller than the threaded part of the stem 35 in order to limit upward movement of the latter with respect to the tool. A vent hole 38 may be provided for the escape of air when the shank is driven into the bore 37. The shank 36 is located centrally of the tool with respect to the plungers 13, hence the lower threaded end of the stem 35 serves to locate the plungers in the same position relatively to the bore 5 as already described.

From the foregoing it will be seen that I have provided a simple tool by which a threaded bushing may be set into a base of soft metal. The tool has a threaded stem to receive the bushing and also has a shoulder which engages not only the bushing but also the adjacent surface of the base 2 so that the top surfaces of the base and bushing will both lie in the same plane. It will also be seen that I have provided a simple means by which adjacent parts of the bushing and base can be upset by means of the punches 13 for the purpose of holding the bushing securely to the base. I have found in practice that it is sufficient to use one punch without the cap 15 and move the punch around from one hole 12 to

the next. It facilitates the operation, however, to have all of the punches depressed at the same time and it is for this reason that I have shown them attached to the cap 15. In the drawings I have shown four punches, but with small bushings three punches will suffice, whereas with larger bushings it may be necessary to increase the number of the punches. The points 14 of the punches all lie on a circle which is concentric with the stem 11 and it is for this reason that the upsetting referred to occurs at the correct points to secure the bushing to the base 2. It will further be seen that the modifications permit turning of the tool in the reverse direction even though the burrs raised by the punches should extend upwardly above the surface 10. This last result can either be accomplished by a groove in the bottom of shank 9, a flexible washer, or an extension on the shank which provides a space below the surface S for the formation of the burrs.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a bushing setting tool having a body, a stem on the body rigid with respect thereto to position the bushing with respect to the body and prevent relative lateral displacement between the bushing and body, a shoulder on the body transverse of the stem to engage the bushing and limit movement thereof on the stem toward the body, the body having a series of bores therethrough terminating in the shoulder, the axes of the bores at the shoulder being spaced from the stem by a distance equal substantially to the radius of the bushing, and punch means guided in said bores for movement toward the bushing.

2. In a tool to set an externally and internally threaded bushing in a base having a screw threaded hole therein to receive the external threads of the bushing, said tool having a body, an externally threaded stem rapidly mounted on the body to fit the internal threads of the bushing and prevent relative lateral displacement of the body and bushing, a shoulder on the body transverse of the stem for engagement with both the bushing and base, and punch means guided by the body in a direction to upset adjacent parts of the bushing and base to secure them together.

3. In a tool to set an externally and internally threaded bushing in a base having a screw threaded hole therein to receive the external threads of the bushing, said tool having a body, a threaded stem rigid with the body to fit the internal threads of the bushing and prevent relative lateral displacement of the body and bushing, a bore in the body parallel to the stem and having its axis spaced from the axis of the stem by a distance equal substantially to the radius of the external threads of the bushing, a shoulder on the body to engage both the base and bushing, and punch means guided in said bore to upset adjacent parts of the bushing and base.

4. In a tool to set an externally and internally threaded bushing in a base having a tapped hole to receive the external threads of the bushing, said tool having a body, an externally threaded stem rigid with the body to enter the internal threads of the bushing and prevent relative lateral displacement of the body and bushing, a shoulder on the body substantially perpendicular to the axis of the stem to engage both the bushing and the base, said body having a series of bores therein the axes of which are spaced from the axis of the stem by a distance equal substantially to the radius of the external threads of the bushing, and punch means guided by said bores for movement toward the bushing to upset adjacent parts of the bushing and base to secure them together.

5. In a tool to set an externally and internally threaded bushing in a base having a threaded hole to receive the external threads of the bushing, said tool having a body, an externally threaded stem on the body to enter the internal threads of the bushing, a shoulder on the tool having a surface transverse of the stem for engagement with both the bushing and the base, and means guided in the body to upset adjacent parts of the base and bushing to hold them together, said body having a recess extending thereinto from said surface to receive the portions of the base and bushing which are upset in the punching operation.

6. In a tool to set an externally and internally threaded bushing in a base having a threaded hole to receive the external threads of the bushing, said tool having a body, a stem on the body to enter the internal threads of the bushing, the body having a series of holes therein the axes of which are parallel to the axis of the stem and spaced therefrom by a distance equal substantially to the radius of the external threads of the bushing, and a soft washer on the stem engaging that end of the bushing adjacent to said body and engaging portions of the base adjacent to said bushing and spacing the body from the base and bushing, and punch means in said bores to penetrate the washer and upset adjacent parts of the bushing and base.

7. In a tool to set an externally and internally threaded bushing in a base having a threaded hole to receive the external threads of the bushin, said tool having a body, an externally threaded stem on the body to enter the internal threads of the bushing, a stop surface on the body to engage the base, a shoulder on the body adjacent the stem extending below the stop surface, and punch means guided by the body to upset adjacent portions of the base and bushing.

MAURICE J. FLYNN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
680,560	Barnes	Aug. 13, 1901
831,162	Hord	Sept. 18, 1906
1,326,195	Hasty	Dec. 30, 1919
1,724,312	Pugh	Aug. 13, 1929
1,797,390	Wood	Mar. 24, 1931
1,952,395	Tillyer et al.	Mar. 27, 1934
2,349,493	Enders	May 23, 1944