June 22, 1965 R. H. ARMACOST 3,190,160

SLUG SHEDDER

Filed April 3, 1963

FIG. 1.

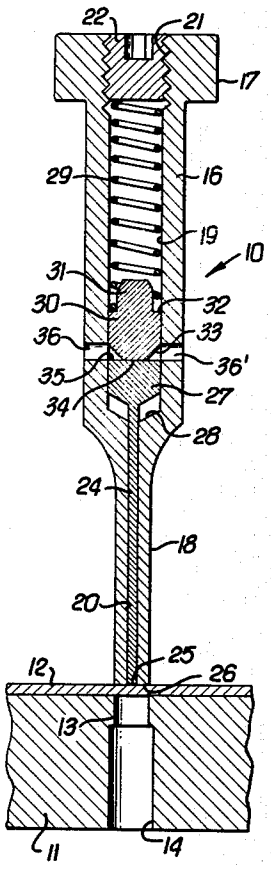


FIG. 2.

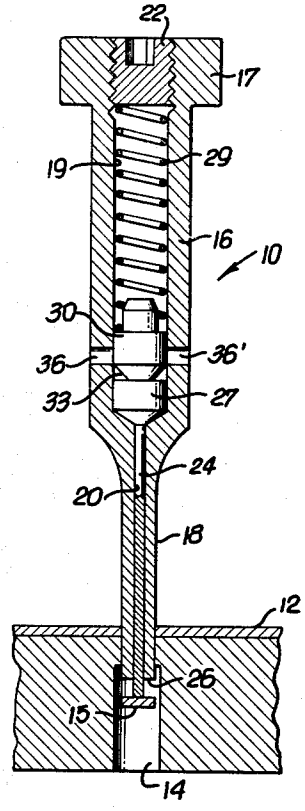


FIG. 3.

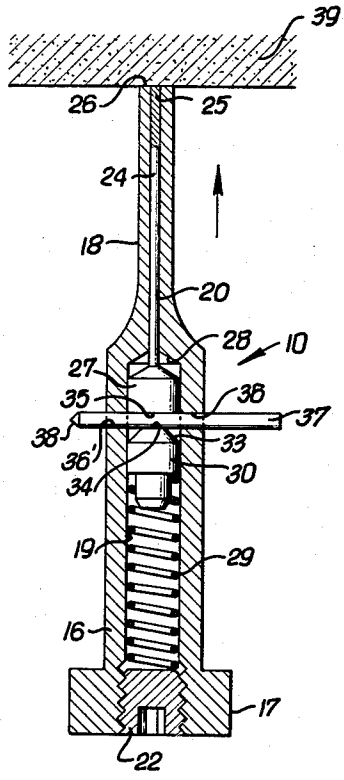
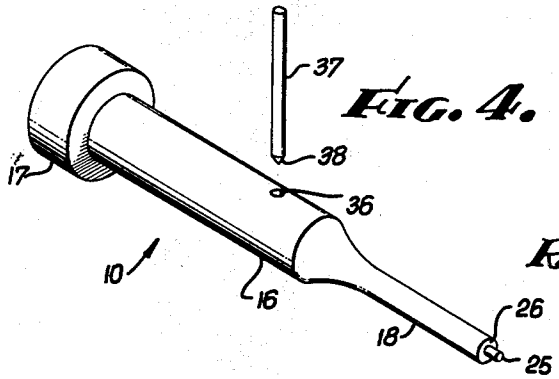


FIG. 4.



ROBERT H. ARMACOST
INVENTOR.

BY Beehler & Shanahan
ATTORNEYS.

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SLUG SHEDDER

Robert H. Armacost, Los Angeles, Calif., assignor to American Drill Bushing Company, Los Angeles, Calif., a corporation of Maryland

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The invention relates to a piercing punch of such design that after the punch has operated upon a workpiece the slug which has been punched out of the workpiece will be prevented from momentarily adhering to the punch and accordingly prevented from being withdrawn with the punch from the workpiece. More particularly, the invention is concerned with an expedient for positioning the slug shedding element in such a manner that it will not interfere with the sharpening of the punch when sharpening becomes necessary.

Piercing punches have been fabricated for a great many years and in considerable assortment, many of which make no attempt to provide anything other than a punchout device. More recently, and in order to prevent tie-ups in machinery, attention has been directed to incorporating into some piercing punches slug shedding elements designed to kick loose the slug which the piercing punch creates in its passage through the work so that the slug will always fall free through the die and not jam the operation by being pulled backwardly in company with the punch. Since punches of this kind need to be sharpened frequently in order to cut a clean hole with proper tolerance, sharpening becomes a problem when punches are equipped with slug shedding means. The most common expedient has been to disassemble the punch assembly whereby to remove the backup spring and the slug shedding mechanism while the sharpening is taking place and also where any retempering of the piercing face is being done, the device then being subsequently reassembled for use. Assembly and disassembly, however, can consume a considerable amount of time and either the machinery will be idled unnecessarily or else a relatively large inventory will have to be stocked of replacement punches to keep the machinery in operation while dull punches are being sharpened.

In order to minimize disassembly of composite punches of the slug shedder type, some resort has been had to a hold back means for the slug shedding element. Because of there being only a relatively small structure involved providing somewhat limited space, hold back means heretofore devised have engaged such a narrow limited area on the slug shedding element as to give a very insecure retention for the element during the sharpening operation. The insecure hold which is the best the prior art has been able to provide has been so undependable that on a great many occasions the slug shedding element becomes dislodged popping out during the sharpening of the piercing punch and resulting in the element being cut off too short. This consequently necessitates disassembly of the device and substitution of a new slug shedding element. Another inadequacy in attempts to keep such a slug shedding pin in assembled condition during sharpening of the tool has resided in the fact that the backup spring continues to press against the slug shedding element with all of its initial force and hence, if there is any dislodgement whatsoever in the means provided for holding back the slug shedding element during sharpening, the slug shedding

element tends to be immediately pressed outwardly to an unwanted position because of the pressure of the spring always being present.

It is therefore an object of the invention to provide a new and improved slug shedding piercing punch which is of such design that the slug shedder can be securely removed from extended position during sharpening without likelihood of being dislodged until the sharpening operation has been entirely completed.

Another object of the invention is to provide a new and improved slug shedding piercing punch which incorporates a device for securely holding the backup spring entirely out of engagement with the slug shedding element during sharpening so that there is no spring pressure to contend with from the point of view of keeping the slug shedding element in a withdrawn position while the piercing punch is being sharpened, and if need be, while the slug shedding element is being shortened a corresponding amount.

Still another object of the invention is to provide a simple, direct and effective means of forcing the spring out of contact with the slug shedding element without it being necessary to incorporate accessory parts in a very simple piercing punch design, the device being specially secure against dislodgement while the piercing punch is being handled, placed in position for sharpening, while sharpening is taking place and until the piercing punch is ready for replacement in its operating position.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a longitudinal sectional view of the slug shedding piercing punch shown in the position it would have when ready for operation upon a workpiece.

FIGURE 2 is a longitudinal sectional view similar to FIGURE 1 but showing the piercing punch moved downwardly through a work cycle.

FIGURE 3 is a longitudinal sectional view of the piercing punch in inverted position preparatory to sharpening and showing the spring held in retracted position.

FIGURE 4 is a side perspective view of the piercing punch and showing the manner in which an accessory part is used to retract the spring and hold it in the desired retracted position.

In an embodiment of the invention chosen for the purpose of illustration, there is shown a slug shedding piercing punch indicated generally by the reference character **10** designed to cooperate with a die **11** in order to punch holes from sheet material comprising a workpiece **12**. The die is provided with a customary die aperture **13** corresponding to the requisite piercing punch and an adjacent clearance aperture **14** through which slugs **15** punched from the workpiece can fall.

The slug shedding piercing punch in the chosen embodiment consists of a spring housing **16** at the upper end of which is a collar **17** useful in mounting the piercing punch in one of the customary punch presses. Extending downwardly from the spring housing as shown in FIGURES 1 and 2 is a piercing punch shaft **18** which is an integral portion of the spring housing and is customarily of relatively smaller outside diameter.

Within the spring housing is an axially extending spring chamber **19** extending the full length of the spring housing, an in axial alignment with the spring chamber is an axial bore **20** which extends entirely through the piercing punch shaft. At the upper end of the chamber **19** is a threaded portion **21** in which may be positioned a threaded plug **22** closing the outer end of the chamber, the threaded plug **22** being provided with a hexagonal recess for insertion and removal of the plug when needed.

A shedder pin in the chosen embodiment consists of a shank **24** slidably positioned in the bore **20** having a lower end **25** as viewed in FIGURES 1 and 2 adapted in one position as shown in FIGURE 1 to coincide with a cutting face **26** of the piercing punch shaft **18**. At the upper end of the shank as shown in FIGURE 1 is a head **27**, joined to the shank, the head being freely slidable in the lower end of the chamber **19**. Inasmuch as the bore is appreciably smaller in diameter than the diameter of the chamber **19**, there is formed an annular shoulder **28** at the junction of the bore with the chamber.

In order to urge the piercing pin outwardly through its slug shedding movement, there is provided a spring **29** having its upper end bearing against the plug **22** and provided at its lower end with a spring keeper **30**, as shown in FIGURES 1 and 2.

The spring keeper **30** has a reduced portion **31** providing a shoulder **32** for reception of the lower end of the spring. On the opposite side the keeper has an annular beveled end **33** terminating in a face **34** which is normally in engagement with a face **35** on the adjacent side of the head **27**. Action of the spring **29** upon the spring keeper **30** tends to force the spring keeper against the head **27** and eject the lower end **25** of the shank **24** outwardly so as to dislodge any slug punched out by the cutting face **26** during its operation, as suggested by the arrangement of parts in FIGURE 2.

The spring housing is provided with a transverse hole **36, 36'** the hole being such that it pierces the wall of the spring housing on diametrically opposite sides, making in effect, a hole having two parts **36** and **36'**. It is important to note that the location of the hole **36, 36'** is such that the lowermost edge of the hole is substantially coincident with the face **35** of the head **27** and that the uppermost edge of the hole **36, 36'** is susbtantially coincident with the uppermost edge of the annular beveled end **33** of the spring keeper **30**.

When the piercing punch is to be sharpened it is advantageous to press the shank **24** inwardly to approximately the position shown in FIGURE 1, this inwardly pressing operation resulting in shifting the spring keeper **30** to a position such that the beveled end is centered with respect to the hole **36, 36'**. This inwardly pressing operation can be done with the fingers pressing the shank inwardly from the extended position shown in FIGURE 4, for example. After the shank has been pressed inwardly, as proposed, a retention pin **37** having a tapered end **38** is inserted into the hole **36, 36'** and forced inwardly with sufficient pressure to cam back the spring keeper **30** to the position shown in FIGURE 3. The retention pin **37** is made long enough so that it extends generously through the entire length of the transverse hole **36, 36'** and so that it can protrude from opposite sides as shown to good advantage in FIGURE 3. Extending as described, the retention pin cannot readily be dislodged and accordingly the spring **29** and its keeper **30** are securely held back in restrained position while the slug shedding piercing pin is being handled preparatory to and during the grinding as well as subsequently until it is ready for reinsertion into the punch press.

In this type of device, grinding is best accomplished by mounting the piercing punch in inverted position as shown in FIGURE 3. In this orientation the slug shedder pin will fall by gravity until the head **27** rests upon the retention pin **37** in which position, the end **25** of the shank **24** will be coincident with the cutting face **26** of

the piercing punch shaft **18**. When a grinding wheel **39** is then applied to the piercing punch to sharpen the cutting face, the shank will be shortened by a corresponding amount. After sharpening the retention pin **37** is withdrawn and the piercing punch is then again ready for use.

Having thus described my invention, I claim:

1. A slug shedding piercing punch comprising a body having a spring housing at one end and a piercing punch shaft at the other end terminating in a cutting face at a free end thereof, said spring housing having an axially extending chamber therein and said shaft having an axial bore therethrough in axial alignment with and in communication with said chamber and means forming a shoulder at the junction of said bore with said chamber, a shedder pin having a shank slidably contained in said bore and a head for said shank located in said chamber and means on said head adapted to seat on said shoulder when the pin is in extended position, a spring keeper slidably contained in the chamber and normally in engagement with said head, spring retaining means located at an end of said chamber opposite said bore and a spring in said chamber in engagement at one end with the keeper and at the other end with the spring retaining means, means forming a laterally open recess having an outer end larger than an inner end thereof between said keeper and said head, said spring housing having a transverse hole in the wall at a location coincident with the outer end of said recess when the shedder pin is in its innermost position, said hole being adapted to removably receive a retention pin at a location behind said head whereby to hold the spring in retracted position during sharpening of the shaft and shortening of the shedder pin.

2. A slug shedding piercing punch comprising a body having a spring housing at one end and a piercing punch shaft at the other end joined to and forming an integral part of said spring housing and terminating in a cutting face at a free end thereof, said spring housing having an axially extending chamber therein and said shaft having an axial bore therethrough in axial alignment with and in communication with said chamber, said bore being of smaller diameter than the chamber and forming a shoulder at the junction of said bore with said chamber, a shedder pin having a shank slidably contained in said bore and a head for said shank located in said chamber and adapted to seat on said shoulder when the pin is in extended position, a spring keeper slidably contained in the chamber and normally in engagement with said head, a removable plug for said chamber located at an end thereof opposite said bore and a spring in said chamber in engagement at one end with the keeper and at the other end with the plug, an annular beveled end on said keeper at the side thereof in engagement with said head, said spring housing having a transverse hole in the wall at a location coincident with the inner face of the head and the annular beveled end of the spring keeper when the shedder pin is in its innermost position, said hole piercing the wall of said housing on opposite sides and adapted to removably receive a retention pin at a location behind said shedder pin whereby to hold the spring keeper and the spring in retracted position and to block the shedder pin from movement inwardly during sharpening of the shaft and shortening of the shedder pin.

3. A slug shedding piercing punch comprising a body having a spring housing at one end and a piercing punch shaft at the other end terminating in a cutting face at a free end thereof, said spring housing having an axially extending chamber therein and said shaft having an axial bore therethrough in axial alignment with and in communication with said chamber and means forming a shoulder at the junction of said bore with said chamber, a shedder pin having a shank slidably contained in said bore and a head for said shank located in said chamber and means on said head adapted to seat on said shoulder when the pin is in extended position, spring retaining means

located at an end of said chamber opposite said bore and a spring in said chamber in engagement at one end with the head and at the other end with the spring retaining means, means forming a laterally open recess between said spring and said head, said spring housing having a pair of axially aligned transverse holes in the wall at a location coincident with said recess when the shedder pin is in its innermost position, said hole being adapted to removably receive a retention pin at a location behind said head whereby to hold the spring in retracted position during sharpening of the shaft and shortening of the shedder pin.

References Cited by the Examiner

UNITED STATES PATENTS

2,917,960	12/59	Gargrave	83—128
3,063,319	11/62	Johnson	83—128
3,106,120	10/63	Reece	83—128

ANDREW R. JUHASZ, *Primary Examiner.*