

[54] **BLANK PUNCHING APPARATUS**

[75] Inventor: **Dennis Daniels**, Bellevue, Wash.

[73] Assignee: **U.S. Amada Ltd.**, Seattle, Wash.

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[52] U.S. Cl. .... **83/104, 83/160, 83/165, 83/552**

[51] Int. Cl. .... **B26f 1/04**

[58] Field of Search ..... **83/102, 104, 158-160, 83/165, 166, 552**

[56] **References Cited**

**UNITED STATES PATENTS**

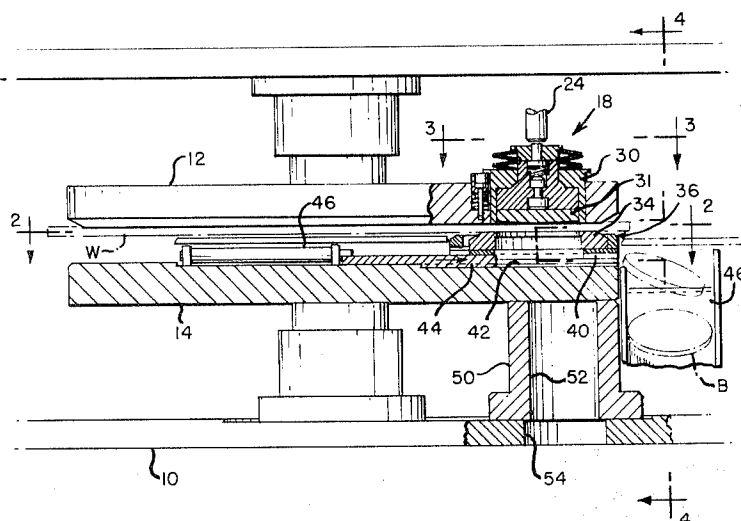
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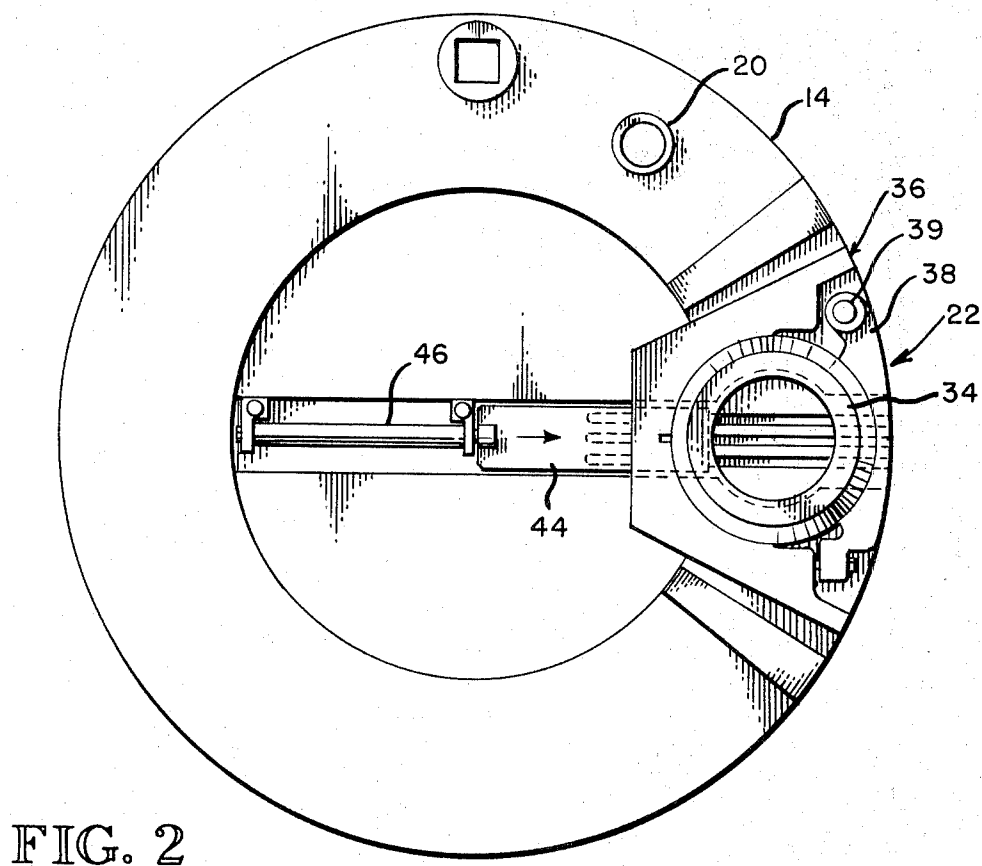
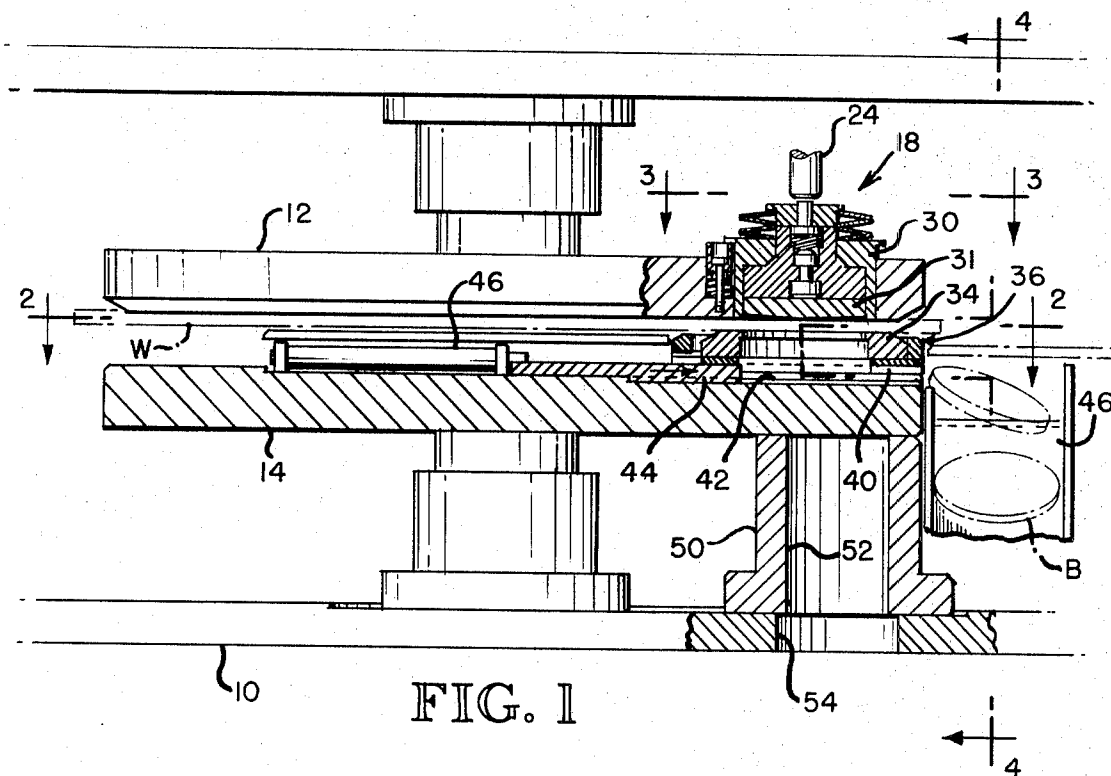
Primary Examiner—J. M. Meister  
Attorney, Agent, or Firm—Seed, Berry, Vernon & Baynham

[57] **ABSTRACT**

A turret-type punch press is provided with a blank collection and side ejection mechanism to segregate blanks, i.e., the finished products, from slugs, i.e., waste products. The blanks are pushed from out beneath the die by a reciprocable pusher and ejected into a discharge chute. A hollow cylinder supporting the lower turret at the punching station is provided with an opening of a diameter large enough to accommodate the largest slug to be punched but the opening is considerably smaller than the blanks to be cut and thus minimizes the area that the lower turret is unsupported.

**6 Claims, 5 Drawing Figures**





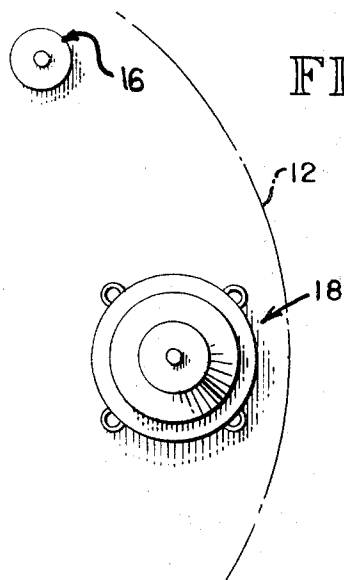


FIG. 3

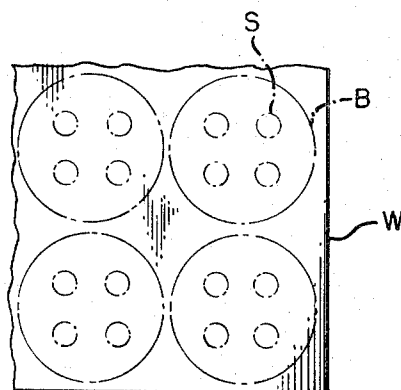


FIG. 5

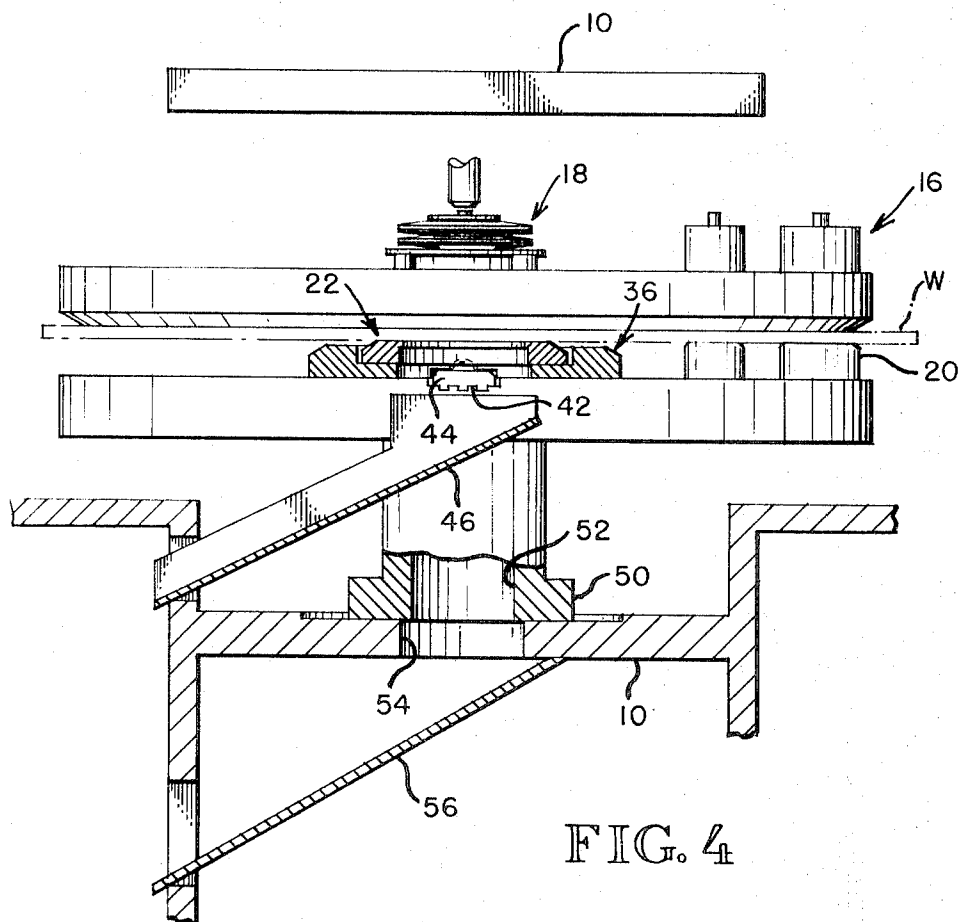


FIG. 4

## BLANK PUNCHING APPARATUS

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention pertains to turret-type punch presses and, more particularly, to multiple tool turret-type punch presses which include a conventional array of punching tools and blanking tools.

#### 2. Description of the Prior Art

Turret-type punch presses employ rotatable upper and lower turrets with the upper turret supporting a variety of punches and the lower turret supporting a variety of corresponding dies. Beneath the lower turret is a hollow cylindrical member which supports the lower turret. The turret support is provided with a slug discharge passage for ejection of slugs cut by the various tools. Heretofore those turrets containing a blanking tool ejected the blanks downwardly through the slug discharge passage of the turret support thus mixing the slugs (wasted material) with the blanks (finished products) and required time-consuming and costly manual separation of the slugs and blanks.

In addition, the slug passage opening in the lower turret supporting member was of necessity provided with an opening large enough to receive the largest blank to be punched. If the blank diameter was extremely large, then the opening in the lower turret supporting member was correspondingly large and left a considerable unsupported span on the lower turret. Since this weakened the overall strength of the machine, the blanking dies sizes had to be reduced or the lower turret undesirably thickened.

### SUMMARY OF THE INVENTION

It is an object of this invention to provide a turret-type punching apparatus with a blank collecting and discharging mechanism which segregates the blanks from the slugs.

It is another object of this invention to provide a lower turret on a rotatable turret-type punch press with means for collecting several blanks and discharging them from the side of the turret along a path separated from the discharge path of the slugs.

It is another object of this invention to provide a turret-type punch press with conventional punching and blanking tools and with a lower turret supporting member having a minimum sized opening to accommodate the discharge of slugs only.

Basically these objects are accomplished by providing rotatable upper and lower turrets respectively carrying punches and dies, one of which is a blanking punch and die and positionable at a punching station on the apparatus. The lower turret is supported by a member which is provided with a slug discharge passage. In the preferred embodiment, the slug discharge passage is smaller than the blanking die opening so that the unsupported span of the lower turret is minimized. The blanks punched by the blanking tool are collected and discharged along a path separate from the slugs so that they remain segregated from the slugs during the punching operation.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a punching apparatus embodying the principles of the invention with parts broken away for clarity.

FIG. 2 is a section taken along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary plan taken along the line 3—3 of FIG. 1.

FIG. 4 is a fragmentary side elevation taken along the line 4—4 of FIG. 1 with parts broken away for clarity.

FIG. 5 is a fragmentary illustration of a typical workpiece from which blanks and slugs are cut along the lines illustrated.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The punching apparatus includes a frame 10 on which is rotatably mounted an upper turret 12 and lower turret 14. The upper turret includes a plurality of various types of punches 16 including a blanking punch 18. The lower turret carries a plurality of corresponding dies 20 including a blanking die 22. As is well known, the turrets are rotated together to position the various tools beneath a ram striker 24 at a punching station. A worksheet W is positionable between the turrets. A typical rotatable turret-type punching apparatus suitable for use in this invention, is illustrated in U.S. Pat. No. 3,685,380, entitled MULTI-TRACK TURRET AND OVERLOAD PROTECTION.

As is well known in blanking operations, a workpiece is divided into multiple parts or blanks B which are separated from the workpiece after first punching the slugs S from the workpiece. As best shown in FIG. 1, the blanks are collected and discharged or ejected to the side of the turret whereas the slugs fall downwardly and are discharged below the turret. Obviously, other ejection techniques are possible with the important concept being that the slugs and blanks are segregated at the time of punching.

FIG. 1 illustrates a conventional blanking punch 18 having a stripper 30 and a punch body 31. The die 22 is provided with a die body 34 and a die holder 36. In the preferred embodiment, the die has a removable section 38 which can be pivoted open about a pivot 39 to release the die body.

The die holder 36 is provided with an ejection channel or passage 40 for side discharge of the blanks B. The upper surface of the lower turret beneath the channel 40 is provided with guide tracks 42. A slider 44 is reciprocally mounted on the guide tracks and is connected to the piston rod of a pneumatic cylinder 46. As is readily apparent, extension of the piston rod will push a blank or a stack of blanks through the channel 34 and into a blank discharge chute 46. In the preferred form, operation of the air cylinder is programmed to operate by tape command every 5 or 10 blanking strokes to thus eject several blanks simultaneously.

The lower turret 14 is supported from the base frame 10 by a turret support 50. In the preferred form, the support is provided with a slug passage 52. Slugs fall through the slug passage 52 and through an opening 54 in the frame 10. Preferably the slugs are then collected on a discharge chute 56 and allowed to slide away from the punching apparatus where they are finally collected at a location separate from the discharge of the chute 46.

As is best shown in FIG. 4, the lower turret 14 is unsupported in the area overlying the slug passage 52. It can be readily seen that the strength of the lower turret is dependent upon the amount of support received by

the turret support 50 and that the larger the unsupported area, the weaker the turret. In this invention the segregation of blanks from the slug, allows the slug passage 52 to be no larger than the maximum slug size to be punched. In one embodiment, for example, this diameter is 4½ inches whereas the blanking die diameter is 6 inches.

While the preferred embodiment of the invention has been illustrated and described, it should be understood that variations and modifications will be apparent to one skilled in the art without departing from the principles of the invention. Accordingly, the invention is not to be limited to the specific form illustrated.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Apparatus for punching large product blanks at a punching station in a turret-type punch press comprising a frame, an upper rotatable turret on the frame having a plurality of tools, one of which is a product blanking punch, positionable at said punching station, a lower rotatable turret on the frame having a plurality of dies corresponding to said punches and positionable at said punching station, means on said frame at said punching station for supporting the lower turret and for receiving scrap slugs punched from said worksheet by said tools, and means independent of said scrap slug receiving means for removing product blanks punched through said blanking die without the product blanks passing to said scrap slug receiving means for segregating the product blanks from the scrap slugs.

2. The apparatus of claim 1, said product blank removing means including ejector means for pushing the

product blanks radially outwardly of the turret.

3. The apparatus of claim 2, said product blank removing means including a discharge chute for receiving the ejected product blanks and carrying the product blanks away from the lower turret.

4. The apparatus of claim 2, said ejector means including a pneumatic ram, a slider connected to said ram and having lower guide surfaces, guide tracks on said lower turret engageable by said guide surfaces for guiding said slider against said product blanks and out from beneath said lower turret.

5. The apparatus of claim 1, said lower turret supporting means including a scrap slug discharge opening for receiving said scrap slugs, said product blanking die having an opening for cutting the product blanks, said scrap slug discharge opening being considerably smaller than said die opening whereby the unsupported span of the lower turret overlying said slug opening is minimized.

6. Apparatus for punching product blanks at a punching station in a turret-type punch press comprising a frame, an upper rotatable turret on the frame having a plurality of tools, one of which is a product blanking punch, positionable at said punching station, a lower rotatable turret on the frame having a plurality of dies corresponding to said punches and positionable at said punching station, scrap slug collecting means, means on said frame at said punching station for supporting the lower turret and for passing the scrap slugs punched from said worksheet by said tools to said scrap slug collecting means, and means for collecting product blanks independent of said scrap slug collecting means.

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