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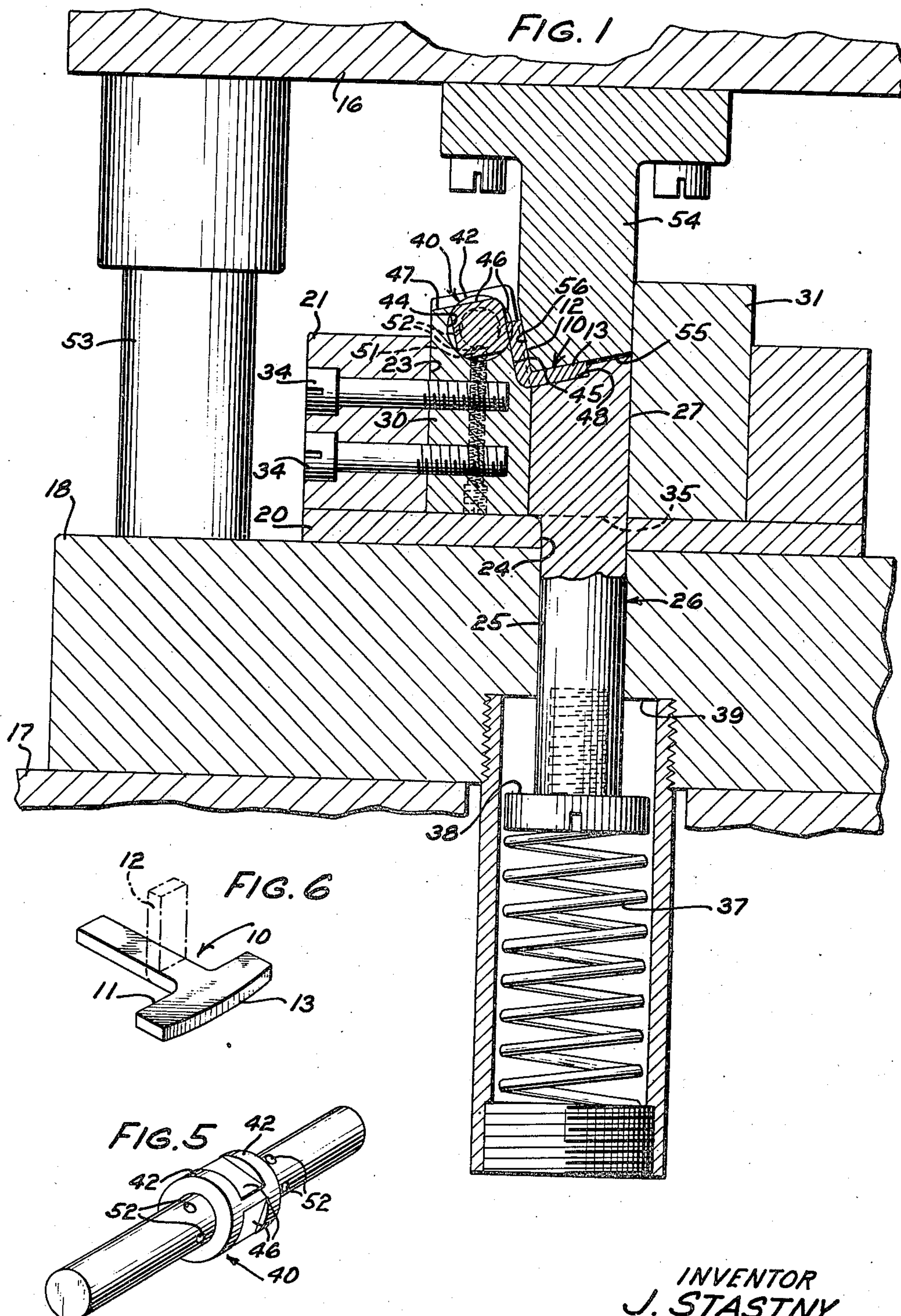
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# ARTICLE FORMING APPARATUS

Filed Feb. 2, 1945

2 Sheets-Sheet 1



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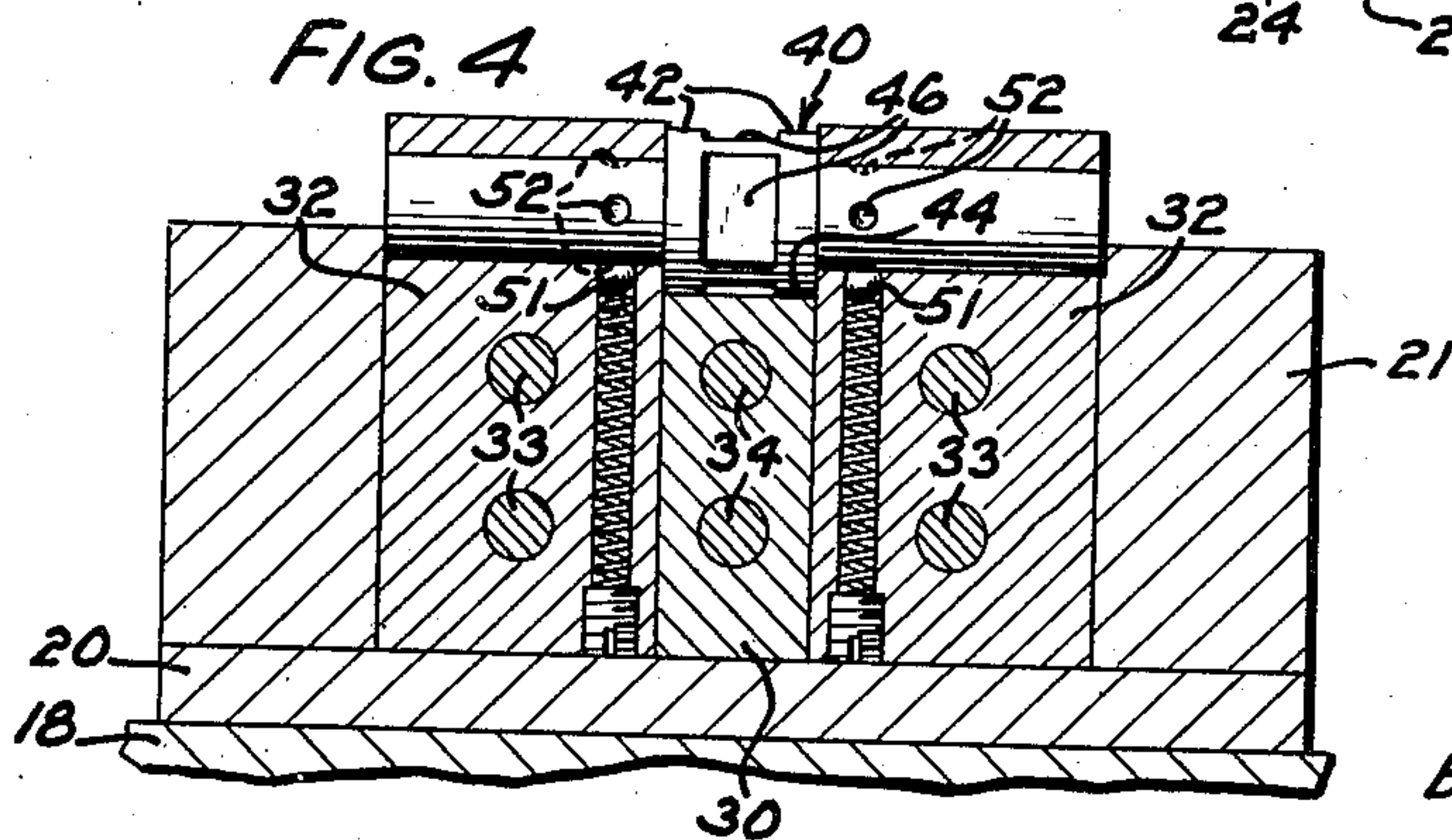
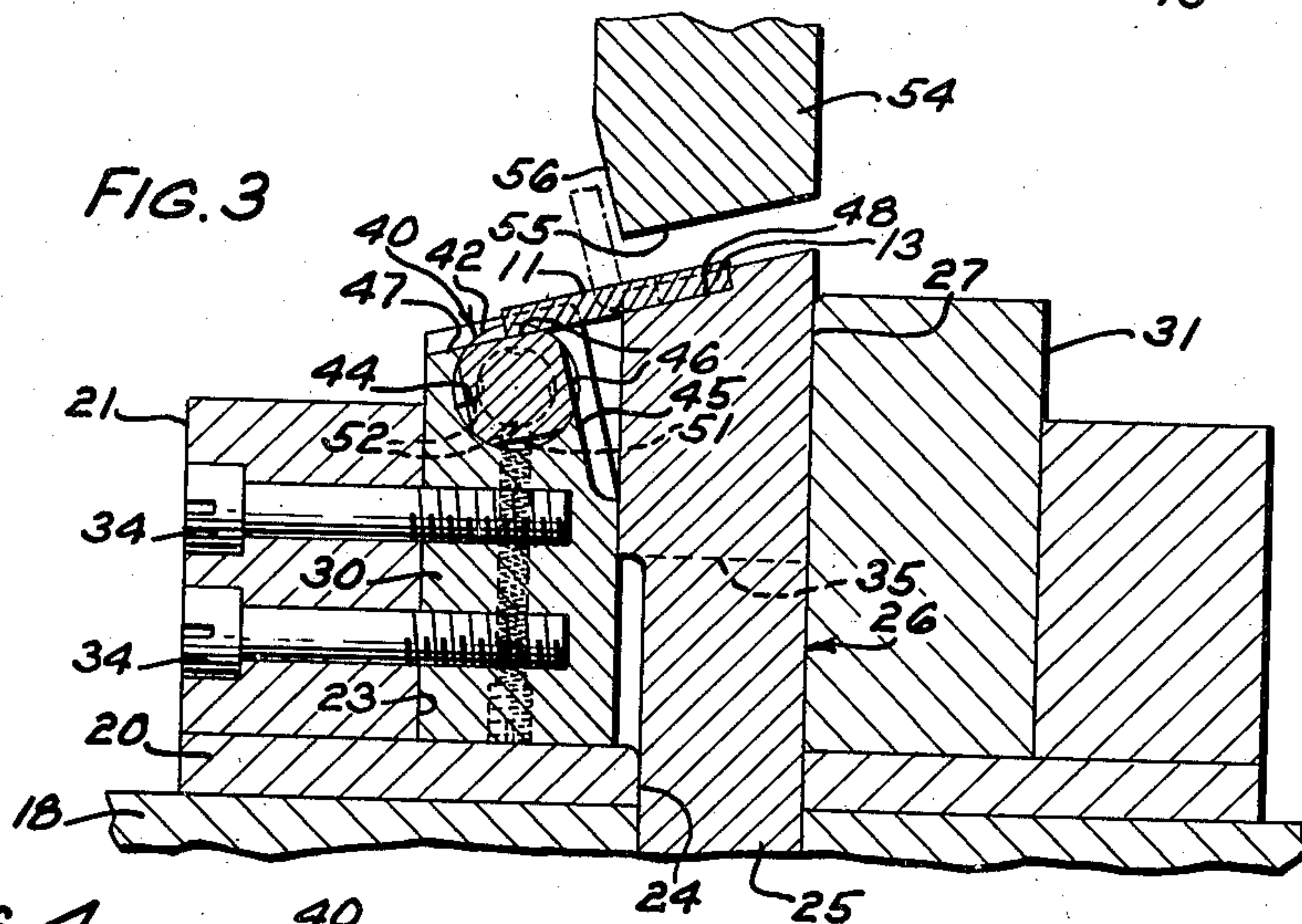
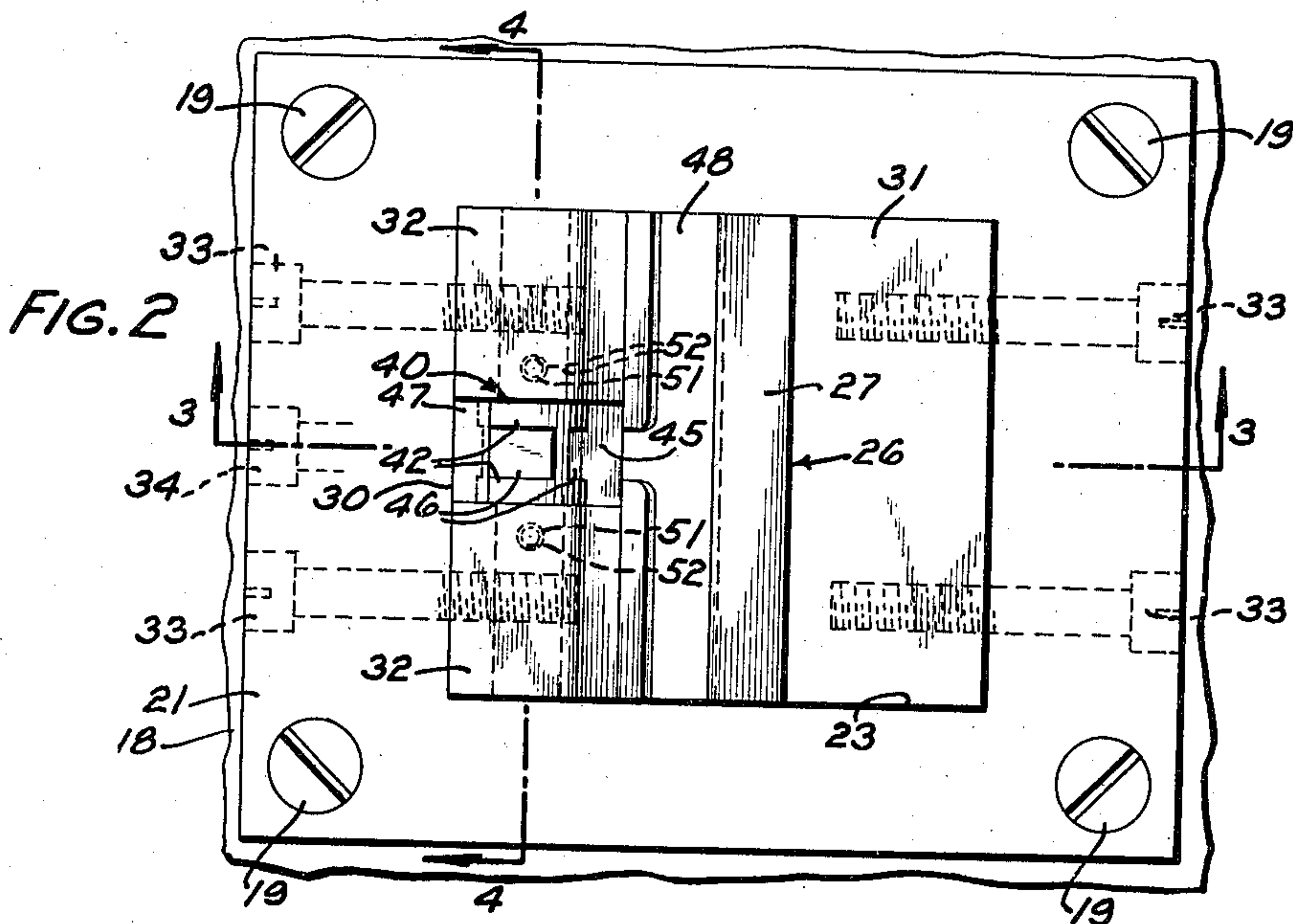
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ARTICLE FORMING APPARATUS

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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

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## ARTICLE FORMING APPARATUS

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6 Claims. (Cl. 153—33)

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This invention relates to article forming apparatus and more particularly to an apparatus for forming angularly shaped articles from metal blanks.

An object of the invention is to provide a practicable and efficient apparatus for forming angularly shaped articles with a minimum of wear on the apparatus and the elimination of defective articles.

In accordance with the above object, the present invention, in one embodiment thereof, as applied to the forming of magnet cores for telephone receivers, which may comprise a right angularly shaped piece part of relatively heavy gauge metal formed from a T-shaped flat blank, comprises a punch and die apparatus having a yieldable blank supporting member and a stationary die supporting a rotatable anvil, the blank supporting member and anvil being provided with cooperating seats for receiving and positioning opposite ends of the flat blank. A reciprocable punch, upon being operated downwardly, first clamps one end of the blank to the blank supporting member and, in the continued descent of the punch and member, the vertical arm of the T-shaped blank is folded upwardly between opposed cooperating die faces on the punch and die. During this latter unitary movement of the blank, punch and member, the rotatable anvil is rotatably indexed 90° without any appreciable sliding of the arm of the blank on its anvil seat, the anvil merely rotating due to the pressure of the arm seated thereon, the movement terminating upon the yieldable member being seated against a positive stop surface. Thus, all sliding friction between the anvil and the piece part is substantially eliminated and, consequently, no appreciable wear occurs on the anvil and no heat tending to burn the piece part is generated. Also, the piece part is completely formed and the bent set with the positive stopping of the yieldable member.

Other objects and advantages of the invention will more fully appear from the following detailed description taken in conjunction with the accompanying drawings, in which

Fig. 1 is a fragmentary central vertical section through a forming apparatus embodying the features of the invention, the parts being shown in the positions assumed thereby at the completion of the article forming operation;

Fig. 2 is a plan view of the lower portion of the apparatus;

Fig. 3 is a fragmentary central vertical section taken on the line 3—3 of Fig. 2, the parts being

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shown in their normal positions and a blank to be formed seated at opposite portions on the yieldable supporting member and rotatable anvil;

Fig. 4 is a fragmentary vertical section taken on the line 4—4 of Fig. 2;

Fig. 5 is a perspective view of the rotatable anvil; and

Fig. 6 is a perspective view of the T-shaped magnet core blank showing, in broken outline, the bent-up arm.

The present embodiment of the invention as shown in the drawings may be used advantageously for forming angularly shaped parts or articles such as, for example, a magnet core 10 (Fig. 1) formed from a T-shaped flat blank 11 (Fig. 6) of relatively heavy gauge metal, a vertical arm 12 being bent at right angles adjacent a horizontal arm 13.

As shown in the drawings, referring particularly to Fig. 1, the magnet core forming apparatus embodying the features of this invention may be operatively connected to a punch press, which may be of any usual type. Since it is not essential to a complete understanding of the invention, the punch press has not been fully illustrated, except those parts directly concerned with this invention, which consist of the following: A vertical reciprocable platen and a stationary bed 16 and 17, respectively. Fixed to the upper face of the press bed 17 is a bolster plate 18, to which is secured, by screws 19, together with a plate 20, a rectangular shaped frame 21, having a similarly shaped aperture 23, the plate which is reciprocably guided a shank portion 25 of circular cross section of a spring pressed pad or blank supporting member 26 having a rectangular shaped head 27, the end faces of which slide upon opposite faces of the frame aperture 23. Within the frame aperture 23 at opposite longitudinal sides of the head 27 is a die member 30 and a guide block 31, the side faces of the head being slidable on the adjacent opposite faces thereof and also upon combined guide and bearing blocks 32 (Fig. 2) arranged at opposite ends of the die member 30. The guide block 31 and bearing blocks 32 and the die member 30 abut the upper face of the plate 20 and are fixed to adjacent walls of the frame aperture 23 by screws 33 and 34, respectively (Fig. 2). A shouldered face 35 on the blank supporting member 26 formed at the juncture of the shank portion 25 and head 27 of the supporting member engages the upper face of the fixed plate 20 in the extreme lowered position of the sup-



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porting member, as shown in Fig. 1, thus providing a positive stop therefor. The blank supporting member 26 is normally maintained in its upper position (Fig. 3) by a compression spring 37 operatively associated therewith (Fig. 1), a screw head 38 carried by the supporting member engaging an annular face 39 on the bolster plate 18 limiting the upper movement of the supporting member under the action of the spring 37.

Journalled at opposite ends in the spaced bearing blocks 32 is a rotatable anvil 40 (Fig. 5), having an enlarged portion intermediate its ends provided with spaced circular end portions 42, which bear and rotate upon an arcuate bearing surface 44 formed on the die member 30. At its right side (Figs. 1 and 2) the die member 30 is cut out to form a die recess, indicated at 45, to receive the arm 12 of the magnet core 10 during the forming operation, the recess being formed at a suitable angle from vertical to facilitate the forming and setting of a right angle bend. A portion of the anvil 40 between the circular portions 42 is formed with four equally spaced plane or flat faces 46 (Fig. 5), one of which is always in line with an inclined rectilinear face of the die recess 45. Another of the anvil flat faces 46, the upper one, as viewed in Figs. 1 and 2, is always in line with an inclined upper face 47 of the die member 30, which is disposed at right angles to the referred-to face of the die recess 45. The upper end face of the blank supporting member 26 has an inclination similar to that of the upper face 47 of the die member 30 and has a T-shaped seat 48 formed therein for receiving and positioning the horizontal arm 13 of the T-shaped flat blank 11, the vertical arm 12 of the blank being seated and positioned on the uppermost flat face 46 of the rotatable anvil 40 and between the circular portions 42 thereof, as shown in Fig. 3, when the blank supporting member is in its normal upper position.

Carried in each of the bearing blocks 32 is a spring pressed ball detent 51, which, in cooperation with a set of four equally spaced suitably shaped depressions 52 in each reduced end of the anvil 40, serves to yieldably retain the anvil in its indexed position at the termination of each forming operation, to be referred to hereinafter.

The reciprocable platen 16, which receives motion from a suitable power source in a well-known manner, is guided in its movements on a plurality of rods 53 fixed to the bolster plate 18, one of the rods being shown in Fig. 1. Attached to and depending from the platen 16 is a punch 54 having a lower blank engaging face 55, which has an inclination similar to that of the upper face of the blank supporting member 26 and the upper face 47 of the die member 30. Upon its left side, the punch 54 is formed with an inclined rectilinear die face 56, which is parallel to the referred-to similar face of the die recess 45 of the die member 30.

In the operation of the above-described apparatus, a T-shaped flat blank 11 is first mounted in position on the apparatus, as shown in Fig. 3, wherein its vertical arm 12 rests on the uppermost flat face 46 of the rotatable anvil 40 between the circular portions 42 of the anvil and the horizontal arm 13 and the adjacent portion of the arm 12 in the T-shaped seat 48 formed in the upper end face of the yieldable blank supporting member 26. Thereafter, the punch 54 is caused to descend, whereupon the blank 11 is first firmly clamped to the blank supporting member 26, and as the punch continues to descend, carrying with

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it the blank and supporting member, the blank arm 12 resting on the rotatable anvil 40 is folded upwardly to the position shown in Fig. 1 and between the inclined rectilinear die faces 45 and 56 of the die member 30 and punch 54, respectively. The resistance of the spring 37 is such that during the entire bending operation the relative position of the punch 54 and blank supporting member 26, as shown in Fig. 1, is maintained. Downward motion of the parts is positively halted upon the shouldered face 35 of the blank supporting member 26 engaging the upper face of the fixed plate 20, at which instant the angularly shaped magnet core 10 is formed and its bend set with the outer arcuate face thereof at the juncture of the right angle bend in the arm 12 seated at the bottom of the die member recess 45. As the arm 12, resting on the flat face 46 of the rotatable anvil 40, is folded upwardly 90° during its bodily downward movement, the anvil is rotated clockwise 90° due to the pressure of the arm 12 thereon, but no appreciable sliding friction occurs therebetween to cause wear on the anvil and no heat is generated, such as would burn the formed article. Upon completion of the forming operation, no change in the relative position of the anvil face 46 and the arm 12 of the article has taken place and another anvil face 46 has been positioned to receive the following blank to be formed. In the retraction of the punch 54, the spring pressed blank supporting member 26 follows, thus elevating the formed article to the dotted outline position, as shown in Fig. 3. Due to the inclination of the die recess 45 in the die member 30 and the cooperating die face 56 on the punch 54, the completed article is elevated with a minimum of friction between the engaged faces of the article and the die member 30.

What is claimed is:

1. An apparatus for forming angularly shaped parts comprising a stationary die having a forming surface, a rotatable anvil having a surface upon which one portion of a part is seated and which is movable into the plane of said forming surface, a movable member cooperating with said anvil to support another portion of the part, a plunger for gripping the part to said member and moving it past said anvil to bend the part therebetween and thereafter, in cooperation with said forming surface, forming the part, and means for maintaining said member in operative relation with the part and plunger during the bending and forming of the part.

2. An apparatus for forming angularly shaped parts comprising a stationary die having a forming surface, a rotatable anvil cooperating with and arranged above said forming surface, said anvil having a surface upon which one portion of a part is seated and which is movable into the plane of said forming surface, a movable member arranged laterally of said die for supporting another portion of the part, a plunger for gripping the part to said member and moving it together with said member past said anvil to bend the part therebetween and thereafter, in cooperation with said forming surface, forming the part, and means for maintaining said member in operative relation with the part and plunger during the bending and forming of the part.

3. An apparatus for forming angularly shaped articles from blanks comprising a stationary die having a forming surface, a rotatable anvil having a surface upon which one portion of a blank is seated and which is movable into the plane of said forming surface, a yieldable member upon



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which a second portion of the blank is seated, and a reciprocable punch having a die surface cooperating in its movement with said member and said die forming surface to first clamp said second blank portion to said member and, in its continued movement, to bend said one blank portion between said cooperating die surfaces, said anvil being rotatably indexed during the bending operation without change in relative position between said one blank portion and said anvil.

4. An apparatus for forming angularly shaped articles from blanks comprising a stationary die having a die formation, a rotatable anvil having a plurality of equally spaced seats movable in succession into the plane of said die formation mounted above said die, one of said die seats being normally in position to seat one portion of a blank, a yieldable member mounted laterally of said die upon which a second portion of the blank is seated, and a reciprocable punch having a die formation on a side face thereof cooperating in its movement with said member and said stationary die formation which is arranged parallel to said punch die formation to first clamp said second blank portion to said member and, in its continued movement, to bend said one blank portion between said cooperating die formations, said anvil being rotatably indexed during the bending operation without change in relative position between said one blank portion and said anvil.

5. An apparatus for forming angularly shaped articles from blanks comprising a stationary member having a die formation, a rotatable anvil having a plurality of equally spaced plane faces movable in succession into the plane of said die formation upon one of which one portion of a blank is seated, a yieldable member upon which a second portion of the blank is seated, and a reciprocable punch having a die face arranged

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parallel to said die formation and cooperating in its movement with said yieldable member and die formation to first clamp said second blank portion to said yieldable member and, in its continued movement, to bend said one blank portion between said cooperating die face and die formation, said anvil being rotatably indexed during the bending operation without change in relative position between said one blank portion and said anvil.

6. An apparatus for forming angularly shaped articles from blanks comprising a stationary member having an inclined die formation, a yieldable pad arranged laterally of said member and having an inclined end face formed with a seat for locating one portion of a blank, a rotatable anvil having a surface upon which a second portion of the blank is seated and which is movable into alignment with and contiguous to said die formation, and a reciprocable punch having a die face parallel to said die formation and cooperating in its movement with said pad to first clamp said first blank portion to said pad and, in its continued movement, to bend and set said second blank portion between said cooperating die formation and die face, said anvil being rotatably indexed during the bending operation without change in relative position between said second blank portion and said anvil.

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