Feb. 2, 1954 R. C. INGERSOLL 2,667,853

AUTOMATIC RECEIVING AND EJECTING MEANS FOR PRESSES

Filed Dec. 16, 1948 3 Sheets-Sheet 1

Fig. 4

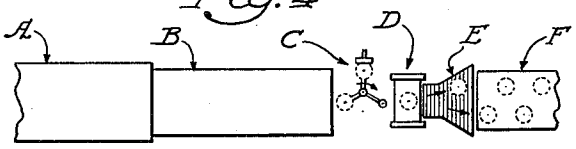
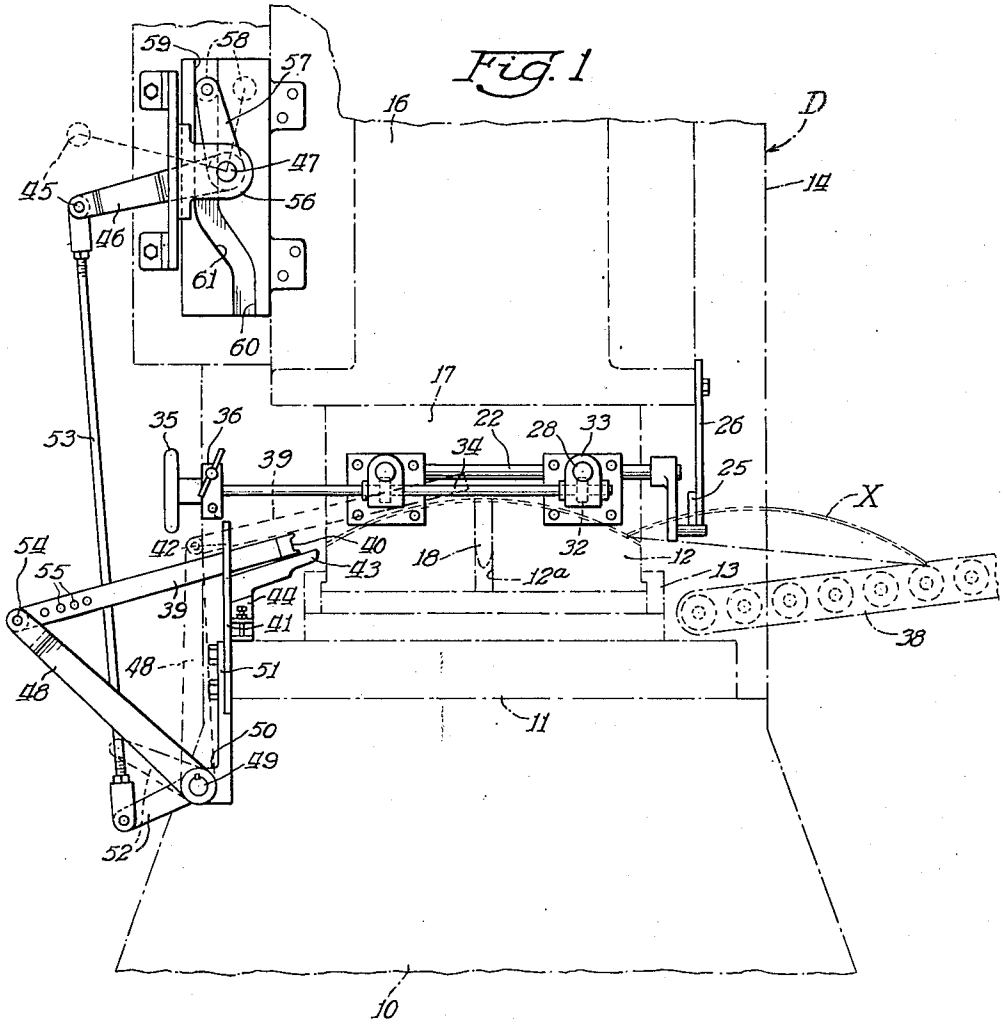


Fig. 1



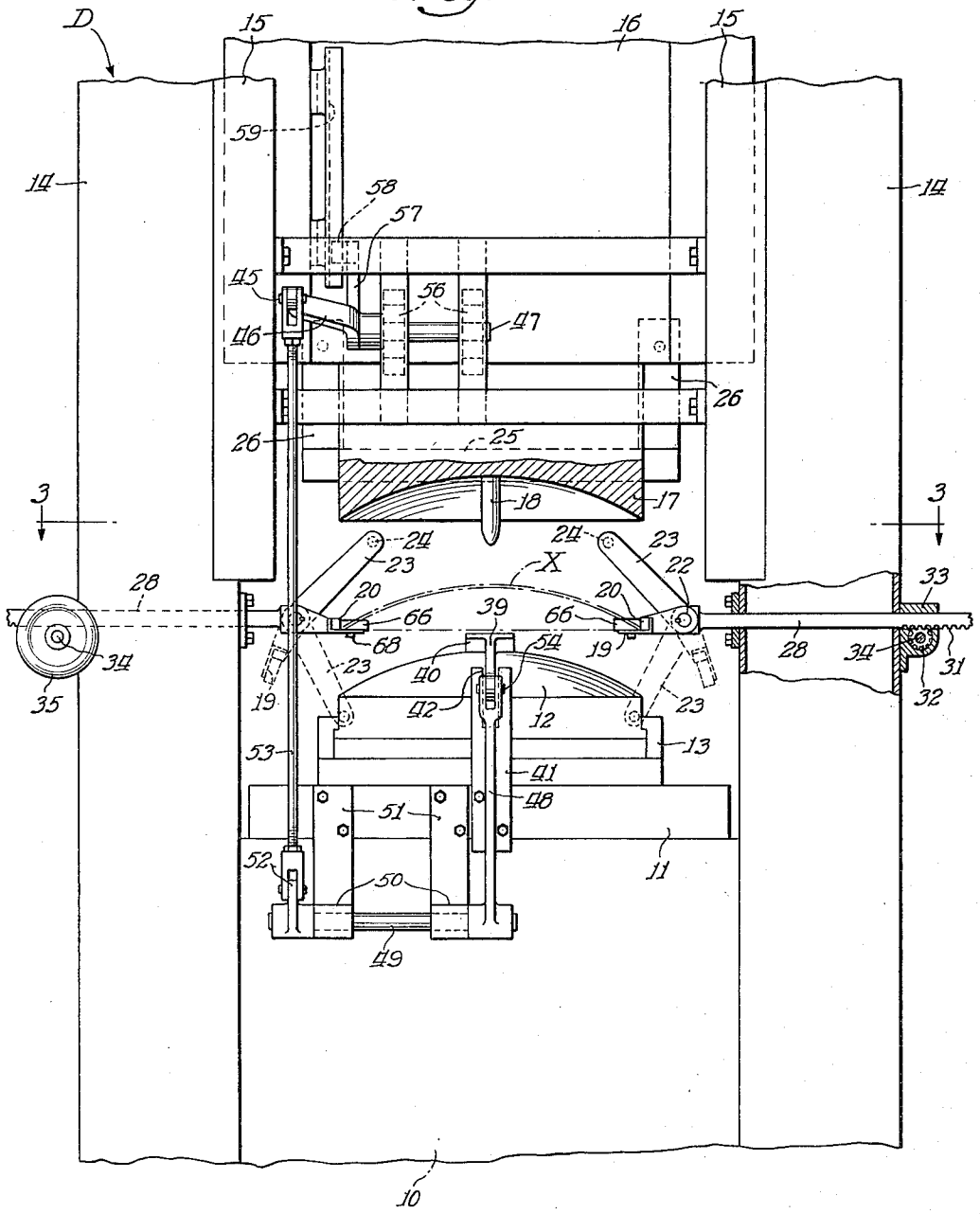
Inventor:
Roy C. Ingersoll
By: Edward C. Fitzgerald
Atty.

Feb. 2, 1954 R. C. INGERSOLL 2,667,853

AUTOMATIC RECEIVING AND EJECTING MEANS FOR PRESSES

Filed Dec. 16, 1948 3 Sheets-Sheet 2

Fig. 2



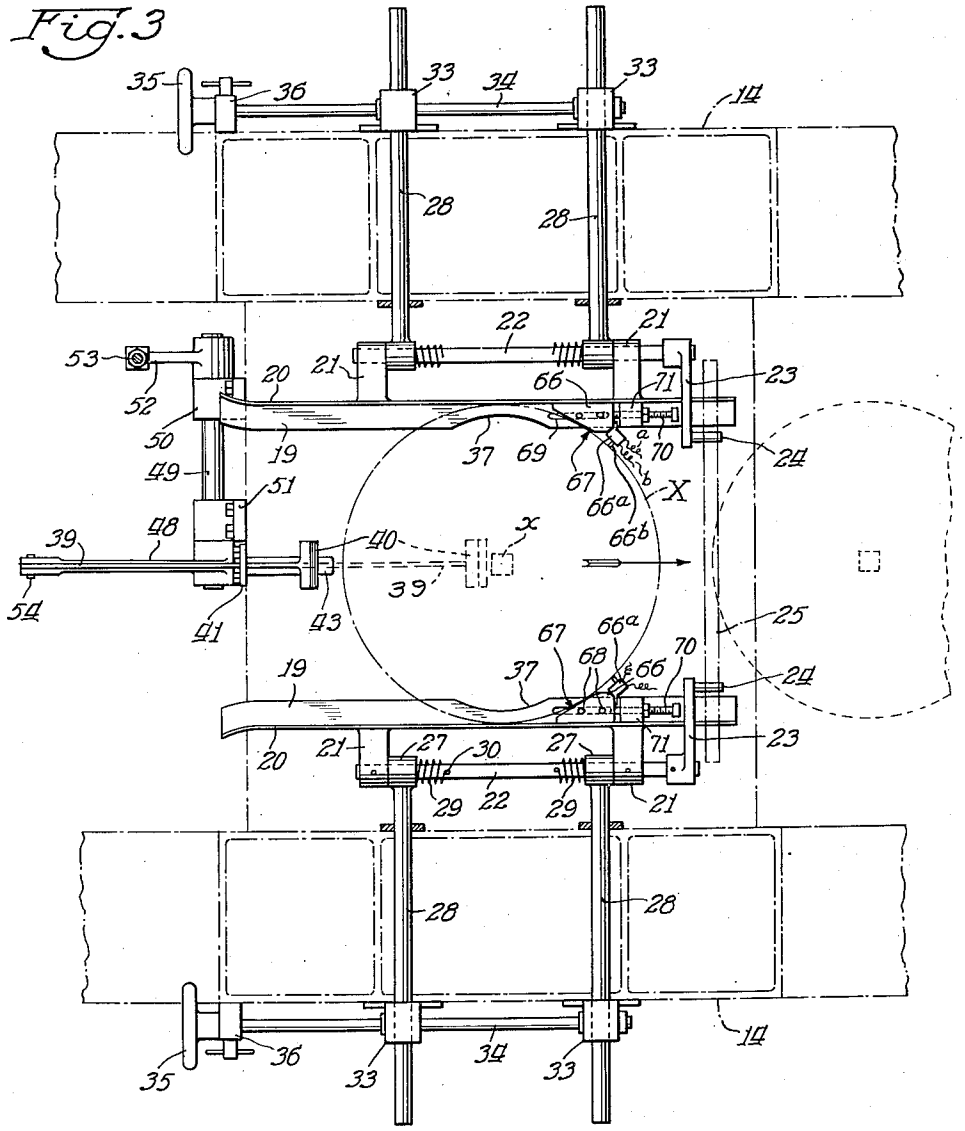
Inventor:
Roy C. Ingersoll
By: Edward C. Britzlaugh
Atty.

Feb. 2, 1954 R. C. INGERSOLL 2,667,853

AUTOMATIC RECEIVING AND EJECTING MEANS FOR PRESSES

Filed Dec. 16, 1948 3 Sheets-Sheet 3

Fig. 3



Inventor:
Roy C. Ingersoll
By: Edward C. Britzlaugh
Atty.

Patented Feb. 2, 1954

2,667,853

UNITED STATES PATENT OFFICE

2,667,853

AUTOMATIC RECEIVING AND EJECTING MEANS FOR PRESSES

Roy C. Ingersoll, Winnetka, Ill., assignor to Borg-Warner Corporation, Chicago, Ill., a corporation of Illinois

Application December 16, 1948, Serial No. 65,630

7 Claims. (Cl. 113—50)

1

This invention relates generally to apparatus for shaping articles from sheet metal blanks; and it has particular reference to a press arrangement that is adapted to reshape agricultural discs after they have been operated on by a rolling mill which has transformed the edges of the discs to a tapered or beveled cross-section. The present improvements reside in the provision of novel, automatically operable means, which are responsive to the reciprocal movement of the press ram, for depositing each disc upon the lower die of the press and for removing or dislodging the disc from such die.

It is a primary object of this invention to simplify the operation of the press for reshaping the discs; to increase the accuracy of such operation; and to reduce to a minimum the amount of manual labor usually required in handling the blank during the reshaping operation in the press.

Another principal object of the present invention is to provide a press with efficient means which are capable of receiving a disc or blank in a plane between the shaping dies and to deposit such disc or blank upon the lower die where it is acted on by the movable die on the ram. In this connection the means which deposits the disc or blank are responsive to the movements of the ram toward the bed of the press, and the actuation of such means is timed so as to effect the placement of the disc or blank prior to its engagement by the upper or driven die of the press.

Another principal object hereof resides in providing a press with means adapted for operation in a manner to dislodge the disc or blank from the lower die of the press, such means also being responsive to a portion of the reciprocal movement of the ram.

Still another principal object resides in providing a press with novel means which operate in synchronized relation and effective to successively position the disc or blank on one die and at the proper time to remove the disc or blank from the press, the operation of such means being wholly effected in response to reciprocal movement of the ram.

Additional objects, aims, and advantages of the invention contemplated herein will be apparent to persons skilled in the art after the construction and operation of the novel blank handling arrangement is understood from the within description. It is preferred to accomplish the numerous objects of the present improvements, and to practice the invention, in substantially

2

the manner hereinafter fully described and as more particularly pointed out in the appended claims, reference being made to the accompanying drawings that form a part of this specification.

In the drawings:

Fig. 1 is a fragmentary, vertical elevation, looking at a side of a disc-shaping press and illustrating the application thereto of the present invention, the ram being shown in its lower position prior to its retractable or upward movement;

Fig. 2 is a similar elevational view of the press looking at the feed side or receiving end which is at a right angle to Fig. 1, this view showing the ram in upward or raised position and a portion of the blank handling means ready to deposit a disc or blank on the lower die;

Fig. 3 is a horizontal section of the press taken along the plane of line 3—3 on Fig. 2, parts of the view being in section to show structural details; and,

Fig. 4 is a layout showing a portion of an operating line for "processing" sheet metal blanks to form agricultural discs and showing the location of the reshaping press upon which the present instrumentalities are incorporated.

The drawings are to be understood as being more or less of a diagrammatic character for the purpose of disclosing a typical or preferred form of the invention contemplated herein, and in these drawings like reference characters identify the same parts in the different views.

Referring first to the layout arrangement shown in Fig. 4, it will be seen that the circular disc blanks, which may have been previously shaped to a concavo-convex section, are reheated in a furnace A from which they are passed through a quench tank B, and then are transferred by conveyor rollers C to the reform press D to remove any irregularities or distortions therein. The discs are automatically handled in the reform press D which reshapes them and discharges them in a single row to a conveyor shift table E for dividing the discs into a plurality of rows for travel through a washer F, and thence through the remaining stations of the "processing" line.

The present improvements are particularly concerned with the automatic handling of the discs at the reshaping or reforming press D, such improvements including a novel arrangement that is actuated in response to the reciprocal movement of the press ram for automatically handling the discs at the reshaping press station.

This reshaping press may be of any well-known type and, as shown in the drawings, may comprise a bed 10 having a bolster 11 thereon which supports the convex die 12 that is secured to said bolster by suitable clamp means 13. Vertical columns 14 of desirable construction are positioned at opposite sides of the bed 10 and extend upwardly above the die 12 to provide guides 15 for the ram 16 which is reciprocated toward and away from the bed of the press by any suitable or well-known means. The ram 16 carries on its lower portion the concave die 17 which conforms with and is generally a counterpart of the lower shaping die 12. At its central region this concave die 17 is provided with a tapered pin 18 of suitable cross-section which is adapted to fit into a similarly shaped central bore 12*a* in the die 12, for the purpose of centering the disc which has been deposited on supporting rails later to be described. It is here stated that the disc has a suitably shaped opening *x* (Fig. 3), the dimensions of which correspond generally with the diameter of pin 18 for assisting in the centering of the discs in the reform press.

The portion of the disc handling arrangement which deposits the disc on the lower die 12 preferably comprises swinging means, between the dies, which may receive the disc from a conveyor and are arranged to support the disc above said die 12 and at the proper time these said swinging supporting means are automatically withdrawn from the disc. This arrangement comprises a pair of horizontally extending angle metal rails arranged parallel to each other in a proper plane above the die 12, the flanges of such rails defining respectively horizontal elongate supports 19 and upstanding abutments 20. Each of these rails has a pair of lugs 21 projecting in an outward horizontal direction away from the axis of the reciprocal movement of the ram. At their outer portions these lugs are apertured to receive horizontally extending rock-shafts 22, and at an end of each rock-shaft there is a suitable cam means which preferably takes the form of a radially extending arm 23 which define effective means whereby the rock-shafts are rotated.

The free ends of arms 23 have lateral pins 24 which are adapted to be engaged by a cross bar 25 carried by the lower portion of the ram by means of straps or hangers 26. Each rock-shaft 22 is rotatably mounted in axially bored journaling bosses 27 on the adjacent ends of a pair of horizontal rods 28 arranged in suitably spaced parallel relation to each other and extending through guide bearings in the standards 14, as shown in more detail in Fig. 3. When the ram carried bar 25 contacts and moves the arms 23 in a downward direction, the rock-shafts 22 will be correspondingly rotated and the supporting rails will be lowered by a swinging movement to the positions shown in broken lines in Fig. 2. This downward movement of the rails withdraws them from the disc X and such disc will be deposited upon the top of the convex die 12. During the downward movement of the ram the guide pin 18 will be entered in the axial opening *x* of the disc to centrally position the disc relative to fixed die 12.

When the ram is being retracted from the die 12, the actuating arms 23 are adapted to follow the movement of the bar 25 by reason of the fact that rock-shafts 22 are automatically returnable to their normal positions where they

receive the discs. This automatic function is preferably effected by means of coiled springs 29 which surround rock-shafts 22, one end of each spring being looped around a restraining pin 30 projecting from the rock-shaft and the other end of each spring being anchored to a rod 28, in any suitable or usual manner. This automatic return of the rock-shafts and the rails supported thereby is adapted to swing the rails back to their initial position where they are ready to receive the next disc.

The rod 28 of each pair are mounted for longitudinal sliding movement in the columns 14 in order to alter or vary the distance between the rails, thus to permit a change-over when the press is to be operated for reshaping discs of larger or smaller dimensions. This adjustability of the arrangement is adapted to be quite readily accomplished by providing racks 31 on the outer end portions of rods 28, such racks being engaged by pinions 32 mounted in housings 33 through which the rods 28 pass on the outer walls of the columns 14. These pinions 32 are secured to rotatable shafts 34 journaled in the housings 33, and said shafts may be rotated by means of hand wheels 35 at the ends of said shafts. Means in the form of locks or clamp brakes 36 surround the shafts 34 and may be readily released by the operator to permit rotation of the shafts for adjusting the rods 28 as well as the rails supported at the inner ends of said rods.

As may be seen in Fig. 3, the disc-supporting flanges 19 of the rails are provided with segmental recesses or notches 37 defined by an arc of a circle inscribed from the axis of the press. These recesses or notches 37 will assist in clearing the disc from the rails quickly and permit the rails to clear the lower die 12 when the rails are withdrawn from the disc.

After the ram starts its upward retractive movement away from die 12, it is desirable that the disc X be dislodged from such die to discharge the reformed disc upon a suitable conveyor assembly 38 (Fig. 1) which receives the disc and carries it away from the press to the next station of the "processing" line. The remaining portion of the disc or blank-handling mechanism, which operates in synchronized relation with the ram, includes means which are closely related to the positioning portion of the mechanism and are adapted to remove the reshaped disc. This latter means comprises a reciprocal bar 39 which is arranged radial to the axes of the dies of the press and has a cross-member 40 at its radially inner end which is adjacent the margin of die 12. As seen in Fig. 1, the bar is positioned in a plane extending oblique to the horizontal so that it lies approximately tangent to the curvature of die 12. This reciprocal bar 39 is guided in a plate 41 which is secured in an upright position to the side of the bolster 11 and has a vertically elongated recess or slot 42 in its upper portion through which the bar 39 passes and in which said bar is adapted to be reciprocated longitudinally. At the lower portion of the slot or recess 42 there is a cam block 43 carried in an adjustable bracket 44 on the inner side of the plate 41, said cam block being adapted to provide a definite guide for the bar 39 during its sliding movement.

The arrangement for operating the bar 39 in a reciprocal manner to dislodge the disc blank comprises bell-crank means which preferably consists of a long arm 48 secured to a rock-shaft

49, which latter is journaled in bearing bosses 50 at the lower ends of suitable hangers 51 that are secured to the bolster alongside the plate 41, as best shown in Fig. 2. The rock-shaft 49 also carries a short arm 52 which has pivotal connection at its outer end with a vertically reciprocal plunger rod 53 that is arranged to operate the disc displacing mechanism. Arm 48 of the bell-crank means has its swinging end portion operatively connected by a pivot pin 54 to the other region of the reciprocal bar 39 for moving said bar in both a forward and a return direction with respect to the die and disc thereon. The pivot pin 54 may be selectively inserted through any one of a series of holes 55 made in the outer region of the bar, thus predetermining the distance which is to be traveled by said bar and its cross-member 40. It will be apparent that this arrangement is adapted to dislodge discs having different dimensions.

The plunger rod 53, which is arranged vertically alongside or adjacent one of the columns 14, has its upper end pivotally connected as at 45 with the end of a horizontal arm of a bell-crank carried on a rock-shaft 47. Suitable bearing brackets 56, which are anchored to the column 14, provide journals for the rock-shaft 47. The other bell-crank arm 57 extends in an upward direction adjacent but out of contact with a side face of the press ram and carries a roller 58 on its upper end. This arm 57 of the bell-crank is adapted to be oscillated to rock the shaft 47 and operate the bell-crank, and thereby transmit motion through the medium of plunger rod 53 to the disc displacing bar 39. Oscillation of the bell-crank arm 57 is effected by positively operated mechanism which may take the form of cam means defined by a channeled guide which is mounted upon the adjacent face of the ram 16. Said guide comprises a long straight vertical portion 59 and a short offset lower portion 60 which are connected to each other by an oblique region 61, the cross-sectional dimension of said guide channel being sufficient to accommodate the roller 58 therein.

When the reciprocal ram 16 is in its lowered position, the roller 58 will be in the upper portion 59 of the guide channel. As the ram approaches the end of its withdrawal movement the roller 58 is first engaged in the intermediate cam region 61 of the guide channel and then reaches the offset region 60. This effects a swinging of the bell-crank arm 57 toward the right to rock the shaft 47 and lift the other bell-crank arm 46, which in turn raises plunger rod 53. Then, through the instrumentality of bell-crank arms 52 and 48, the reciprocal bar 39 will be shifted radially inward toward the disc on the die 12. The distance which is traversed by the reciprocal bar 39 and its cross-member 40 is to the central region of die 12 as shown by dotted lines in Figs. 1 and 3 and will be sufficient to dislodge the reshaped disc beyond the central area of the lower die to permit said disc to slide off said die and be received by the conveyor 38.

Means are provided for definitely locating the discs on the rails 19 and 20 so that such discs will be axially aligned with the upper and lower dies 17 and 12 respectively, and prior to operating the rails to deposit a disc on the lower die. Said means may comprise suitable assemblies each including a stop member 66 and a limit switch 66*a*, attached to and carried by the rails 19 and 20 so as to project inwardly toward each other in the space between said rails. As illustrated in Fig. 3, the stops 66 are arranged to engage the edge portion of a disc which is opposite the edge to be engaged by the dislodging portion of the disc handling mechanism. The faces 67 of the stops 66 against which the disc will abut are oblique to be engaged by the edges of discs having larger or smaller diameters. Also for the purpose of accommodating different sizes of discs, the assemblies may be adjusted longitudinally on the rails 19 and 20, such adjustments being readily effected by releasing the attaching means or bolts 68 the shanks of which pass through slots 69. The assemblies are then moved longitudinally by the set screws 70, carried in blocks 71, to the desired positions when they are locked by tightening the bolts 68. These adjustments of the assemblies are made preferably after the rails have been adjusted toward or from each other by the rack and gear arrangement on the rail supporting rods 28. The limit switches 66*a* may be any convenient or well-known design and each has a detent 66*b* which is adapted to be engaged by the disc edge to trip the switch for controlling the mechanism which operates the press. Conductors *a* and *b* lead from the limit switch to the electrical elements (not shown) which initiate the operation of the reform press D. This provides a safety feature which is desirable in an automatic mechanism of this character.

While this invention has been described in detail in its present preferred form or embodiment, it will be apparent to persons skilled in the art, after understanding the improvements, that various changes and modifications may be made therein without departing from the spirit or scope thereof. It is aimed in the appended claims to cover all such changes and modifications.

What is claimed is:

1. A press for forming discs having concavo-convex cross-section comprising a convex die for receiving a blank, a ram movable in directions toward and retractable from said die, and a concave die on said ram confronting said convex die, in combination with an ejector assembly comprising, a reciprocal bar; means for guiding said bar in a plane approximately tangent to the work face of said convex die; a cross member on the portion of said reciprocal bar adjacent said convex die for engagement with a formed blank on said convex die; bell-crank means mounted on a fixed portion of said press one arm of said bell-crank being connected to said reciprocal bar; a plunger rod reciprocal vertically alongside said press and having its lower portion connected to another arm of said bell-crank means; means defining an irregularly shaped guide on said ram; and swingable means pivoted on an upper portion of said press and having a portion operatively connected to said plunger rod, said swingable means having another portion cooperatively associated with said guide, the retractable movement of said ram being effective to move said swingable means in a direction to raise said plunger rod thereby to operate said ejector assembly and dislodge the blank on said convex die.

2. A press for forming discs having concavo-convex cross-section comprising a convex die for receiving a blank, a ram movable toward and retractable from said die, and a concave die on said ram confronting said convex die, in combination with an ejector assembly comprising, a reciprocal bar; means for guiding said bar in a plane approximately tangent to the work face of said convex die; a cross member on the por-

tion of said reciprocal bar adjacent said convex die for engagement with a formed blank on said convex die; bell-crank means mounted on a fixed portion of said press, one arm of said bell-crank being connected to said reciprocal bar; a plunger rod reciprocal vertically alongside said press and having its lower portion connected to another bell-crank arm; means defining a vertically extending guide channel on said ram, said channel having an offset lower region; swingable means pivoted on a fixed portion of said press adjacent said guide channel and being connected to the upper region of said plunger rod, said swingable means having a member engaged in said guide channel, the retractable movement of said ram being effective to move said swingable means in a direction to raise said plunger rod thereby to operate said ejector assembly and dislodge the blank from said convex die.

3. A press for forming discs having concavo-convex cross-section comprising a convex die for receiving a blank, guides extending above said die, a ram movable toward and retractable from said die, and a concave die on said ram confronting said convex die, in combination with an ejector assembly comprising, a reciprocal bar; means for guiding said bar in a plane approximately tangent to the work face of said convex die; a support on which said reciprocal bar is movably mounted; a cross-member on the end portion of said reciprocal bar adjacent said convex die for engagement with a formed blank on said convex die; a first bell-crank mounted on a fixed portion of said press; means supporting and adjustably connecting an end region of said bar to a first arm of said bell-crank; a vertical plunger rod reciprocal longitudinally alongside said press and having its lower portion connected to a second bell-crank arm; means on said ram defining a vertically extending cam guide channel; a second bell-crank pivotally mounted on a stationary portion of said press, one arm of said bell-crank being connected to the upper region of said plunger rod; and a roller carried by the other arm of said second bell-crank in cooperative association with said cam channel, the retractable movement of said ram being effective to rock the bell-crank associated with said cam channel, thereby to move said plunger rod in a direction to rock said first-mentioned bell-crank for operating said ejector assembly and dislodge the blank from said convex die.

4. A press for forming discs having dished cross-section comprising a fixed convex die, a reciprocal ram movable toward and retractable from said convex die, and a concave die on said ram, in combination with an intermittently operable ejector assembly comprising, a reciprocal blank engaging member; means for guiding said member in a plane tangent to and across the work face of said convex die; a lower bell-crank pivotally mounted on a stationary lower portion of said press, a first arm of said bell-crank being operatively connected to said reciprocal member; and an upper bell-crank pivotally mounted on a stationary upper portion of said press, a first arm of said lower bell-crank being operatively connected to a first arm of said upper bell-crank; and means on said ram cooperating with a second arm of said upper bell-crank and operative in response to reciprocal movement of said ram for rocking both bell-cranks and thereby actuate said blank engaging member.

5. A press for forming discs as defined in claim 4 wherein means on the ram define a grooved cam member, and the second arm of the upper bell-crank is cooperatively associated with the groove in said cam member.

6. A sheet metal forming machine comprising a bed having a fixed arcuate die for supporting a blank; vertical guides at the sides of said fixed die having portions extending above the horizontal plane thereof; a mobile ram reciprocal in said guides and having an arcuate die adapted for cooperation with said fixed die; an automatically reciprocable intermittently operable member having a portion in a plane tangent to the arcuate face of said fixed die; a vertically adjustable cam block on said bed supporting and guiding an end region of said reciprocable member during movement to and from said fixed die; a bell-crank having a first arm adjustably connected to and supporting the end region of said reciprocatory member which is remote to said fixed die; a vertically extending reciprocal rod connected to a second arm of said bell-crank; and means actuated by said ram during withdrawal movement thereof to move said rod in a direction to actuate said bell-crank thereby to move said reciprocable member tangently across the arcuate surface of said fixed die thereby to dislodge a blank therefrom.

7. A machine for forming dished cultivator discs comprising a bed having a fixed die of convex cross-section for supporting a disc of concavo-convex section; a mobile ram reciprocal to and from said fixed die; a die of concave cross-section on said ram adapted for cooperation with said fixed die; an automatically reciprocable intermittently operable member having a portion extending tangent to the arcuate face of said fixed die; cam means on said bed close to said fixed die and supporting the adjacent end region of said reciprocable member; a bell-crank having a first arm adjustably connected to and supporting the end region of said reciprocable member which is remote to said fixed die; a vertically reciprocal rod connected to a second arm of said bell-crank; and means actuated by said ram adapted during withdrawal movement of said ram to move said reciprocal rod in a direction to rock said bell-crank thereby to move said reciprocable member in a plane tangent to said fixed die for engagement with an edge of the disc for dislodging said disc.

ROY C. INGERSOLL.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
227,829	Perkins	May 18, 1880
451,534	Turner	May 5, 1891
1,285,104	Frahm	Nov. 19, 1918
1,415,838	Griffiths	May 9, 1922
1,570,710	Schenck	Jan. 26, 1926
1,747,463	Booth	Feb. 18, 1930
1,797,239	Newman	Mar. 24, 1931
1,878,520	Hughes	Sept. 20, 1932
1,872,474	Lindgren	Aug. 16, 1932
2,264,826	Butterfield	Dec. 2, 1941
2,291,722	Ingersoll	Aug. 4, 1942