April 30, 1946. F. A. BRANDES 2,399,198

PRESS

Filed Feb. 25, 1944 5 Sheets-Sheet 1

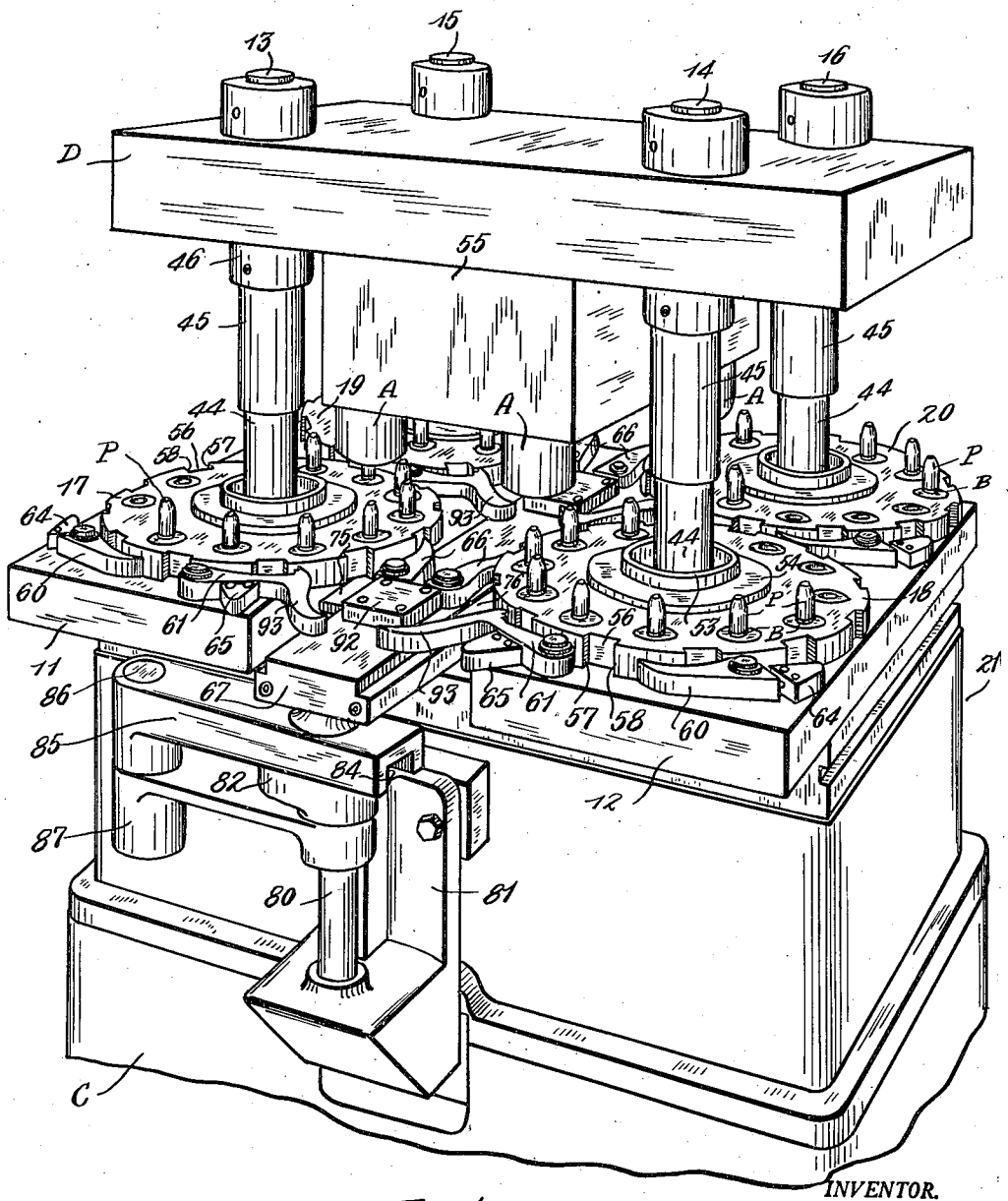


FIG. 1

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PRESS

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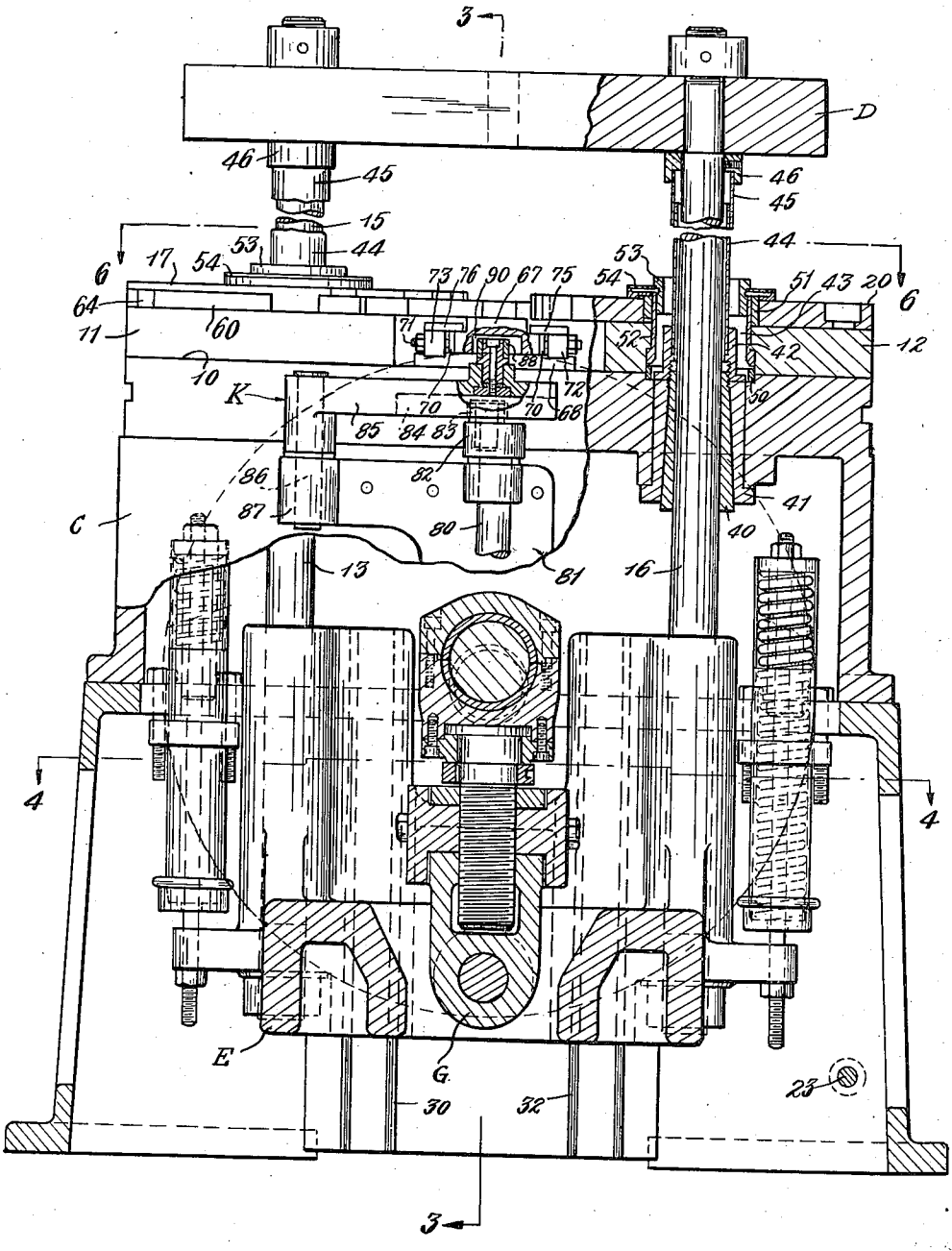


FIG. 2

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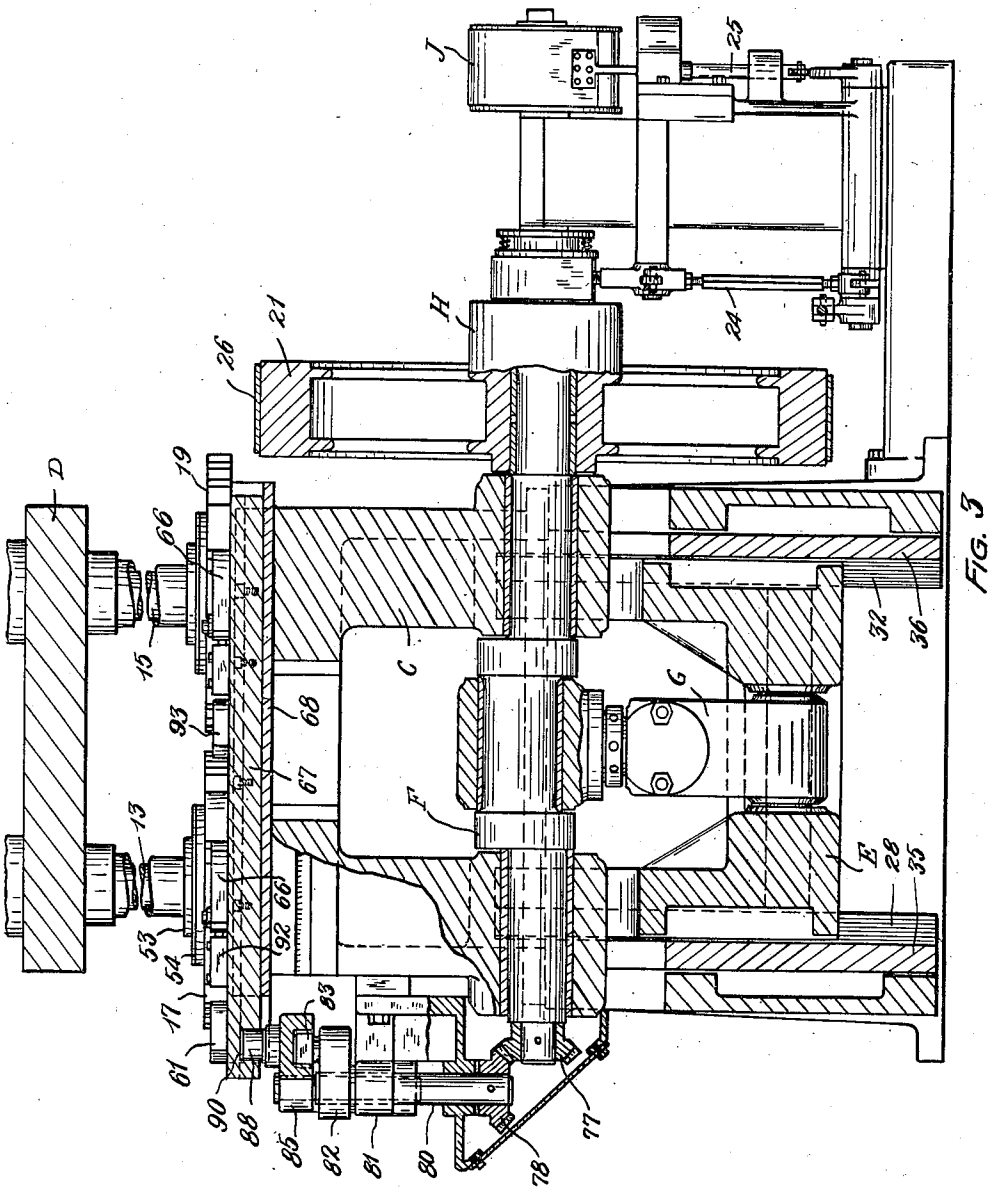


FIG. 3

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April 30, 1946. F. A. BRANDES 2,399,198

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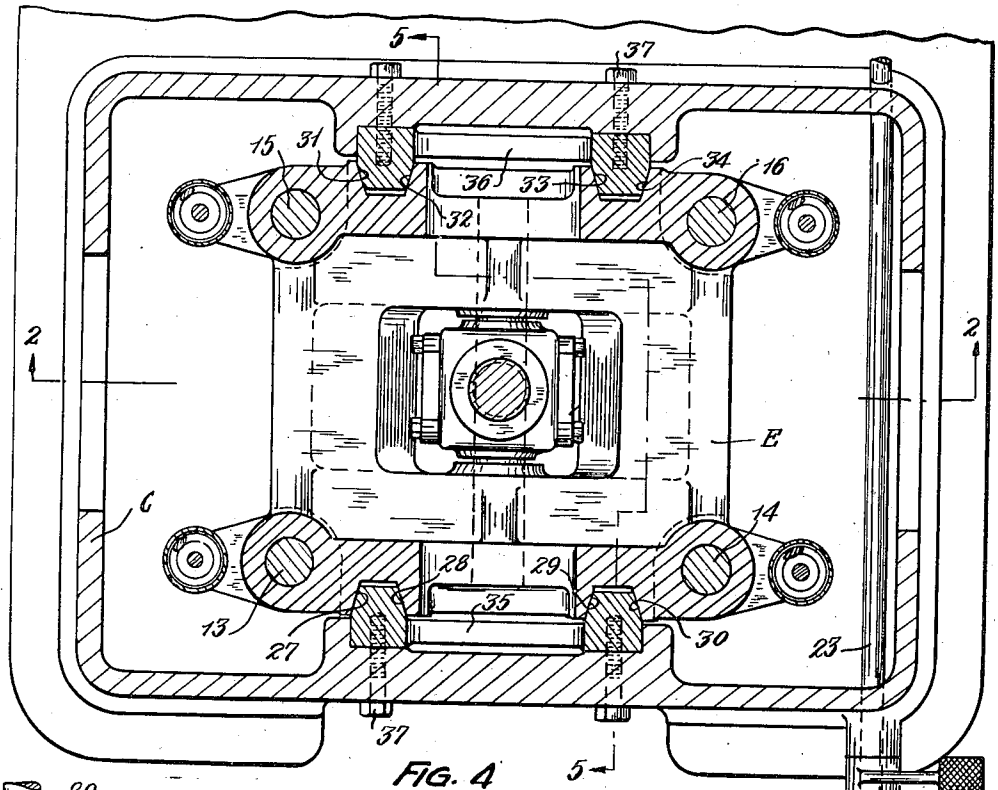


FIG. 4

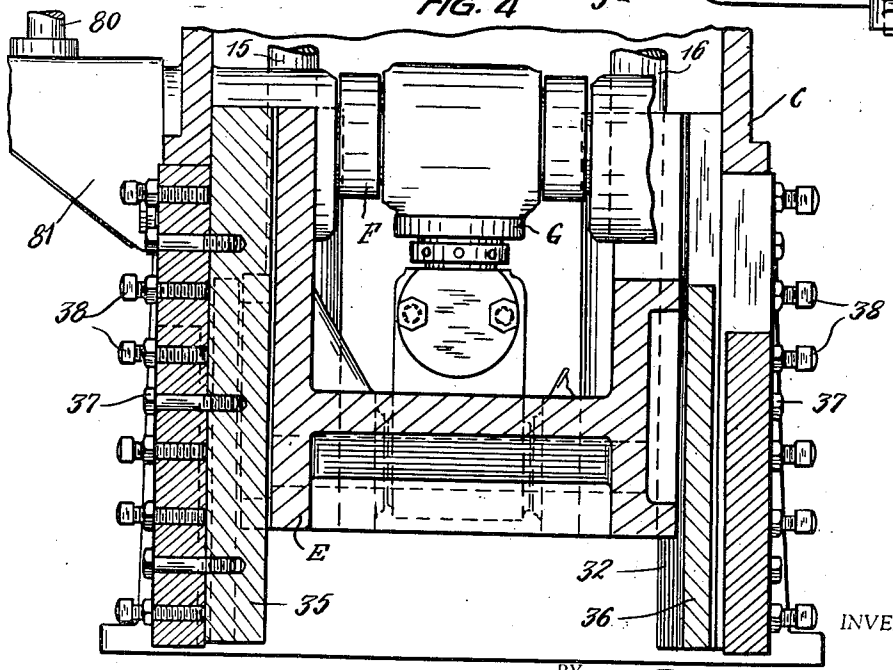


FIG. 5

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April 30, 1946. F. A. BRANDES 2,399,198

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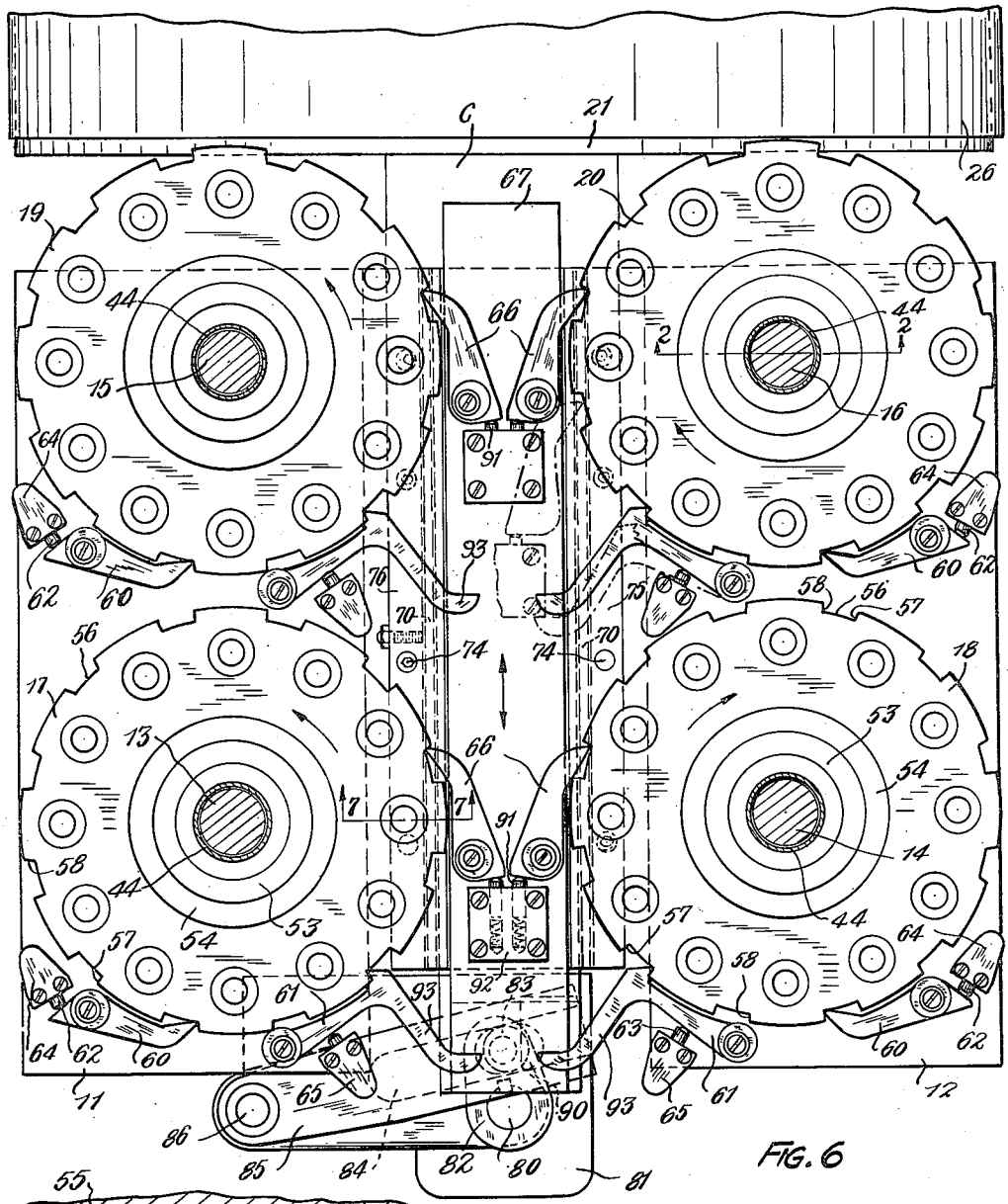


FIG. 6

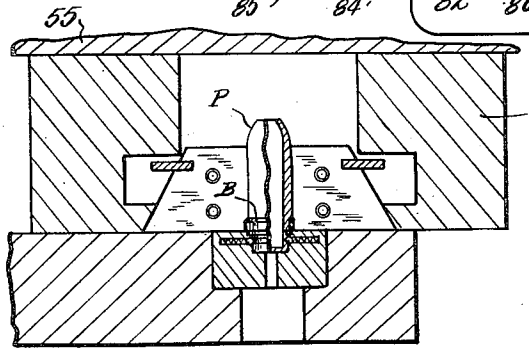


FIG. 7

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Patented Apr. 30, 1946

2,399,198

UNITED STATES PATENT OFFICE

2,399,198

PRESS

Frank A. Brandes, Shaker Heights, Ohio

Application February 25, 1944, Serial No. 523,791

3 Claims. (Cl. 164—88)

The present invention relates to power presses designed primarily for forming articles by tools, such as punches and dies and the like. More particularly, the invention relates to power presses of the character mentioned comprising a rotatable member for automatically feeding or conveying the articles to be operated upon to one or more tools as desired, and to feeding mechanism of the character referred to.

The principal object of the invention is the provision of a novel and improved power-actuated press of the character referred to having a movable head or like member adapted to carry a tool, for example, a punch or die, which head is reciprocable towards and from a stationary abutment or bolster by a plurality of draw bars or tension members projecting into or through the stationary abutment, and comprising rotatable "dial" feed and/or tool carrying members interposed between the head and abutment and located concentrically with respect to the draw bars, in combination with means for automatically indexing or rotating the rotatable feed member in timed relation to the reciprocation of the head.

Another object of the invention is the provision of a novel and improved press of the character referred to comprising a frame having an abutment surface or table, a cross-head located within the frame, means for reciprocating said cross-head, a second cross-head located above the abutment surface or table and adapted to carry a tool, such as a punch, die, or the like, and means including a plurality of draw bars or tension members for operatively connecting said cross-heads whereby they move as a unit, in combination with rotatable feed and/or tool carrying members located concentrically with respect to the draw bars, and means for automatically indexing or rotating the feed member in timed relation to the reciprocation of the cross-heads.

Another object of the invention is the provision of a novel and improved press of the character referred to comprising a frame having an upper supporting surface, a generally rectangular cross-head located within the frame, means connected to said cross-head adjacent to the center thereof for reciprocating the same, a second generally rectangular cross-head located above the supporting surface of the frame and adapted to carry a tool, such as a punch, die, or the like, draw bars or tension members located adjacent to the corners of said cross-heads and projecting through the top of the frame for connecting the cross-heads whereby they move as a unit upon reciprocation of the lower cross-head, rotatable feed and/or die carrying members concentrically located with respect to the draw bars or tension members, and means for automatically indexing or rotating the rotatable feed members in timed relation to the reciprocation of the cross-heads.

The invention resides in certain details of construction and combinations and arrangements of parts and further objects and advantages will be apparent to those skilled in the art to which the invention relates from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of this specification, in which similar reference characters designate corresponding parts, and in which

Fig. 1 is a perspective view of the upper part of a floor type power press embodying the present invention;

Fig. 2 is an end view of the press shown in Fig. 1, less the tooling, with portions broken away and shown in section, the lower portions of the view being in section approximately on the line 2—2 of Fig. 4 and the upper right-hand portions of the view being in section approximately on line 2—2 of Fig. 6;

Fig. 3 is a sectional view, with portions shown in elevation, approximately on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view, approximately on the line 4—4 of Fig. 2;

Fig. 5 is a sectional view, approximately on the line 5—5 of Fig. 4;

Fig. 6 is a sectional view, approximately on the line 6—6 of Fig. 2; and

Fig. 7 is a sectional view, approximately on the line 7—7 of Fig. 6.

For purposes of illustration, the machine shown in the drawings and hereinafter described in considerable detail, is shown in Figs. 1 and 7 as supplied with tools for performing a simple operation which is representative of work which might be done on a machine of the character here involved. The particular operation shown is that of clamping a metal band B about the base of a projectile P by a collapsible die, designated generally by the reference character A, see Fig. 7. In the particular machine shown, four similar operations are carried on simultaneously, as will be hereinafter more particularly described. However, it is to be understood that innumerable operations other than the particular operation shown may be performed on the machine of the present invention and that different operations may be performed at different stations, as desired.

Generally speaking, the machine shown comprises a multi-part rectangular frame C adapted to be supported on a floor, the upper part of which frame forms a supporting surface or table 10 upon which the die bolsters 11 and 12 are detachably supported, and an upper cross-head D reciprocable towards and from the table 10 by draw rods or bars 13, 14, 15 and 16 connected thereto adjacent to the corners of the cross-head and projecting through the table 10, in combination with "dial" members 17, 18, 19 and 20 concentrically located with respect to the draw bars 13, 14, 15 and 16, respectively. The lower ends of the draw bars 13, 14, 15 and 16 are connected to the lower cross-head E which is located within the frame C near the base of the machine and together with the upper cross-head D and the draw rods 13, 14, 15 and 16 form the cross-head assembly, which assembly is adapted to be reciprocated vertically by a crankshaft F operatively connected to the lower cross-head E by an adjustable connecting rod or pitman G.

The crankshaft F passes horizontally through the frame C below the table 10 and above the lower cross-head E and is supported in the frame by suitable bearings which engage portions of the concentric part or parts of the crankshaft. The rear end of the crankshaft F, as the machine is viewed in Fig. 1, is provided with a flywheel and driven pulley 21, see Fig. 3, rotatably supported thereon but adapted to be connected thereto by a clutch H of conventional construction actuated by a pedal 22 fixed to a horizontal shaft 23 rotatably supported by the frame C and operatively connected to the clutch by suitable linkage mechanism, designated generally as 24. The actuating mechanism 25 of a brake J connected to the crankshaft F outside of the clutch H is operatively connected to the clutch actuating mechanism in such a manner that at all times when the clutch is disengaged the brake is applied. The clutch H, the brake J and the operating mechanism therefor may be of any well-known construction and are not described in detail. Suffice it to say that the press may be operated automatically or not, as desired. The flywheel and driven pulley 21 is continuously rotated during operation of the press from some convenient power source, such as an electric motor (not shown) with which it is connected by a belt 26.

The lower cross-head E is guided in its vertical movement by a plurality of cooperating V-ways 27, 28, 29, 30, 31, 32, 33 and 34, the first two of which are on the interior of the front wall of the frame C and the exterior of the front wall of the cross-head E, as viewed in Fig. 4, while the latter two are on the interior of the rear wall of the frame and the exterior of the rear wall of the cross-head. The ways are located to the side of the crankshaft F and the ways on the frame extend well above the lower edge of the concentric portion or portions of the crankshaft. This construction permits the ways, particularly those on the frame, to be made extremely long, thus affording a long guiding surface without increasing the overall height of the press, with the result that the accuracy with which the upper cross-head is moved is greatly increased. In the particular embodiment shown, the ways on or carried by the frame and which guide the lower cross-head E are formed directly on U-shaped members 35 and 36, the pair of ways on one side of the machine being formed on one member and the pair of ways on the other side being formed on the other member. The members 35 and 36 are connected to the frame by a plurality of bolts 37, however, the members may be adjusted or moved towards or from the interior of the frame by adjusting bolts 38 threaded into tapped holes in the frame C and provided with locknuts for retaining them in any adjusted position. The inner ends of the bolts 38 abut the members 35 and 36, as indicated in Fig. 5 of the drawings. Alternatively, other means of adjusting the ways inwardly and outwardly with respect to the interior of the frame may be employed and/or the ways may be formed on individual members so as to permit the individual adjustment of the two ways at either side of the cross-head E. The members 35 and 36 are U-shaped or have cut-out portions opening into their upper edges, which construction permits the ways to extend above the lower part of the concentric part of the crankshaft F. In order to take full advantage of the increased length of the ways on the interior of the frame C, that part of the interior of the frame directly underneath the cross-head E is unobstructed, permitting the cross-head to travel downwardly almost to the floor upon which the press is supported, and the upper side of the cross-head is cut out to accommodate the crankshaft, permitting the surfaces thereof which engage the ways on the frame to extend above the lower portion of the concentric part of the shaft.

Where the draw rods 13, 14, 15 and 16 project through the frame C, they are guided by adjustable split tapered sleeves 40 slidably supported in tubular members 41 fixed in the frame C. The upper ends of the sections of the tapered sleeves 40 are cylindrical and have threaded engagement with members 42 surrounding the rods and located above the frame C. The construction is such that as the members 42 are rotated, the tapered sleeves 40 are moved within the cylindrical members 41 and by virtue of the cooperating tapered surfaces therebetween, the sections of the sleeves 40 of which there are preferably three, are adjusted inwardly or outwardly with respect to the draw rods which project therethrough. The draw rods project through suitable apertures 43 in the die bolsters 11 and 12 and the parts of the rods between the top of the frame C and the underside of the upper cross-head D are preferably provided with telescopic guides 44 and 45 fixed to the members 42 and to bushings 46 carried by the draw rods underneath the cross-head D. The guards 44 and 45 prevent the draw rods from being marred, etc. In construction, the machine thus far described is very similar to that shown in my United States Patent No. 2,310,890, issued February 9, 1943, to which reference is made for a more complete description of certain features of construction shown herein but not described in detail.

In the present instance the die bolsters 11 and 12 are fixed to the top or table 10 of the frame, one extending longitudinally along either side of the frame and the "dial" feed and/or die carrying members 17, 18, 19 and 20 are supported thereon for rotation about the draw bars 13, 14, 15 and 16, respectively. The die bolsters 11 and 12 are located or fixed with respect to the holes in the frame through which the draw rods project by annular-shaped members 50, the lower ends of which are located in the upper counterbored end of the holes in the frame surrounding the outwardly projecting flange on the lower ends of the members 42, see Fig. 2. The "dial" members are supported on the die bolsters for rotation about cylindrical spacer members 51 fixed to the die

bolsters by sleeve members 52, the lower ends of which have flanges that engage shoulders on the die bolsters while the upper ends thereof are threaded to receive nut-like members 53, the outer ends of which overlie disk-like members 54 that engage the upper surfaces of the members 51. The construction is such that the "dial" members are free to rotate about the members 51.

In operation, the "dial" members are intermittently rotated or indexed in the direction indicated by the arrows, see Fig. 6, to transfer or carry blanks or articles to be operated upon to and from positions underneath tools carried by and projecting downwardly from the upper cross-head D. As previously stated, any suitable tool arrangement may be employed. Referring to the particular tool arrangement shown in the drawings, the bands B are adapted to be compressed onto the lower ends of the projectiles P by the dies A fixed to a spacer block 55 attached to the underside of the cross-head D while being held in the working stations by the "dial" feed members. As shown, the working stations happen to be the four stations located nearest to the vertical centerline of the machine, as viewed in Fig. 6. The other stations shown are either loading or unloading or idling stations. The loading and unloading of the "dial" member is preferably performed either automatically or manually in one or more of the outside stations. While in the illustration given an operation is performed at only one station in any given "dial" member, any number of stations may be employed, as desired and any suitable station or stations may be employed for forming, ejecting, or loading, etc., other than the stations shown. Obviously the ejecting and loading is preferably performed at a station or stations near the sides of the machine since these stations are more accessible than the other stations and the forming or working is preferably performed at stations near to the center of the machine.

While the cross-head D is adjacent to its upper limit of travel, the "dial" members are rotated or indexed to carry the work from station to station. The periphery of each of the "dial" members 17 to 20, inclusive, is provided with a plurality of vertical ratchet slots 56 forming double-faced ratchet teeth 57 and 58 and during the working portion of the cycle of operations, the "dial" members are held stationary by the engagement of pawls 60 and 61 with the teeth 57 and 58, respectively, of different ratchet slots 56. The pawls 60 and 61 are continuously urged in a direction to engage the ends thereof with the ratchet teeth 57 and 58 by spring-pressed detents 62 and 63 slidably supported in brackets 64 and 65, respectively, bolted to the die bolsters. The construction is such that the pawls 60 and 61 prevent rotation of the "dial" members in either direction except during the period that indexing is taking place. The "dial" members are indexed periodically by pawls 66 pivotally connected to a slide bar 67 slidably supported on a plate 68 fixed to the upper part of the frame intermediate the die bolsters 11 and 12. The particular manner in which the slide bar 67 is supported is immaterial. As shown, the slide bar 67 is of inverted T-shape and the lower projecting sides of the bar are confined between vertical gibs 70 engaging opposite sides of the bar and adjustable towards and from the slide bar by screws 71 carried by members 72 and 73 fixed to the plate 68 by screws 74. In addition to holding the plate 68 and the members 72 and 73 in position, the screws 74 retain members 75 and 76 in position on the members 72 and 73, respectively. The adjacent sides of the members 75 and 76 overlie the side flanges of the slide bar 67 and prevent vertical movement thereof.

The slide bar 67 is reciprocated in timed relation to the reciprocation of the cross-head D by crank mechanism, designated generally by the reference character K, operatively connected thereto and to the crankshaft F. As shown, the crankshaft F is connected by miter gears 77 and 78 to the lower end of a vertical shaft 80 rotatably supported in a bracket 81 detachably bolted to the frame C. The upper end of the shaft 80 is provided with a crank 82 upon which a roller 83 is eccentrically mounted with respect to the axis of rotation of the shaft 80. The roller 83 engages within a slot 84 in the underside of an arm 85 pivotally connected to a pin 86 fixed in a boss 87 located to one side of the shaft 80. A roller 88 carried by the arm 85 and located above the upper surface of the arm engages in a transverse slot 90 in the underside of the slide bar 67. The construction is such that the slide bar 67 is reciprocated in timed relation to the rotation of the crankshaft F and the reciprocation of the cross-head D. As an alternative construction, the roller 83 or one similar thereto could engage directly in the slot 90 or in a slot similar thereto in the slide bar 67, but the particular construction shown has the advantage that a rapid index is effected, that is, the portion of the cycle of operation taken up by indexing is less than one-half of the complete cycle.

The pawls 66 carried by the slide bar 67 and which have previously been referred to are continuously urged in directions to engage the "dial" members by spring-pressed detents 91 slidably supported in members 92 fixed to the upper surface of the slide bar 67. The construction is such that as the slide bar 67 is retracted, that is moved towards the bottom of the page, as viewed in Fig. 6, the pawls 66 ride over the peripheries of the "dial" members until they engage in the next ratchet slot and upon movement of the slide bar 67 in the opposite direction, they rotate or advance the "dial" members one station. The retracted position of one of the pawls is indicated in dot-dash lines in Fig. 6. The other pawls will assume a similar position. Prior to the slide bar 67 reaching its extreme retracted position, the rear sides of the members 92 engage extensions 93 on the pawls 61, withdrawing the pawls from the ratchet slots and in turn the ratchet teeth with which they had previously been engaged. As the slide bar 67 is moved in a direction to advance the "dial" members, the members 92 move away from the extensions 93 on the pawls 61, allowing them to return to their normal operating position but before they are in position to engage the ratchet teeth with which they were originally in contact, the pawls 66 have advanced the "dial" members sufficiently that the pawls 61 ride upon the periphery of the "dial" members. When the "dial" members have been advanced one station, the pawls 61 engage within the next following ratchet slot and prevent further rotation of the "dial" members in a forward direction until the beginning of the next indexing operation is to be performed. As previously stated, movement of the "dial" members in a reverse direction is prevented by the pawls 60 which advance from one ratchet slot to the next.

From the foregoing, the operation of the press herein shown and described will be obvious. Suffice it to say that the blanks may be fed either

manually or automatically to one or more of the "dial" members at any of the stations shown, preferably a station adjacent the outside of the press, and that thereafter the blanks will be indexed from station to station, which stations may include one or more forming operations or the like. The indexing operation or operations are performed in predetermined timed relation to the reciprocation of the cross-head D and that except for the intervals during which actual indexing of the "dial" members is taking place, the "dial" members are held in a fixed position by the pawls 60 and 61.

From the foregoing disclosure, it will be apparent that the objects heretofore enumerated and others have been accomplished and that a novel and improved, small, compact and inexpensive press comprising dial feed members supported for rotation about the draw bars has been provided. While the preferred embodiment of the invention has been described with considerable detail, I do not wish to be limited to the particular construction shown, which construction may be varied within the scope of this invention and it is my intention to cover hereby all adaptations, modifications and variations thereof which come within the practice of those skilled in the art to which the invention relates.

Having thus described my invention, what I claim is:

1. In a press of the character described, the combination of a frame having a supporting surface, a cross-head located to one side of said supporting surface of said frame and adapted to carry a plurality of tools or the like, power-actuated means including a plurality of draw bars or tension members projecting through said supporting surface of said frame for reciprocating said cross-head, a plurality of rotatable feed members located at the cross-head side of said frame, each of said members being supported for rotation around one of said draw bars, and means for intermittently rotating said feed members in timed relation to the reciprocation of said cross-head.

2. In a press of the character described, the combination of a frame having an upper supporting surface thereon, a cross-head located within said frame, power-actuated means for reciprocating said cross-head, a second cross-head located above said supporting surface of said frame and adapted to carry a plurality of tools or the like, a plurality of draw bars or tension members projecting through said supporting surface of said frame and connected to said cross-heads whereby they move as a unit, said draw bars being connected to said first-named cross-head symmetrically with respect to the connection of said power-actuated means thereto, a plurality of rotatable feed and/or die carrying members located above said supporting surface, each of said members being supported for rotation around one of said draw bars, and power-actuated means for intermittently rotating said feed members in timed relation to the reciprocation of said cross-heads.

3. In a press of the character described, the combination of a frame having an upper supporting surface thereon, a generally rectangular cross-head located within said frame, a crankshaft located intermediate said supporting surface and said cross-head and extending across the center of said cross-head, a pitman pivotally connected to said crankshaft and to said cross-head adjacent to the center of the latter, a second generally rectangular cross-head located above said supporting surface and adapted to carry a die or the like, four draw bars or tension members projecting through said supporting surface and connected to said cross-heads adjacent to the corners thereof, a plurality of rotatable feed and/or die carrying members located above said supporting surface, each of said members being supported for rotation around one of said draw bars, and means for automatically intermittently rotating said members in timed relation to the reciprocation of said cross-heads.

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