

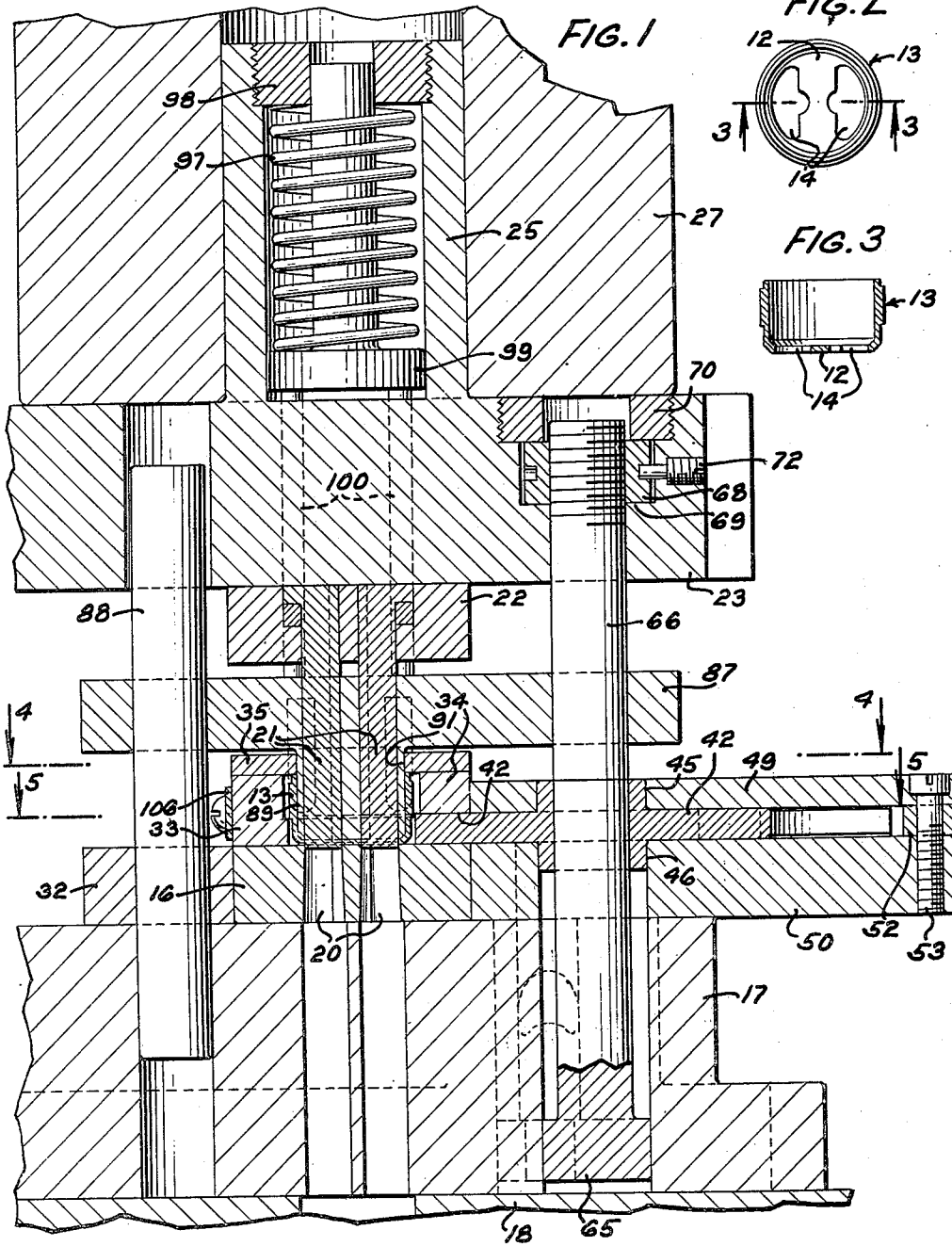
Dec. 12, 1950

E. A. BRANDT
BLANK FEEDING AND LOCATING MECHANISM
FOR PUNCH PRESSES

2,533,914

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5 Sheets-Sheet 1



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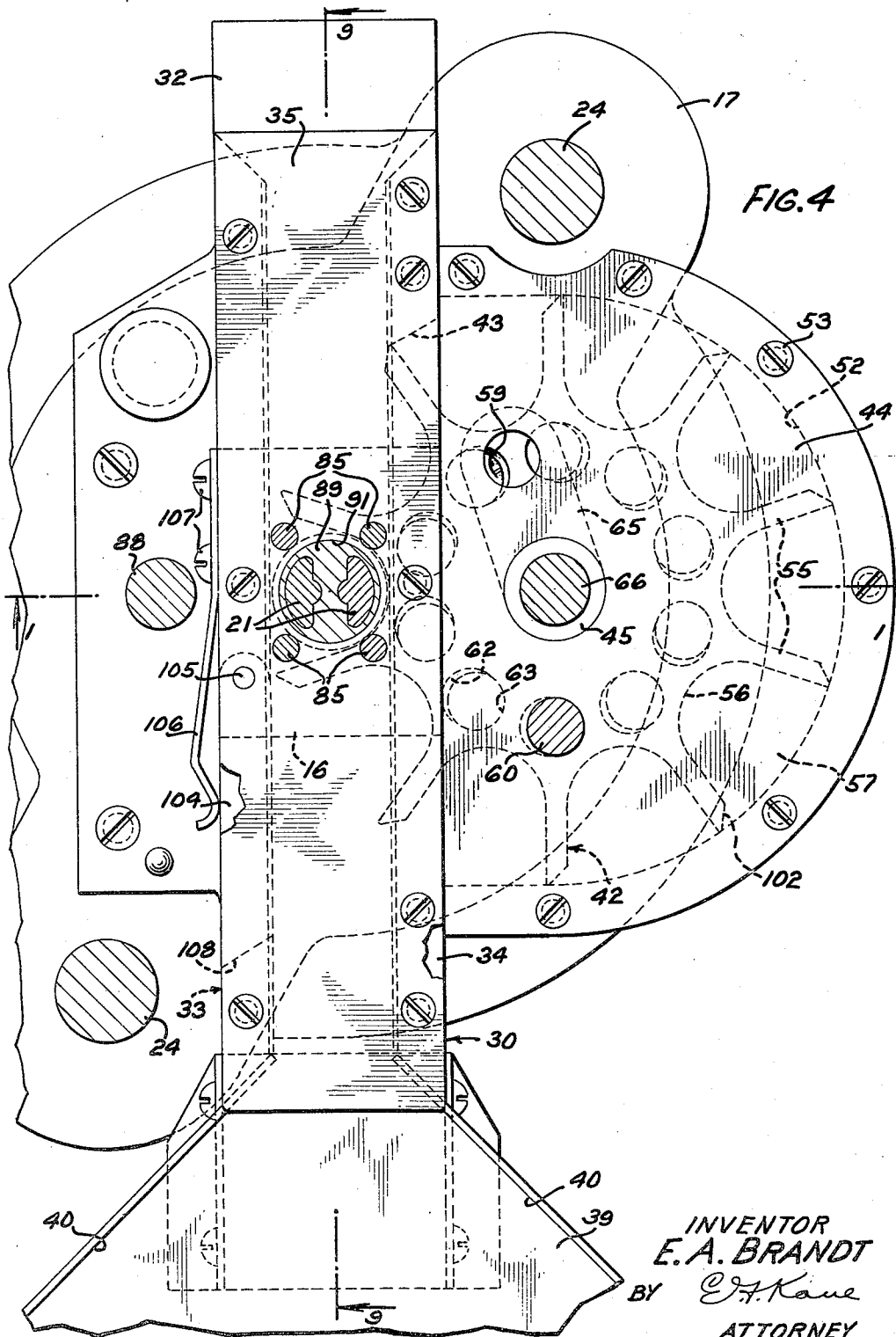


FIG. 4

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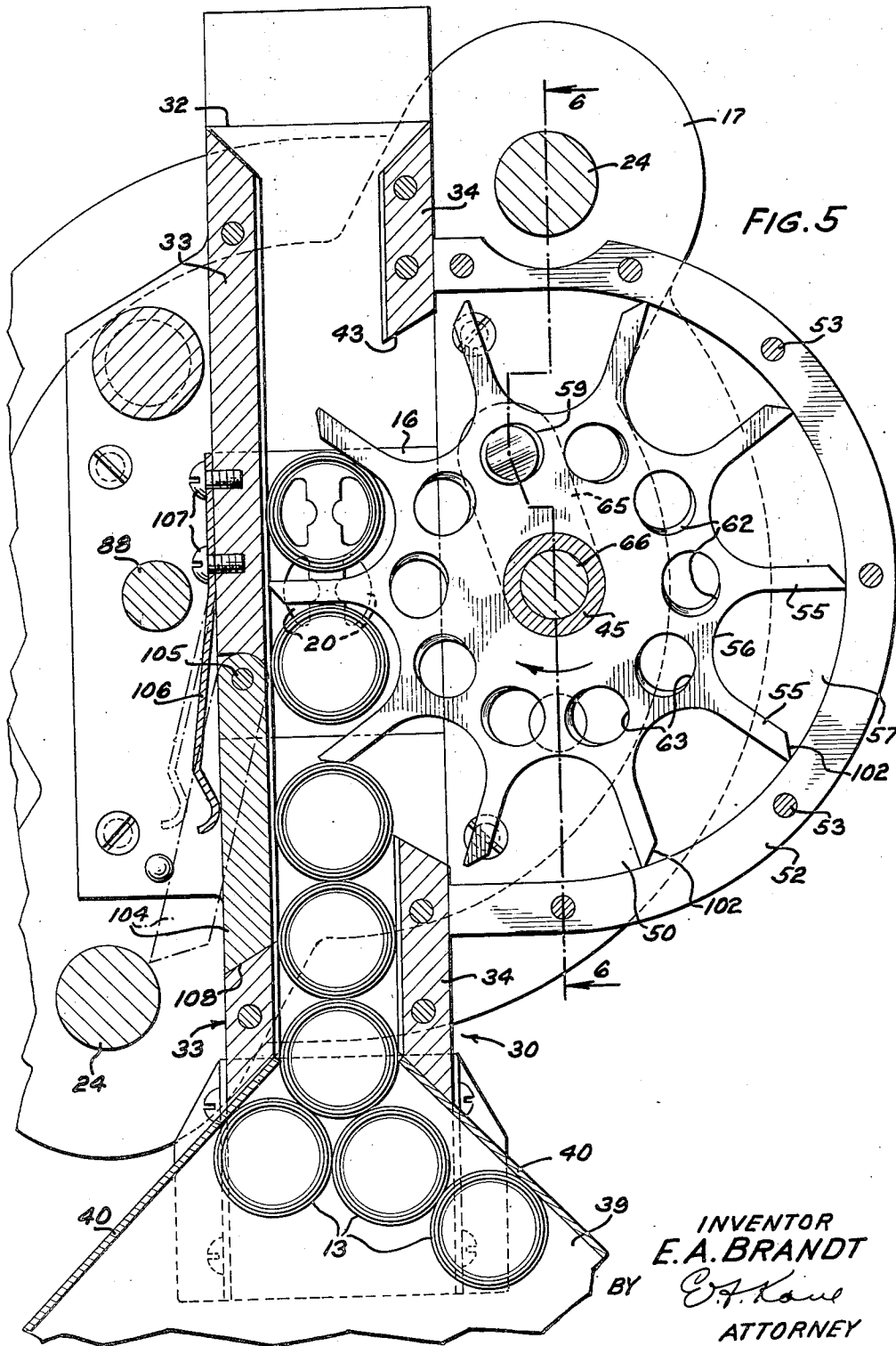
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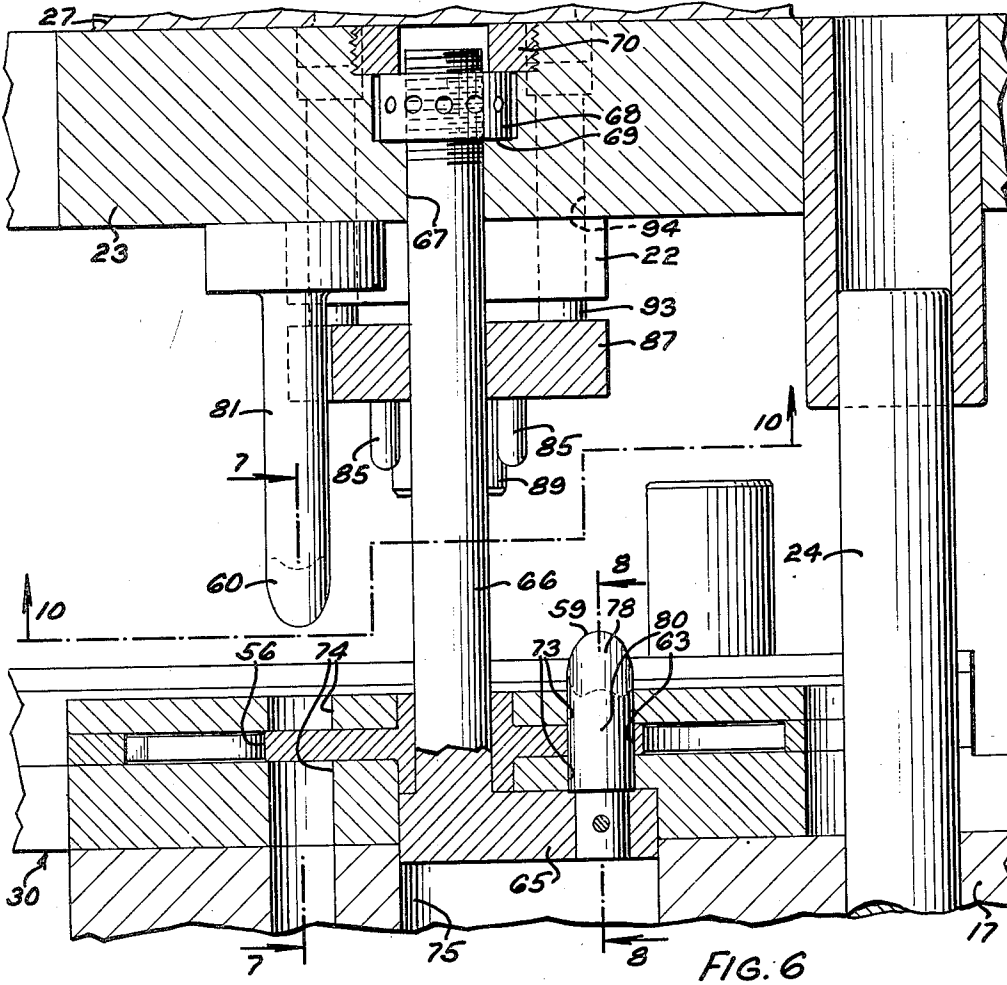


FIG. 6

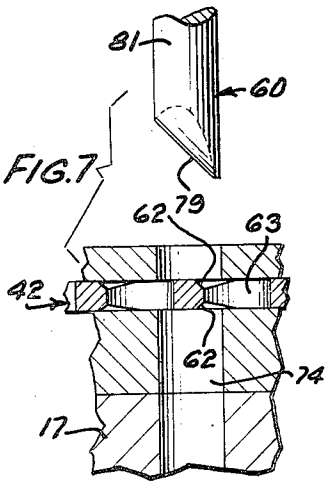


FIG. 7

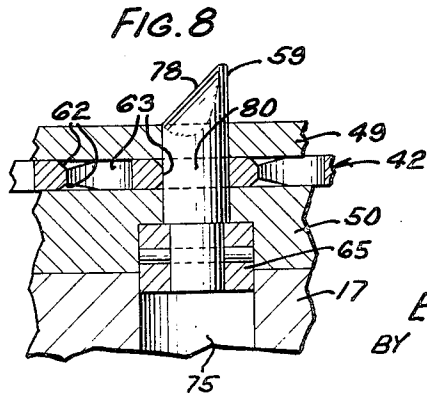


FIG. 8

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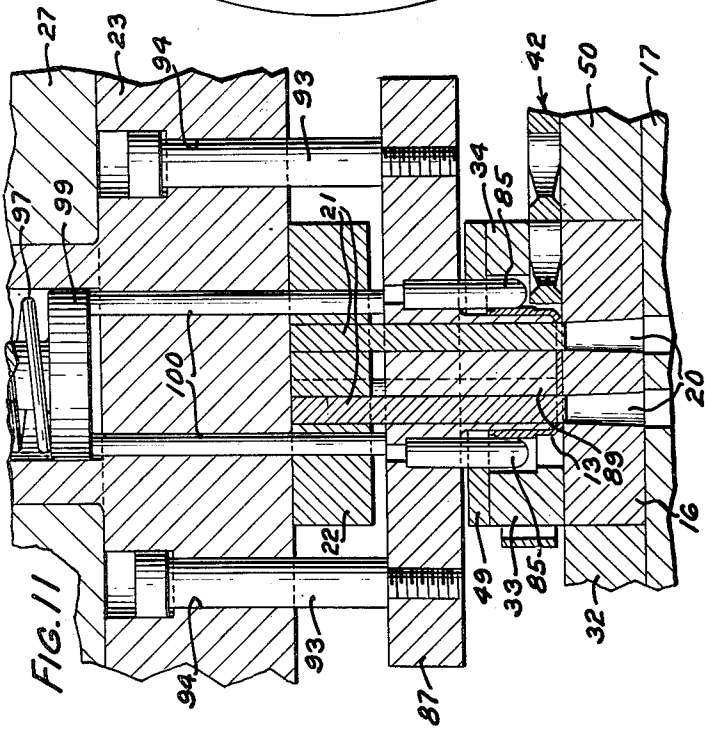
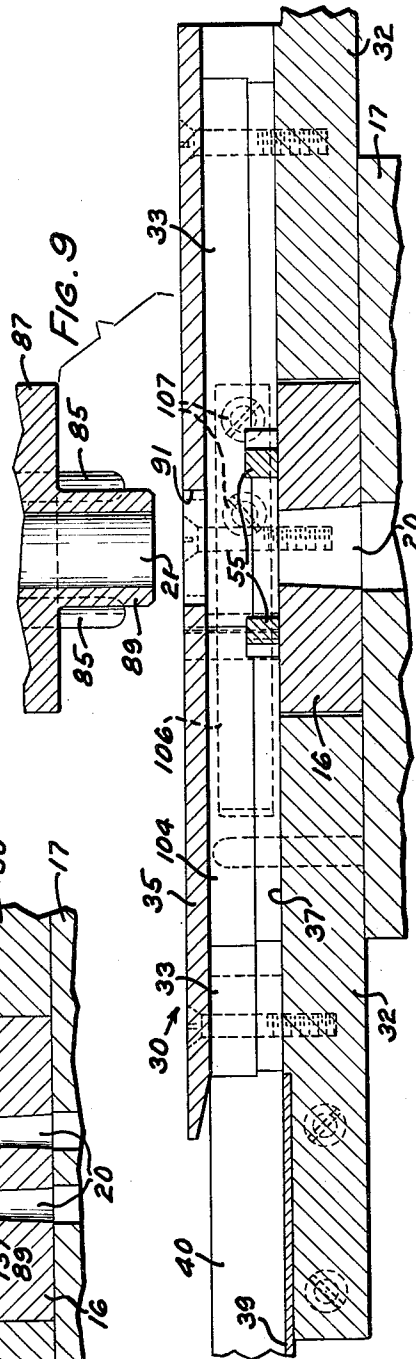
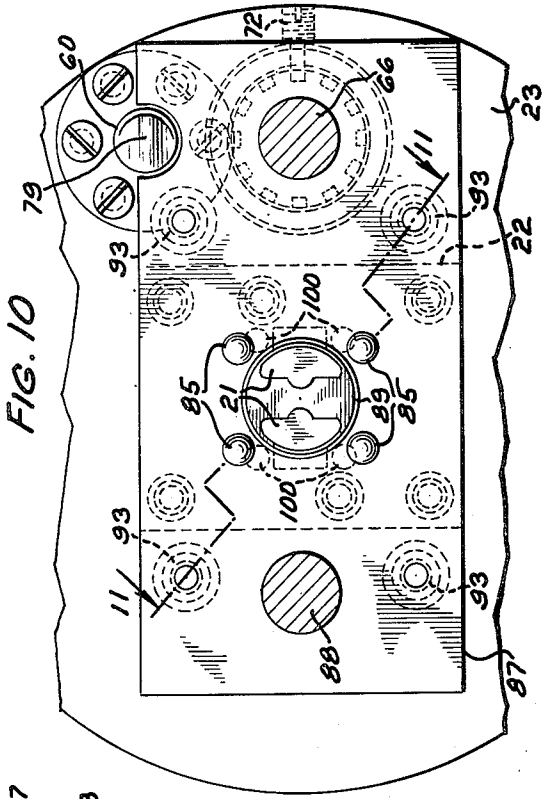
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UNITED STATES PATENT OFFICE

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BLANK FEEDING AND LOCATING MECHANISM FOR PUNCH PRESSES

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This invention relates to blank feeding and locating mechanisms for punch presses and more particularly to a step by step feeding mechanism which is cam actuated by the reciprocation of the punch press ram.

An object of the present invention is to provide an improved blank feeding and positioning mechanism for punch presses.

In one embodiment of the invention for feeding and locating cup-shaped articles to be perforated, to a perforating punch press, there is provided a magazine including a guideway for receiving the articles and guiding them in a predetermined path into alignment with the perforating punch and die of the punch press and a portion of the guideway is slotted to receive a portion of a feed wheel having radiating fingers and part locating pockets formed in the periphery thereof and which wheel is indexed step by step to position the parts in axial alignment with the punch and die. The step by step rotation or indexing of the feed wheel is accomplished by a pair of cam actuating members reciprocable with the ram, one of which actuating members engages the feed wheel to advance the wheel one-half a step as the ram is raised and the other of which cam members acts to advance the feed wheel the second half step during the first part of the downward movement of the ram. A portion of one side wall of the chute is yieldably mounted to rock about a pivot and may be forced outwardly by an improperly positioned part or blank forced thereagainst by a finger of the feed wheel and aids in freeing the piece part from jamming engagement with the finger and in restoring the part to the chute without injury to the part.

The invention will be more fully understood from the following description when considered in connection with the accompanying drawing illustrating the preferred embodiment of the invention in which:

Fig. 1 is a vertical lateral sectional view of the apparatus taken centrally through the punch, die and feed wheel and showing the punch and die in closed position;

Fig. 2 is a plan view of the cup-shaped article or piece part to be processed in the apparatus shown;

Fig. 3 is a sectional view of the piece part taken on the line 3-3 of Fig. 2;

Fig. 4 is a plan sectional view of the apparatus taken on the line 4-4 of Fig. 1 showing, in dotted lines, a star feed wheel holding a piece part in alignment with the punch and die;

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Fig. 5 is a plan sectional view taken on the line 5-5 of Fig. 1 with the ram in raised position showing the feed wheel in an intermediate position;

Fig. 6 is a fragmentary sectional view taken on the line 6-6 of Fig. 5 showing the parts of the punch and die in their open or separated position;

Fig. 7 is a detail sectional view through one of the actuating cams and a portion of the feed wheel taken on the line 7-7 of Fig. 6;

Fig. 8 is a fragmentary sectional view showing the relation between another cam actuator and the feed wheel taken on the line 8-8 of Fig. 6;

Fig. 9 is a fragmentary vertical longitudinal sectional view through a portion of the apparatus and the guide chute associated therewith and showing a portion of the punch and die in an intermediate separate position;

Fig. 10 is a fragmentary horizontal sectional view indicated by the line 10-10 of Fig. 6 looking up and showing a portion of the punch holder and associated parts mounted thereon; and

Fig. 11 is a fragmentary sectional view through the mechanism showing the punch and die in closed position with a piece part therebetween and taken generally along the line 11-11 of Fig. 10.

The punch and die mechanism illustrated herein is adapted to perforate the bottom 12 of a cup-shaped article 13 forming a pair of irregularly shaped perforations 14-14 therein, as indicated in Figs. 2 and 3. The punch press mechanism for effecting this perforating operation comprises the stationary die 16 (Figs. 1, 5, 9 and 11) fixed to a die holder 17 mounted on a bolster 18 of the punch press. The die 16 is provided with a pair of irregularly shaped apertures 20 and cooperates with a pair of irregularly shaped punches 21 secured by a retaining plate 22 to the punch holder 23. The punch holder 23, slidable on a pair of aligning pins 24-24 secured in the die holder 17, has an upwardly extending shank 25, by means of which the punch holder is removably secured to the ram 27 of the punch press. The press and the punch and die construction herein described and illustrated are of conventional design and are disposed at an angle of approximately 45° to the horizontal plane to facilitate the feeding of the articles 13 to the press.

The mechanism for feeding the parts to the press includes a guideway 30 for guiding the parts 13 in a straight path across the face of

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the die 16. The guideway 30 comprises a bottom wall or plate 32 secured to the die holder 17, side walls 33 and 34, and a top wall or plate 35 and the plate 32 is formed to fit around a portion of the die 16 and has an article supporting surface 37 flush with the top surface of the die 16. At its forward end, the guideway is provided with a feed tray 39 for receiving a plurality of piece parts and the tray 39 has angularly disposed sides 40 for directing the piece parts into the rectangular aperture of the chute 30. The tray 39 and the guideway 30 form a magazine for handling a substantial number of piece parts at one time.

Urged downwardly by gravity, the parts 13, which are placed on the sloping tray, are directed by the side walls 40 into the guideway 30 and, as they are guided in a straight path across the die 16, the parts are successively engaged by portions of an intermittently actuated feed wheel 42 to locate each part in a predetermined position relative to the punch and die prior to the perforating stroke of the punch. A portion of the star wheel or the feed wheel extends into cooperative relation with the interior of the guideway 30 through a slot 43 (Figs. 1, 4 and 5) in the lower portion of the wall 34 and the feed wheel 42 is provided with oppositely directed hub portions 45 and 46 journalled in bearings formed in plates 49 and 50. The plate 50 is rigidly mounted on the die holder 17 and the plate 49 is secured in spaced relation thereon by a spacer member 52 and machine screws 53. Extending radially from the axis of the feed wheel are a number of fingers 55, the vertical surfaces of which merge with the curved surfaces 56 of the feed wheel to form a plurality of pockets 57 for receiving the piece parts 13 therein.

The feed wheel 42 is adapted to be rotated step by step to engage and feed successive piece parts 13 to a predetermined position in alignment with the punch and die in timed relation with the reciprocation of the ram 27 of the punch press. In order to provide for a smoother working of the feed wheel 42 and to reduce the shock incident to the indexing thereof, the step by step indexing movement is accomplished in two parts or half steps, the first part or half step occurring during the upward movement of the ram, and the second part or half step occurring during the downward movement of the ram.

A pair of cam actuators 59 and 60 (Fig. 6), mounted for reciprocation with the punch holder 23, cooperate with the cam surfaces 62—62 formed on the edges of a plurality of apertures 63 in the feed wheel 42 for advancing the feed wheel through two half-step indexing movements for each reciprocation of the ram. The cam member 59 extends upwardly from and is carried by a laterally extending arm 65 formed on the lower end of a rod 66 passing through a central aperture in the feed wheel. The upper end of the rod extends through an aperture 67 in the punch holder 23 and threadedly engages a nut 68 thereon, which is clamped between a shoulder 69, formed in the aperture 67, and a threaded annular member 70 secured in the upper end of the aperture. The nut 68, after the cam member 59 has been adjusted to its proper position axially of the rod 66, is locked in adjusted position by a set screw 72 (Fig. 1). The cam member 60 is secured to and extends downwardly from the underneath side of the punch holder 23. Clearance holes 73, 74 and 75 are provided to accommodate the reciprocation of the cam

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members 59, 60 and the lateral supporting arm 65, respectively.

The actuators 59 and 60 are provided, respectively, with inclined camming surfaces 78 and 79 and cylindrical shank portions 80 and 81 and are arranged relative to the apertures 63 of the feed wheel so that as they are reciprocated with the ram, they alternately engage the feed wheel and advance it a half-step at a time, the shank portions entering the apertures 63 in the wheel serve to lock it against movement during the interval of dwell. With the ram in its raised position, as shown in Fig. 6, the actuator 59 is in its raised position, fitting within an aperture 63 of the feed wheel and holding it in this position against movement after having advanced it one-half step in a clockwise direction, as viewed in Fig. 5. Several of the piece parts 13 will assume the relationship relative to the feed wheel, as illustrated in Fig. 5, in which intermediate position of the wheel none of the piece parts is aligned with the die. On the downward movement of the ram, as the actuator 59 leaves one of the recesses 63 in the feed wheel 42, the end of the cam surface 79 of the actuator 60 engages a cam edge 62 in its path and rotates the feed wheel through one-half step to complete the indexing of the feed wheel and thus align the piece part 12 with the axis of the punch and die, as indicated in Fig. 4. This final indexing of the feed wheel 42 to properly position the part in alignment with the die is accomplished during the first portion of the downward movement of the ram so that the part has come to rest and is properly positioned before the punch has been lowered to the level of the part, and the feed wheel is maintained in this position by the shank portion 81 of the actuator 60 engaging in an aperture 63.

In order to more accurately locate the part with respect to the punch and die, there is provided a plurality of gage pins 85—85, mounted for reciprocation with the ram and adapted to engage the outer periphery of the cup-shaped article 13 on the downward movement of the ram. The pins 85 extend downwardly from a stripper member 87 slidably mounted on a pair of aligning pins 88 and 86 (Fig. 1). Also extending downwardly from the stripper plate 87 is a portion 89, which is adapted, upon downward movement of the stripper, to pass through an aperture 91 in the plate 35 of the guideway 30 and engage the bottom wall 12 of a cup-shaped article 13 (Fig. 1). The stripper plate 87 and the projecting portion 89 are apertured to slidably receive the punches 21 and are secured to the punch holder 23 by a plurality of headed rods 93 secured to the stripper member and slidably engaging in shouldered recesses 94 in the punch holder, which construction permits a limited movement of the stripper relative to the punch holder. The stripper 87 is yieldingly urged downwardly by a spring 97 mounted in the shank 25 of the stripper plate, the spring reacting against the plug 98 to urge a plunger 99 downwardly and transmit its force to the stripper plate 87 through a plurality of pusher pins 100 slidably mounted in recesses in the die holder 23 and the retaining member 22.

To facilitate the movement of piece parts 13 into and out of the pockets 57 of the feed wheel 42, the end surfaces 102 of the arms 55 are obliquely formed, as indicated in Figs. 4 and 5. Thus, the parts, as the feed wheel 42 rotates, are guided freely into the pockets 57 of the feed wheel prior to their being perforated and, after

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being perforated, the parts are freely released from the pockets.

The wall 35 of the guideway is provided with a section 104, pivoted at 105, for rocking movement about its pivot and is held in normal position by a spring 106 secured to the wall 33 by the screws 107. The pivoted section 104 has an inclined end surface 108, which fits against a similarly inclined surface on the wall 33 to limit its inward movement and align its inner guide face with the inner guide face of the wall 33. Thus, during the feeding operation of the apparatus, should a piece part 13 become improperly positioned so as to become wedged between an arm 55 of the feed wheel and the wall 33 of the guideway, the section 104 would yield to the pressure of the part against it and aid in freeing the part from the end of the arm 55 and restore it to its normal position in the guideway 33.

From the foregoing description, it will be seen that a simplified feeding and positioning mechanism has been provided in which the piece parts are guided in a predetermined path across the die and are successively engaged and positioned in alignment with the punch and die by a star-shaped feed wheel indexed step by step by a pair of cam actuators movable with the ram to rotate the wheel one-half step on the upward movement of the ram and one-half step on the downward movement of the ram and that the guideway has a yieldable section which serves to release an improperly positioned part wedged between the feed wheel and the guideway.

What is claimed is:

1. In a press having a pair of relatively movable tools and tool holders therefor, the combination of a guideway supported by one of said tool holders for guiding a blank in a predetermined path relative to the tools, a feed wheel rotatable step by step supported by said one tool holder and having a plurality of radially disposed fingers cooperating with said guide member for moving and positioning successive blanks longitudinally of the guideway to locate the blanks in a predetermined position with respect to said tool, a cam member carried by the other of said tool holders for actuating said feed wheel through one-half step during the relative receding movement of said tool holders, and another cam member carried by said other tool holder for actuating said feed wheel the other half step during the relative advancing movement of the tool holders.

2. In a press having a tool for processing articles and a reciprocable ram for actuating said tool, the combination of a guideway for guiding the articles in a predetermined path of travel relative to said tool, an intermittently rotatable star wheel cooperating with said guideway for moving and positioning successive articles therein to locate the articles in a predetermined position relative to the tool, cam means carried by the ram to partially index the star wheel on the upstroke of the ram, another cam means on the ram for completing the indexing of the star wheel on the downstroke of the ram, and means for locking the star wheel against movement during the intervals between movements thereof.

3. In a press having a tool for processing articles and a reciprocable ram for actuating said tool, the combination of a guideway for guiding the articles in a predetermined path of travel relative to said tool, an intermittently rotatable star wheel positioned adjacent said guideway and having a plurality of radiating arms movable into said guideway for moving and positioning suc-

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cessive articles in said guideway to locate the articles in a predetermined position relative to the tool, cam means carried by the ram to partially index the star wheel on the upstroke of the ram, another cam means on the ram for completing the indexing of the star wheel on the downstroke of the ram, means for locking the star wheel against movement during the intervals between movements thereof, a yieldable wall section in said guideway adjacent said star wheel movable from normal position by an improperly positioned part urged against the yieldable wall section by the star wheel, and resilient means for returning said yieldable wall section to its normal position.

4. In a machine having a stationary tool member and a reciprocable tool member for processing parts, a magazine mounted in a fixed relation with respect to said stationary tool member for receiving and guiding the parts in a predetermined path relative to the tool members, an intermittently rotatable star wheel associated with the magazine for moving and positioning successive parts in said magazine to locate the parts in predetermined relation to said tool members, a plurality of recesses in said wheel, a plurality of cam surfaces on said wheel, a first actuator connected for reciprocation with said reciprocable tool member and having a cam surface thereon engageable with the cam surfaces of said wheel to partially index said wheel on the receding movement of said movable tool member and having a portion engageable in said recesses to prevent rotation of said wheel during the interval of dwell, and a second actuator connected for reciprocation with said reciprocable tool member and having a cam surface engageable with the cam surfaces of said wheel to complete the indexing of said wheel on the advancing movement of said movable tool member and having a portion engageable in said recesses to prevent rotation of said wheel during the interval of dwell.

5. In a machine having a stationary tool member and a reciprocable tool member for processing piece parts, the combination of a magazine mounted in a fixed relation with respect to said stationary tool member for receiving and guiding parts in a predetermined path relative to the tool members, an intermittently rotatable star wheel associated with the magazine and having a plurality of radial arms movable into the magazine for moving and positioning successive parts therein to locate the parts in predetermined relation to said tool members, a plurality of recesses in said wheel, a plurality of cam surfaces on said wheel, a first actuator connected for reciprocation with said reciprocable tool member and having a cam surface thereon engageable with the cam surfaces of said wheel to partially index said wheel on the receding movement of said movable tool member and having a portion engageable in said recesses to prevent rotation of said wheel during the interval of dwell, a second actuator connected for reciprocation with said reciprocable tool member and having a cam surface engageable with the cam surfaces of said wheel to complete the indexing of said wheel on the advancing movement of said movable tool member and having a portion engageable in said recesses to prevent rotation of said wheel during the interval of dwell, said magazine having a pivoted wall portion therein adjacent said feed wheel movable from a normal position by an improperly positioned part urged

against the pivoted wall portion by the feed wheel, and means for yieldably retaining said pivoted portion in normal position.

6. In a press having a reciprocatory ram and a processing tool comprising a stationary die holder and a punch holder movable with said ram, the combination of a guideway mounted on the stationary die holder for guiding articles in a predetermined path relative to the tool, a centrally apertured feed wheel mounted on said stationary die holder for intermittent rotation and having a plurality of radially disposed fingers cooperating with said guide member for engaging and positioning successive blanks therein to locate the blanks in a predetermined position relative to the tool, a plurality of cam surfaces on the upper face of said wheel, a plurality of cam surfaces on the lower face of said wheel, a rod mounted on said reciprocable punch holder in coaxial alignment with and extending through the aperture in said wheel, a laterally projecting arm on the lower end of said rod, an upwardly extending cam member carried by said arm engageable with the cam surfaces on the lower side of said wheel for partially indexing said wheel on the upstroke of said ram, and a downwardly extending cam member mounted on said reciprocable tool holder engageable with the camming surfaces on the upper side of said wheel to complete the indexing movement of said wheel on the downstroke of the ram.

7. In a press having a tool for processing articles and a reciprocatory ram for actuating said tool, a guideway for guiding the articles in a predetermined path of travel relative to said tool, an intermittently rotatable star wheel cooperating with said guideway for engaging and positioning successive articles therein to locate the articles in a predetermined position relative to the tool, means for mounting said guideway and said intermittently rotatable wheel in fixed position on said press, said wheel having an

axially disposed aperture, a plurality of surfaces extending transversely between the opposite faces of said wheel, cam edges on the upper portion of said transverse surfaces, cam edges on the lower portion of said transverse surfaces, a rod movable with and extending downwardly from said ram through the axial aperture in said wheel, a laterally projecting arm on the lower end of said rod, an upwardly extending cam member carried by said arm engageable with the cam edges on the lower side of said wheel for partially indexing said wheel on the upstroke of the ram, a surface on said cam member parallel with the path of movement of said ram and engageable with said transverse surface on said wheel for locking said wheel against rotation, a cam member movable with and extending downwardly from said ram engageable with the upper cam edges of said wheel to complete the indexing movement of said wheel on the downstroke of said ram, a surface on said downwardly extending cam member parallel with the path of movement of said ram and engageable with said transverse surfaces on said wheel for locking said wheel against rotation, and means for securing said rod and said downwardly extending cam member to said ram.

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