

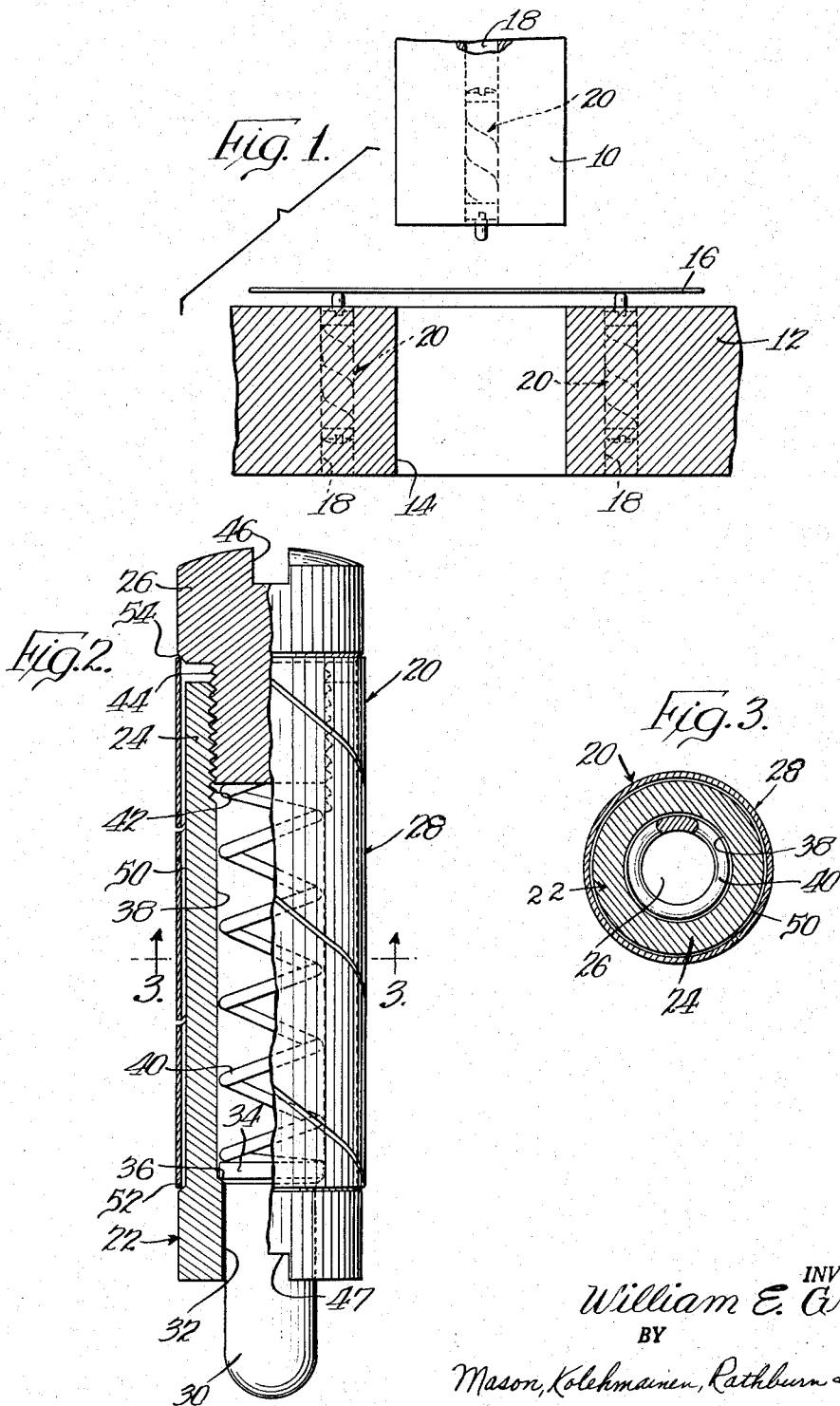
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SPRING PLUNGER

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## SPRING PLUNGER

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The present invention relates to a tool room accessory for jigs, fixtures and dies which is variously called a spring plunger, ejector pin, stripping pin, or an oil pin and which will hereinafter be called a spring plunger.

The primary object of the present invention is to provide a new and improved spring plunger.

A further object of the present invention is to provide a new and improved spring plunger which can be readily applied to a die punch or die block or the like.

A further object of the present invention is the provision of a new and improved spring plunger which can be installed in dies and the like without the necessity of any threading and which can be installed in simply made openings extending through the dies or die block or the like and which can be readily adjusted in the event its position has to be changed for any reason.

Various types of spring plungers have been utilized in the past. One presently used in considerable numbers includes an externally threaded tubular body portion in which is mounted a spring pressed plunger element. This type of spring plunger requires drilling and tapping of an opening in the tool in which it is to be used. It is difficult to install and cannot be adjusted beyond a certain point. One of the difficulties results from the fact that it is substantially impossible to tap openings or holes in the tool deep enough to allow the spring plunger to be screwed in far enough to obtain the desired die life.

The spring plunger of the present invention does not require a tapped hole. It can readily be made to fit any standard sized reamed hole from about one-eighth inch up. It can be locked securely at any point in the hole. It can be removed easily and can be thereafter reinserted.

In brief, the spring plunger of the present invention includes a tubular body within which is mounted a spring pressed plunger element. The tubular body includes an external expansible gripping element and means cooperatively associated with it whereby the element can be expanded against the side walls of the opening or hole in the die or the like in which the plunger is to be mounted. Accordingly, the hole does not need to be threaded and it can be simply formed as by a drilling and reaming operation. The gripping element is preferably made from spring steel and in helical elongated form, the helical arrangement being such that as the ends of the element are forced toward each other, the element expands outwardly tightly to mount the spring plunger in the hole.

Other objects and advantages of the present invention will become apparent from the ensuing description of an embodiment of the invention, in the course of which reference is had to the accompanying drawing, in which:

Fig. 1 is a diagrammatic arrangement illustrating an installation of three of the spring plungers of the present invention, one in a die punch and two in a die block;

Fig. 2 is an enlarged partly sectional view of the spring plunger of the present invention ready for insertion into a hole; and

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Fig. 3 is a transverse cross sectional view of the plunger taken along the line 3—3 of Fig. 2.

Referring now first to Fig. 1 it may be noted that it discloses in diagrammatic fashion a movable die punch 10 and a die block 12 having an opening 14 into which the die punch 10 is adapted to be moved to effect a punching operation. Supported above the die block 12 is a sheet metal work piece 16 which is adapted to be punched or perforated by the movable die punch 10.

When sheet metal such as the work piece 16 is punched it has a tendency to adhere to either one or both of the die members 10 and 12. This is particularly true if the metal or the machinery is oily as it usually is. In order to eliminate such sticking of the work piece or the punched out portion of it, the tool herein illustrated is shown provided with structure defining three openings 18 within which are mounted spring plungers 20 constructed in accordance with the present invention. One of the spring plungers is located in the movable die punch in order to strip or eject the punched out portion of the work piece from it and the die block 12 is shown as including two of the spring plungers in order to lift the work piece from the die body after the punching operation, as for the purpose of facilitating its movement or removal.

The spring plunger 20 of the present invention includes a body 22 comprising the two parts 24 and 26 which are movable longitudinally relative to each other and gripping element 28 which is adapted to be expanded outwardly securely to engage the walls of the opening 18 in which the spring plunger is mounted. One portion of the body, in this case body portion 24, is made tubular slidably to receive a work engaging plunger element 30 having an end projecting axially outwardly through an opening 32 in the body member 24. The element 30 has an enlarged head 34 abutting against an internal shoulder 36 formed between the opening 32 and the inner wall 38 of body member 24. The head 34 is engaged by an elongated helical spring 40 whereby the pin 30 is normally maintained in its projected position but is movable into the portion 24 upon the application of force thereto as, for example, when the movable die punch engages the work piece and moves it down in the course of the performance of the punching operation.

In order to expand the gripping element 28, the body elements 24 and 26 are mounted for longitudinal movement relative to each other. This movement is provided as by providing the upper (as viewed in Fig. 2) end of body member 24 with internal threads 42 and a reduced diameter portion of the body member 26 with the external threads 44, these threads being of the usual "right hand" type. The upper end of the body portion 26 and the lower end of body portion 24 are provided as with screwdriver slots 46 and 47, respectively, whereby they can be moved toward each other to expand the gripping element and away from each other to free it.

The gripping element 28 is preferably formed from some resilient material such as spring steel and in the shape of a helix, the pitch of which is about 45° but which may be in the range of about 30° to 60°. It should be noted also that the pitch is arranged to give the gripping element a "left hand thread." The gripping element 28 is formed so as to be supported in an external cylindrical channel 50 formed in a body portion, preferably portion 24. The gripping element should encircle rather closely the channel portion of body 24 so that its ends abut against the resulting opposed bevelled shoulder portions 52 and 54 formed in what might be considered the heads of the body portions 24 and 26. As a result, the movement of the two body portions toward each other expands the spring element outwardly. Not only is the

spring element moved or expanded outwardly by the bevelled portions but the helical arrangement insures that the spring element will expand substantially throughout its length thereby to provide a holding action over a considerable area. Also, the left and right hand threads on the gripping element and body portions, respectively, insures good working of the arrangement. For one thing, the gripping element provides a locking action to maintain the body elements in adjusted position. Also the arrangement contributes toward expansion of the gripping element over its full length.

From the foregoing detailed description of the present invention it may be observed that the spring plunger of the present invention can be made readily. Likewise it can be easily installed in through holes and requires no threading or tapping. Also, it can be adjusted as to its position at any time in the event the dimensions of the die are to be changed as a result of use or for any other reason. Adjustment can be effected very easily by effecting relative rotation of the body parts as by screwdrivers or other tools inserted into the opposed slots 46 and 47 at the opposite ends of the pin.

While the present invention has been described in connection with the details of an illustrative embodiment, it should be understood these details are not intended to be limitative of the invention except as set forth in the accompanying claims.

Having thus described my invention, what I desire to secure by United States Letters Patent is as follows:

1. A spring plunger for mounting in a tool or the like, having structure defining a hole therethrough including in combination, a body supporting a spring pressed plunger element normally projecting from the body adapted to be inserted into said opening with said plunger normally projecting from one end of said hole, and means for fixedly securing the body in the opening comprising an outwardly expansible gripping element mounted on said body and adapted to grip the hole defining structure of the tool, and means for expanding said gripping element against said structure, said expansion means comprising a rotatable member accessible through the other end of said hole.

2. A spring plunger for mounting in a die block, having structure defining an opening, including in combination, a body having relatively rotatable portions movable toward and away from each other, a spring pressed plunger element normally projecting from an end of one of said portions, and an outwardly expansible wall structure gripping element mounted on said body with opposite ends thereof in engagement with respective ones of said movable body portions and expansible outwardly to engage said wall structure when said body portions are moved toward each other to axially compress said wall structure.

3. A spring plunger for mounting in a tool or the like, having wall structure defining an opening, including in combination, a body having portions which are threadedly interconnected and movable toward and away from each other, said portions having head portions with oppositely facing external shoulders defining an external cylindrical channel between them, a spring pressed plunger element mounted in and normally projecting from an end of one of said portions, and an outwardly expansible wall structure gripping element of tubular helical construction mounted in said channel in engagement with said shoulders and expansible outwardly to engage said wall structure when said body portions and shoulders are moved toward each other, the threads on said body portions and the thread on said gripping element spiraling in opposite directions.

4. A spring plunger for mounting in a tool or the like, having wall structure defining an opening, including in combination, a body having portions movable toward and away from each other, said portions having head portions

with oppositely facing external bevelled shoulders defining an external cylindrical channel between them, a spring pressed plunger element normally projecting from an end of one of said portions, and an outwardly expansible wall structure gripping element mounted in said channel in engagement with said shoulders and expansible outwardly to engage said wall structure when said body portions and shoulders are moved toward each other, said gripping element being of elongated helical construction having a pitch of about forty-five degrees, the helical arrangement being such as to give the gripping element a left hand thread and the body portions having a right hand threaded connection to provide the relative movement between them.

5. A spring plunger for mounting in a tool or the like, having wall structure defining an opening, including in combination, a body having portions movable toward and away from each other, said portions having head portions with oppositely facing external shoulders defining an external cylindrical channel between them, a spring pressed plunger element normally projecting from an end of one of said portions, and an outwardly expansible wall structure gripping element mounted in said channel in engagement with said shoulders and expansible outwardly to engage said wall structure when said body portions and shoulders are moved toward each other, said gripping element being of elongated helical construction being such as to give the gripping element a left-hand thread and the body portions having a right-hand threaded connection to provide the relative movement between them.

6. A spring plunger for mounting in a tool or the like having a cylindrical bore through, comprising a substantially cylindrical body supporting a spring pressed plunger element normally projecting from the body, said body having a maximum external diameter which is less than the internal diameter of said bore, means for fixedly securing the body in the opening comprising an outwardly expansible gripping element mounted on the body, and means including two relatively rotatable parts of said body for expanding said gripping element against the wall of said bore, said rotatable parts being respectively accessible through the opposite ends of said hole.

7. A spring plunger for mounting in a tool or the like, having wall structure defining an opening, including in combination, a body having threadedly engaged portions movable toward and away from each other, said body portions having heads with oppositely facing external shoulders defining an external channel between them, one of said body portions having a hole therein, a plunger element mounted in said hole and normally projecting from one end of said one body portion through said hole, a spring disposed in said hole between the other of said body portions and said plunger to resiliently bias said element in said normally projecting position, and an outwardly expansible wall structure gripping element mounted in said channel in engagement with said shoulders and expansible outwardly to engage said wall structure when said body portions and shoulders are moved toward each other.

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