Dec. 17, 1940. F. A. HYATT 2,225,342

PUNCH STRIPPING DEVICE

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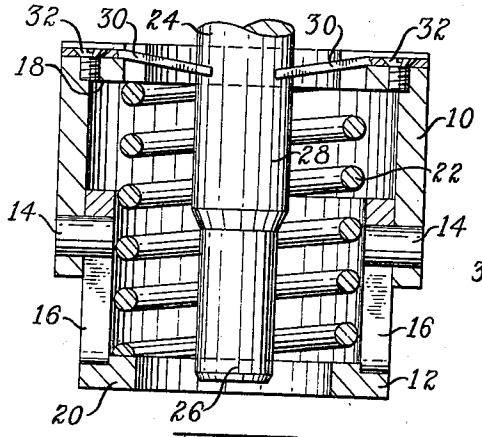


FIG. 1

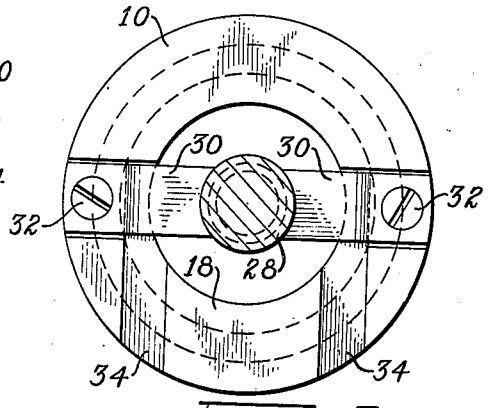


FIG. 2

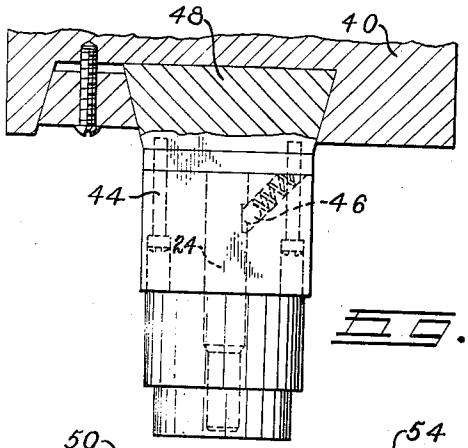


FIG. 3

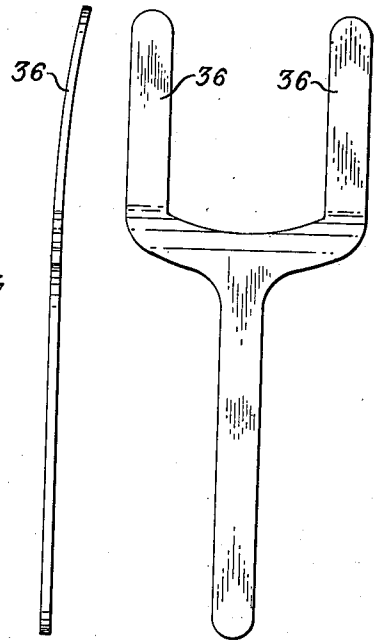


FIG. 4

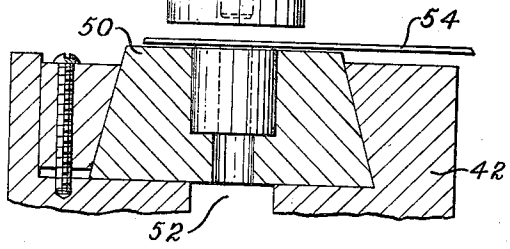


FIG. 5

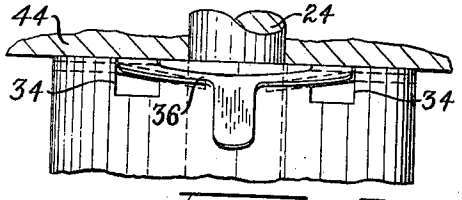


FIG. 6

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PUNCH STRIPPING DEVICE

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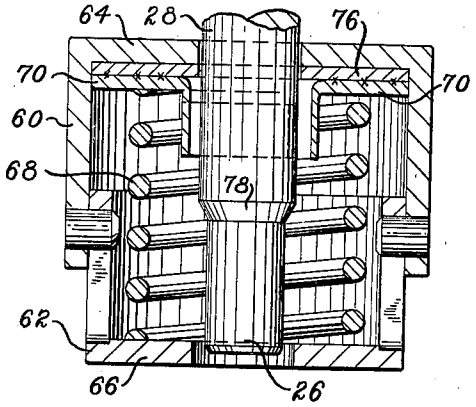


FIG. 7

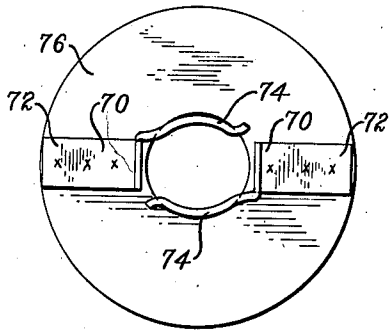


FIG. 8

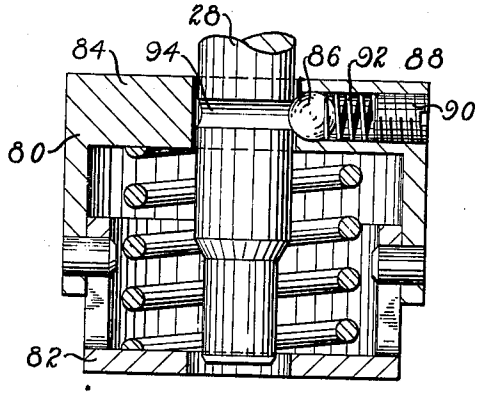


FIG. 10

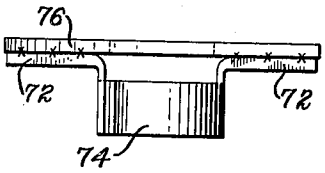


FIG. 9

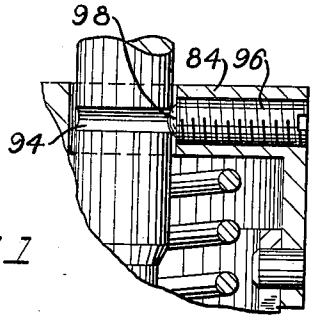


FIG. 11

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UNITED STATES PATENT OFFICE

2,225,342

PUNCH STRIPPING DEVICE

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Application March 18, 1939, Serial No. 262,795

10 Claims. (Cl. 164—110)

This invention relates to stripping devices for use on punch machines for removing or stripping material from the punching tools and particularly to such a device which is in the form of a unit capable of attachment to and removal from the punching tool bodies.

An important object of this invention is to provide an improved stripper for punching tools which is easily installed upon and removed from the bodies of the punching tools and which consists of a few parts readily and economically produced and assembled. Another object of this invention is to provide such a device which is strong, durable, and which though easy to install by the simple process of slipping the device upon a punching tool cannot be shaken off in use and only when outside force is properly applied thereto. A further object of this invention is to provide a novel stripper for punching tools which does not require any alteration of the punch body to receive the stripper, although in two forms of the invention it is preferred to make an easy change in the body to receive the stripper.

Various other objects, advantages and meritorious features of the invention will become more fully apparent hereinafter from the following specification, appended claims and accompanying drawings, wherein:

Figure 1 is a vertical cross sectional view through a stripper made in accordance with this invention,

Fig. 2 is a top view of the stripper shown in Figure 1,

Fig. 3 is a view of a punching machine showing the manner of installing the stripper in Figure 1 and 2 upon a punching tool,

Figs. 4 and 5 are front and side views respectively of a tool especially constructed to aid in the removal of the stripper shown in Figure 1 from the body of the punch,

Fig. 6 is a detailed view of the stripper on a punch body showing the manner of using the tool illustrated in Figure 4 to remove the stripper,

Fig. 7 is a vertical cross sectional view through another form of stripper,

Fig. 8 is a view of the bottom side of an important element of the stripper shown in Figure 7,

Fig. 9 is a side view of the element shown in Figure 8,

Fig. 10 is a vertical cross sectional view through another form of stripper, and

Fig. 11 is a detailed view of a stripper similar to that shown in Figure 10 but altered slightly.

Certain features are common throughout the several forms of the invention illustrated in the drawings. In general, the stripper made in accordance with this invention comprises a pair of telescoping sleeve members provided with means coupling the two members together and serving to limit the extension of the sleeves with respect to one another. Resilient means in the form of a coil spring is provided inside the sleeve members. The coil spring is compressed within the sleeves and the ends thereof yieldingly act upon radial inwardly extending portions or shoulders formed on the opposite outer ends of the telescoping sleeve members.

In each instance there is associated with the radial inwardly extending part of one of the sleeves, preferably the larger, a novel gripping device which is radially projectable into engagement with the punch body. In certain forms of the invention this novel gripping device takes the form of two or more flexible metal strips arranged diametrically opposite one another and shaped for yielding engagement with the side of the punch. In other forms of the invention, the punch body is altered by forming a peripheral groove therein and providing a gripping element associated with the radially inwardly extending portion of one of the sleeves and projectable into interlocking engagement with the groove on the punch body.

Referring in detail to the drawings, the embodiment of the invention shown in Figures 1–6 inclusive comprises a pair of sleeves 10 and 12 telescopingly associated together as shown in Fig. 1. These sleeves are coupled together by a pin and slot connection which prevents the sleeves from rotating relative to one another but allows a certain restricted axial movement of the sleeves relative to one another. For such a connection, two pins are used as indicated at 14. These pins may be press fitted or welded to one of the sleeves such as 10 and project as shown into longitudinal slots 16 formed in the sleeve 12.

The outer ends of the sleeves 10 and 12 are provided with portions or shoulders 18 and 20 respectively which extend radially inwardly toward the axis of the sleeves. Inside the sleeves is a coil spring 22 in a state of compression. The outer ends of this spring seat upon the shoulders 18 and 20 and yieldingly urge the sleeves to their most extended position permitted by the pin and slot connection. The overall length of the sleeves in this position is preferably slightly longer than the exposed portion of the punching tool upon which the stripper is being used. As shown in Figure 1, the lower edge of the sleeve 12 extends

slightly below the shearing end of the punch body **24**. Most punching tools are of the formation shown in the drawings and have a reduced shearing end section **26** and a wider shank portion **28**. The gripping device employed on the form of the invention illustrated in Figures 1 to 6 inclusive is adapted to yieldingly engage the shank portions of such a punching tool. The novel form of gripping device employed in this embodiment of this invention comprises a pair of flat, flexible metal strips or blades **30—30** associated with the shoulder portion **18** on sleeve **10** and arranged so that they project from diametrical opposite sides of the sleeve toward one another. The blades lie substantially in a radial plane. Their outer ends are secured as shown by set screws **32** to the top side of the shoulder **18**. The top side of the sleeve **10** is preferably recessed to receive the outer end of the blade so that a substantially smooth exterior is presented.

The inner end sections of the blades **30—30** are free to flex. The distance separating the ends of these blades is slightly less than the width or diameter of the shank portion of the punch body upon which the stripper is to be installed. When attached to the punch body, the stripper is thrust upwardly from the shearing end of the punch body and as this movement occurs the radial blades **30—30** are caused to be flexed downwardly as their ends commence to engage the wider shank portion **28** of the punch body. Since the end sections of the blades are bent downwardly as the stripper is pushed upwardly upon the punch body, they offer very little resistance to the movement of the stripper in the attaching operation. However, when attempts are made to pull the stripper off the punch body in the opposite direction, the downwardly projecting character of the blade causes them to bite into the shank of the punch body and resist with great force the attempt to remove the stripper. The more force that is applied to pull off the stripper the more the blades are flexed upwardly and exert a greater force resisting such attempts.

As will become more fully apparent in connection with a special tool for removing the stripper, the outer or top end of the sleeve **10** is grooved at two places **34—34** to form a pair of slots extending from the outside surface of the sleeve to the inner edge of the shoulder **18**. Into these slots the ends of the forked instrument illustrated in Figures 4 and 5 are adapted to be inserted. The forked ends of this instrument or tool are indicated at **36—36** and are spaced apart and shaped so that they will fit the grooves **34—34**. As shown in Figure 5, the forked end sections of the tool are slightly curved for a purpose explained hereinafter.

A punching machine of the type upon which the stripper is usable is generally indicated in Figure 3. It comprises an upper and movable member **40**, a lower stationary member **42**, and a block **44** into which the shank portion of the punching tool is inserted. The punching tool is releasably locked in the block **44** by any suitable form of key such as the spring pressed ball **46**. The block may be secured by bolts to a slide **48** which is adjustably secured in the manner shown to the member **40**. The lower member **42** has a similar slide **50** adjustably secured thereto which is provided with a hole aligning with a hole **52** in the member for the purpose of discharging the pieces or blanks of metal sheared off during the punching operations. When the stripper is properly installed upon the punch body it assumes the position shown in Figure 3 with the upper end abutting the under side of the block **44**. A piece of sheet steel upon which the tool is about to operate is indicated at **54**.

In order to release the stripper from the punch body, the forked ends **36—36** of the tool shown in Figure 4 are inserted into the mouths of the grooves or slots **34—34** in the manner shown in Figure 6. When the tool is inserted far enough so that the ends overlie the blades **30—30**, the handle of the tool is swung upwardly and by virtue of the curve in the tool, the forked ends are depressed against the blades and thrust the blades down and out of engagement with the shank of the punch body. It is then easy to pull off the stripper.

The embodiment of the invention illustrated in Figures 7 to 9 inclusive is similar in several respects to the previously prescribed embodiment. It comprises a pair of telescoping sleeves **60** and **62** coupled together through a pin and slot connection of the type previously described. The sleeves are similar to sleeves **10** and **12** respectively except that the shoulder portion at the outer ends of the sleeves extend radially inwardly a greater distance than the shoulder portion **18** and **20**. The shoulder portions in the instant embodiment of the invention are indicated at **64** and **66**. A coil spring **68** similar to spring **22** is provided. It acts to spread the sleeves to their most extended position. The punch tool is the same as that previously described and is referred to by the same reference numbers.

The distinctly novel feature of the embodiment of the invention shown in Figs. 7 and 9 is the gripping devices. Like the previous embodiment, it is associated with the upper end of the sleeve **60** and comprises a pair of flexible metal strips or blades arranged similarly to one another but on opposite sides of the sleeve. Each blade is constructed the same but because of their arrangement they act on opposite sides of the punch body. The two blades are referred to at **70—70**. They are each composed of two sections, an outer flat section **72** lying in a radial plane and an inner flat section **74** bent at right angles to the outer section and shaped so that it can partially embrace the side of the punch body. Originally each strip **70** was in the shape of an L but by imparting two bends to the original construction it is possible to shape the strip in the formation shown. The inner end section of each strip is preferably slightly curved as shown.

The outer end section of the blades **70—70** are supported within the sleeves by the novel provision of a ring member or washer **76** which has an outward diameter enabling it to be fitted within the larger sleeve **70** and an inner diameter permitting it to be received over the shank portion of the punch. The outer end section of each blade **70** is fixed to the washer by welding as shown in Figure 8 or by rivets. The latter form of securement is desirable when the heat of the welding operation will effect the resiliency of the blades. The blades are so disposed on the ring member **76** that the free ends thereof are spaced apart less than the diameter of the shank portion of the punch. They are arranged on the ring as shown in Figures 8 and 9, the ring and the two blades forming a separate element of the stripper assembly. The ring and blade unit is assembled on the stripper in the manner shown in Figure 7. It is interposed between the upper end of the coil spring and the shoulder portion

64. The spring in this embodiment of the invention thus serves also to hold the ring and blade unit in place in the stripper.

When the stripper shown in Figures 7 to 9 inclusive is attached to the punching tool, the inner flexible end sections of the blades ride over the beveled portion 78 of the punch body and thence on to the shank portion 28. At this point the flexible blades yieldingly grip the punch body as they slide thereunder. An unusual result is obtained by this form of invention. It has been found that it requires relatively little effort to attach the stripper to the punch body but when attempts are made to remove it a much stronger pull is required. It is thought that this result is caused by the different actions of the inner end sections of the blades when the stripper is thrust on and taken off the punch body. In the former case it is thought that the yieldable character of the spring enables the blade and washer unit to adjust itself as the stripper advances up the shank of the punching body and in the latter case the blades turn in a slight angle so that the lower edges thereof bite into the shank of the punch.

In the embodiments of the invention illustrated in Figures 10 and 11, the telescoping sleeves 80 and 82 are in general similar in construction to those illustrated in Figure 7. The sleeves, however, differ in one respect by the provision of a relatively thicker shoulder portion 84 on the outer sleeve member 80. Operable in this relatively thick shoulder portion 84 is a novel releasable locking device capable of engaging the side of the punch body and holding the stripper in place thereon. This device comprises a ball 86 operable in the hole 88 radially drilled in the shoulder portion 84. The outer end of this hole is sealed by a threaded plug member 90. Between the member 90 and the ball 86 there is a spring 92 which yieldingly thrusts the ball 86 toward the inner end of the hole. The inner end of the hole is so formed in the drilling process that it has a less diameter than that of the ball and serves to retain the ball within the hole.

To cooperate with this spring-pressed ball 84 the punch body is shaped in a novel way to provide a recess into which the ball can be thrust when the stripper is fully applied upon the punch body. As shown, the shank portion 28 of the punch body is provided with a peripheral groove 94 so that the ball may be interlocked with the punch body on any side thereof. The pressure of the spring 88 is sufficient to retain the stripper upon the punch body for all normal operations but when an excess pull is applied to remove the stripper, the spring 88 will yield and allow the ball to be withdrawn from the groove 94.

The embodiment of the invention in Figure 11 is similar to that in Figure 10 except that in place of the spring and ball a threaded member 96 is provided which extends the full length of the radial hole in the shoulder portion 84. This threaded member, as shown, is provided with a rounded inner extremity 98 which is engageable in the peripheral groove 94 on the punch body. The outer end of the member 96 is slotted for a screw-driver and it is obvious that after the stripper has been advanced fully upon the punch body that upon threading the member 96 a little further inward the rounded end 98 will enter the peripheral groove 94 to lock the stripper upon the punch body.

What I claim is:

1. A stripping device for attachment to a punch comprising, in combination, a pair of elements spring pressed away from one another, one of said elements being circular in formation and carrying a pair of metal fingers extending radially inwardly from opposite sides of the element and terminating in spaced relationship to one another, the distance separating the adjacent ends of said fingers being less than the shank of the punch to which the device is to be attached and being free to flex outwardly as they grippingly engage said shank of the punch.

2. In combination with a punch body, a stripping device encircling the same in spaced relationship, a pair of flexible metal strips carried by the stripping device extending radially toward the punch body from opposite sides thereof and having their inner end sections engaging opposite sides of the punch body, said strips assuming a flexed condition causing their inner end sections to yieldingly grip the punch body therebetween.

3. A stripping device for attachment to a punch comprising, in combination, a pair of circular members telescopingly coupled together for a limited axial movement, a coil spring inside said members yieldingly urging said members to their most extended position, said members and said spring being oversize the diameter of the punch to which the device is to be attached, and flexible flat metal strips carried by one of said members extending radially inwardly from opposite sides of the members and having their inner end sections spaced apart a distance less than the diameter of the punch to which the device is to be attached, the inner ends of said strips being curved to fit the body of the punch and grippingly holding the device thereto when the same is slipped over the punch.

4. Means for attaching a stripping device to a punch body which comprises at least two flexible metal strips extending toward one another having their respective outer end sections fixed with respect to the device and their inner end sections free to engage the body of the punch, the distance separating the inner end sections of the punch being less than the diameter of one part of the punch body so that when the device is fitted upon the punch body the strips are caused to assume a flexed condition as the end sections thereof engage the said part of the punch body.

5. The invention described in claim 4 characterized by the fact that the flexible metal strips are detachable from the stripping device.

6. A device attachable to punch bodies for stripping material therefrom after punching operations are performed comprising, a pair of sleeves telescoping one another, means securing said sleeves together for limited axial movement from a collapsed position to an extended position, a coil spring inside of said sleeves mounted so as to yieldingly urge said sleeves to their extended position, a pair of flat flexible metal strips, means detachably securing said strips to the outer end of one of said sleeves so that they extend in a plane perpendicular to the axis of the sleeves and project radially inward toward the axis of the sleeves from opposite sides thereof, the inner ends of said flexible strips being spaced apart less than the width of a part of the punch body to which the device is attached and shaped to partially embrace the body.

7. A punch stripping device comprising a pair of sleeves telescopingly fitting one another, means limiting the axial movement of said sleeves, a coil spring inside of said sleeves yieldingly urg-

ing the sleeves to their most extended position, the overall length of the sleeves in extended position being slightly longer than the length of the projecting portion of the punch body to which the device is to be attached, flexible metal blades extending diametrically toward one another from opposite sides of the outer end of one of said sleeves, means detachably securing the outer ends of said blades to the outer end of the sleeve in such a manner that the blades lie in a plane perpendicular to the axis of the sleeves and project radially inwardly toward one another, the inner ends of said blades being spaced apart less than the width of the base of the projecting position of the punch to which the device is to be attached, the sleeve to which said blades are secured having one or more openings in the side thereof adjacent the outer end through which a tool may be inserted for flexing the blades.

8. A punch stripping device comprising a pair of sleeves telescoping one another, means securing said sleeves together for limited axial movement from a collapsed position to an extended position, a coil spring inside of said sleeves mounted so as to yieldingly urge said sleeves to their extended position, a pair of flat flexible metal blades in one of said sleeves extending diametrically toward one another, said blades each having an outer flat section extending in a plane perpendicular to the axis of the sleeves and an inner flat section extending in a plane parallel to the axis of the sleeves and shaped to partially embrace a part of the punch body to which the device is to be attached, the outer flat section of each blade being interposed between one end of the coil spring and a part of the sleeve in which it is disposed and held in such position by the tension of the spring.

9. A device attachable to punch bodies for stripping material therefrom after each punching operation is performed; comprising, in combination, a pair of sleeves telescoping one another and provided with radially inwardly extending portions on the opposite ends, means limiting the axial movement of said sleeves, a coil spring inside of said sleeves having its opposite ends seated on said radially inwardly extending portions and yieldingly urging the sleeves to their most extended position, and flexible metal fingers each having a flat outer section interposed between one end of the spring and the radially inwardly extending portion of the sleeve upon which it seats and a curved inner section adapted to partially encircle a shank portion of a punch body, the flexible fingers arranged relative to one another so that their inner curved sections are disposed substantially on opposite sides of the axis of the sleeves.

10. A device attachable to punch bodies for stripping material therefrom after each punching operation is performed comprising, in combination, a pair of telescopingly fitted sleeves having radially inwardly extending portions on their outer ends, means limiting the axial movement of the sleeves relative to each other, a coil spring inside of said sleeves having its opposite ends acting upon the radially inwardly extending portions of said sleeve to urge the same to their most extended position, a flat ring-shaped member interposed between one end of said spring and the portion of the sleeve against which it acts, a pair of flexible metal strips secured to said ring member on diametrically opposite sides thereof, said strips each having a free end section extending similarly to one another but on opposite sides of the axis of the sleeevs, the space between said free end sections of the strips being less than the width of a part of the punch body and adapted when the device is slipped over the punch body to grippingly engage said part to hold the device thereon.

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