July 22, 1958 L. V. WHISTLER ET AL 2,844,378

DETACHABLE TOOL FASTENING MEANS

Filed July 5, 1957

Fig. 2.

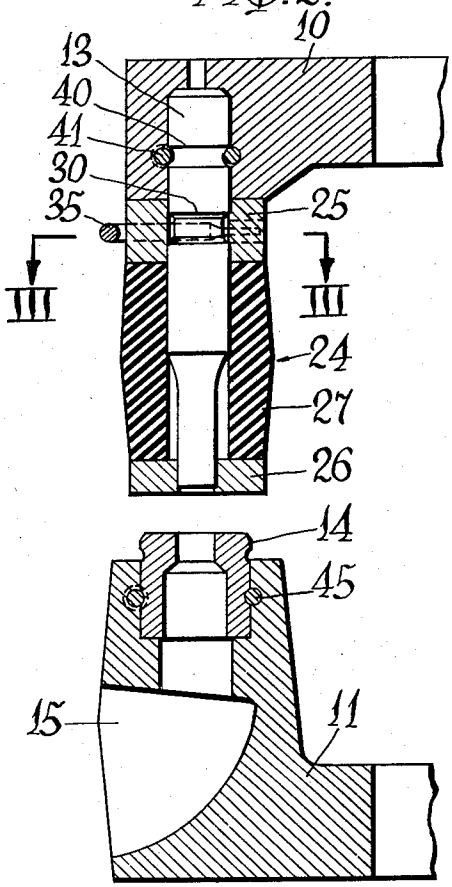


Fig. 1.

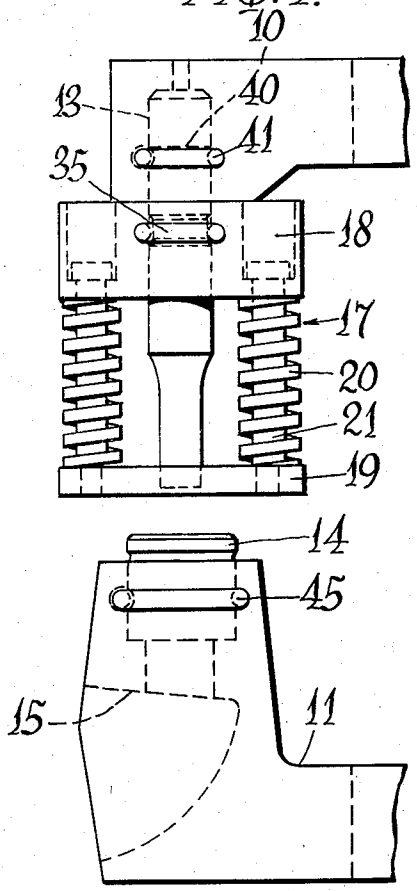


Fig. 3.

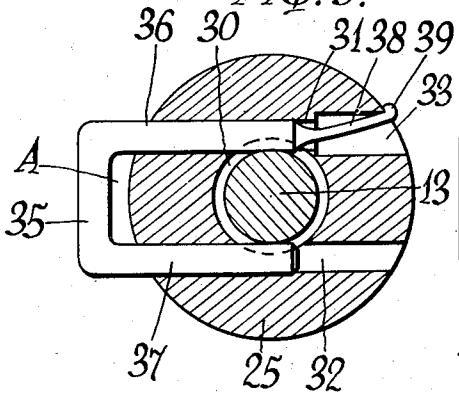
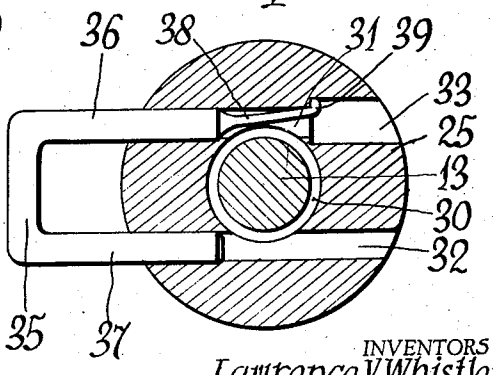


Fig. 4.



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DETACHABLE TOOL FASTENING MEANS

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8 Claims. (Cl. 279—97)

This invention relates to apparatus for perforating or otherwise stamping sheet metal or other sheet material and more particularly to readily attachable and detachable means for securing cylindrical tool parts of such perforating apparatus with respect to members which fit thereabout.

A representaive perforating punch and die mechanism of the general type to which the principles of the present invention are readily applicable is shown and described in Whistler Patent 1,986,036 dated January 1, 1935. In this apparatus a cylindrical punch is detachably secured in a punch holder, a stripper unit is detachably secured to the cylindrical punch, and a hollow cylindrical die bushing is supported in a die holder, the bushing and support being likewise preferably provided with detachable securing means.

While reference is had by way of example to the above-identified Whistler patent, and while the principles of the present invention are illustrated in the accompanying drawing and described in the following specification as applied to such punch and die units, it is to be understood that the three detachable connections referred to above may be employed in a wide variety of punch and die mechanisms, in nearly all of which the general problems of detachably securing a punch in a punch holder, detachably securing a stripper unit to a punch and detachably securing a die bushing in a die holder or die shoe, present themselves.

The most common prior art means for effecting the above detachable connections is by means of set screws. However, although setscrews are widely used for this general purpose, they are awkward and cumbersome in use and do not provide as certain and secure a locking arrangement as is desired.

According to the present invention a U-shaped member is mounted for horizontal movement in the female connecting part and is resiliently detained in either of two assembled positions. In one of the detained positions the legs of the U-shaped member extend through an annular groove in the cylindrical male connecting part to prevent relative axial movement of the parts, while in a second detained position the locking portions of the legs of the U-shaped member are clear of the annular groove in the cylindrical male member, whereby the parts may be readily separated by relative axial movement.

The accompanying drawing and the following detailed description set forth the detachable fastening means of the present invention in conjunction with a particular type of punch and punch holder and die bushing and die holder structure and the stripper attaching embodiment is illustrated and described in conjunction with two known types of stripper units. However, as indicated earlier herein, these embodiments are by way of example only and the principles of the present invention may be applied to various punch and die arrangements and to the securement of various types of stripper units. Accordingly, the principles of the present invention are not

limited to the embodiments thus set forth by way of example and the scope of the invention is limited only as defined in the appended claims.

In the drawing:

Fig. 1 is a general elevational view of a punch and die unit illustrating several instances of application of one form of the attaching and securing means of the present invention;

Fig. 2 is a view taken similarly to Fig. 1 but comprising a cross-sectional view on a vertical central plane and with a modified form of stripper unit;

Fig. 3 is a cross-sectional view on the line III—III of Fig. 2; and

Fig. 4 is a view similar to Fig. 3 but with the locking member in a relatively released position.

The various parts illustrated in Figs. 1 and 2, with the exception of the stripper unit, are identical. These identical parts comprise mainly the punch holder, the punch, the die holder and the die bushing, and these parts will be given the same reference numerals in Figs. 1 and 2.

Referring to both Figs. 1 and 2, the numeral **10** designates a punch holder of the general type shown in Whistler Patent 1,986,036 and the numeral **11** designates a die holder or die shoe of the type shown in that patent. It is well understood in the art that the punch holder **10** will normally be screwed or bolted to the movable platen of a power press and the die holder **11** will be secured to the fixed bed or bolster of the press.

Punch holder **10** is vertically bored to receive a generally cylindrical punch **13** and a companion die bushing **14** is disposed in a counterbore in the upper end of die holder **11**, the latter being provided with a passage **15** for removal of scrap which passes downwardly through the die bushing **14**.

In Fig. 1 a stripper unit is designated generally by the numeral **17** and comprises a base or mounting block **18** and a work sheet engaging pressure plate **19**. Compression coil springs **20** are interposed between block **18** and plate **19** and screws **21** are threaded into plate **19** at their lower ends and have head portions disposed in counterbores in block **18**, all of the foregoing being conventional stripper unit construction which is well understood by those versed in the present art and need not be illustrated or described in further detail.

Fig. 2 shows a variant stripper unit designated generally by the numeral **24**. In this instance an upper mounting block **25** and a lower work engaging pressure plate **26** are cemented or otherwise joined to a compressible rubber bushing **27**.

It is to be understood that all of the foregoing is conventional or known construction in perforating units or similar punch and die holders and that the present invention is particularly concerned with quick detachable means for the various parts, which means will now be described.

The several fastening means are all generally similar and reference will be had more particularly to the detachable fastener which connects stripper **24** with punch **13** in Fig. 2, this fastening arrangement being shown in further detail in Figs. 3 and 4. It will be noted that punch **13** is provided with an annular groove **30** and, referring to Fig. 3, a pair of parallel transverse bores **31** and **32** extend through mounting block **25** of stripper **24** in general alinement with groove **30**, bore **31** having an enlarged counterbore **33** at one end thereof.

The locking element proper comprises a U-shaped or staple-like member **35** which has a pair of parallel leg members **36** and **37** which fit slidably in the bores **31** and **32**, respectively. Leg **36** of U-shaped member **35** has a somewhat resilient reduced extension **38** which has a slightly rounded hook formation **39** at its outer end.

With the U-shaped member **35** in the position shown in Fig. 3 hook formation **39** engages over the outer end of counterbore **33** to resiliently detain the U-shaped member in the position shown and in such position the legs **36** and **37** pass through annular groove **30** of punch member **13** to prevent relative axial movement of the parts.

Annular groove **30** may be of semi-circular cross-section, closely fitting the legs **36** and **37** in which case the member **35** will prevent axial movement of the parts in either direction. In the instance being described the groove **30** is of greater width in an axial direction to adapt punch **13** for other securing devices, but this greater width is merely incidental in the present instance. It will be noted that the legs **36** and **37** of fastener **35** engage the lower side of groove **30** thus preventing relative downward movement of stripper **24**. Upward movement of the stripper is effectively prevented by abutment between the mounting block **25** of the stripper unit and the adjacent lower face of punch holder **10**.

To release the stripper for removal from punch **13** it is merely necessary to withdraw the fastener **35** to the position shown in Fig. 4 against the releasable detaining effect of hook formation **39**. This detaining effect may be overcome by mere manual pulling force on the fastener but in most instances will most effectively be accomplished by inserting a screw driver or the like between the medial portion of the fastener **35** and the periphery of mounting block **25** (in the space marked A in Fig. 3) and exerting a prying force.

When the fastener **35** reaches the position shown in Fig. 4 the hook formation **39** will again exert a resilient detaining effect which, in ordinary usage, will prevent further withdrawal of the fastener **35**. In this position it will be seen that the legs **36** and **37** are clear of the groove **30** of punch **13** and that accordingly relative axial separation of the punch **13** and stripper **24** may be readily accomplished. Further, the fastener **35** normally remains associated with mounting block **25**. This not only prevents mislaying the fastener but prevents it from falling into the die parts where it might cause great damage if not removed.

Referring to Fig. 1, an identical fastener **35** connects stripper unit **17** to punch **13** and the block **18** of stripper unit **17** is bored and counterbored in the same manner as shown in Figs. 3 and 4 and described above in conjunction therewith. In Fig. 1 the fastener **35** and the bores which receive the same extend at right angles to the arrangement of Fig. 2.

Referring to both Figs. 1 and 2, the upper end of punch **13** is provided with a semi-circular groove **40** and a fastener **41** identical with the fastener **35** already described engages bore and counterbore formations in the punch holder **10** which are the same as those illustrated in Figs. 3 and 4.

Still referring to both Figs. 1 and 2, the die bushing **14** of those figures has an annular groove of semi-circular or arcuate cross-section and a U-shaped fastener **45** engages the same just as in the case of the fastener **35** previously described in detail. The die holder **11** is provided with parallel transverse bores and a counterbore just as shown in detail in Figs. 3 and 4 and described in detail above in connection with the fastening between the stripper unit and the punch.

We claim:

1. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having an annular groove therein, said sleeve portion having a pair of parallel transverse openings extending generally tangent to said tool member at opposite sides thereof whereby said openings register with the annular groove in said tool member when the latter and said part are in desired assembled positions, a U-shaped locking member having a pair of legs disposed in said openings and adapted to pass through said annular groove to lock the tool member and said part against relative axial movement, a detent member comprising a reduced extension of one of said legs including detent means for arresting said U-shaped locking member before complete withdrawal from said openings but with said legs withdrawn from locking engagement with said annular groove.

2. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having an annular groove therein, said sleeve portion having a pair of parallel transverse openings extending generally tangent to said tool member at opposite sides thereof whereby said openings register with the annular groove in said tool member when the latter and said part are in desired assembled positions, a U-shaped locking member having a pair of legs disposed in said openings and adapted to pass through said annular groove to lock the tool member and said part against relative axial movement, and detent means for releasably detaining said U-shaped member in a locking position with said legs in engagement with said annular groove and in a partially withdrawn position wherein said legs are withdrawn from said annular groove.

3. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having a peripheral groove therein, said sleeve portion having a transverse bore extending generally tangent to said tool member in registry with the peripheral groove in said tool member when the latter and said part are in desired assembled relationship, a locking member comprising a leg disposed in said bore and adapted to pass through said peripheral groove to lock the tool member and said part against relative axial movement, a detent member comprising a reduced extension of said leg including detent means for arresting said locking member before complete withdrawal from said bore but with said leg withdrawn from locking engagement with said peripheral groove.

4. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having a peripheral groove therein, said sleeve portion having a transverse bore extending generally tangent to said tool member in registry with the peripheral groove in said tool member when the latter and said part are in desired assembled relationship, a locking member comprising a leg disposed in said bore and adapted to pass through said peripheral groove to lock the tool member and said part against relative axial movement, and detent means for releasably detaining said locking member in a locking position with said leg in engagement with said peripheral groove and in a partially withdrawn position wherein said leg is withdrawn from said peripheral groove.

5. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having a peripheral groove therein, said sleeve portion having a transverse bore extending generally tangent to said tool member in registry with the peripheral groove in said tool member when the latter and said part are in desired assembled relationship, a locking member comprising a leg disposed in said bore and adapted to pass through said peripheral groove to lock the tool member and said part against relative axial movement, a detent member comprising a reduced extension of said leg terminating in a lateral projection for detent engagement with said sleeve portion for arresting said locking member before complete withdrawal from said bore but with said leg withdrawn from locking engagement with said peripheral groove.

6. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having a peripheral groove therein, said sleeve portion having a transverse bore extending generally tangent to said tool member in registry with the peripheral groove in said tool member when the latter and said part are in desired assembled relationship, said transverse bore having a counterbore at one end thereof, a locking member comprising a leg disposed in said bore and adapted to pass through said peripheral groove to lock the tool member

and said part against relative axial movement, a detent member comprising a reduced extension of said leg terminating in a lateral projection for detent engagement with opposite ends of said counterbore for selectively arresting said locking member in a tool member locking position and in a partially withdrawn position wherein said leg is withdrawn from locking engagement with said peripheral groove.

7. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having an annular groove therein, said sleeve portion having a pair of parallel transverse openings extending generally tangent to said tool member at opposite sides thereof whereby said openings register with the annular groove in said tool member when the latter and said part are in desired assembled positions, a U-shaped locking member having a pair of legs disposed in said openings and adapted to pass through said annular groove to lock the tool member and said part against relative axial movement, a detent member comprising a reduced extension of one of said legs terminating in a lateral projection in detent engagement with said sleeve portion for arresting said U-shaped locking member before complete withdrawal from said openings but with said legs withdrawn from locking engagement with said annular groove.

8. A cylindrical tool member and a part having a sleeve portion fitting slidably thereon, said tool member having an annular groove therein, said sleeve portion having a pair of parallel transverse openings extending generally tangent to said tool member at opposite sides thereof whereby said openings register with the annular groove in said tool member when the latter and said part are in desired assembled positions, one of said openings having a counterbore at one end thereof, a U-shaped locking member having a pair of legs disposed in said openings and adapted to pass through said annular groove to lock the tool member and said part against relative axial movement, a detent member comprising a reduced extension of one of said legs terminating in a lateral projection in detent engagement with opposite ends of said counterbore for selectively arresting said U-shaped locking member in a tool member locking position and in a partially withdrawn position wherein said legs are withdrawn from locking engagement with said annular groove.

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