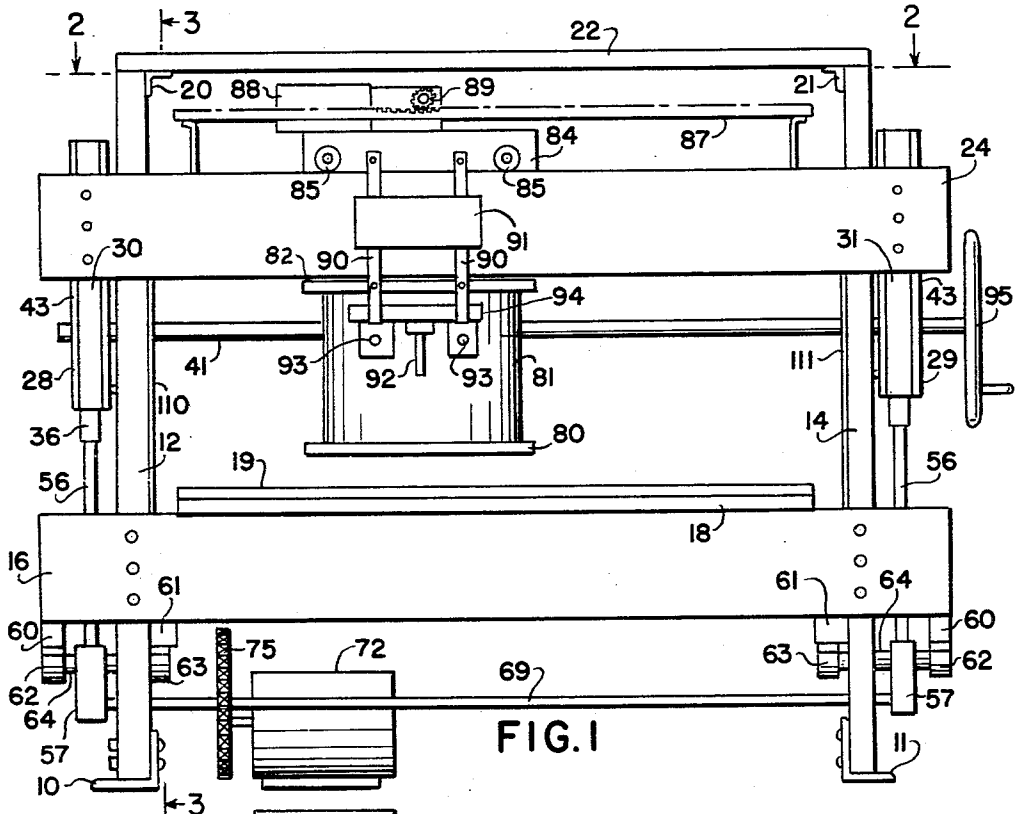
Sept. 22, 1964 M. GOLDBERG ETAL 3,149,523

DIE CUTTING PRESS

Filed June 21, 1961 2 Sheets-Sheet 1



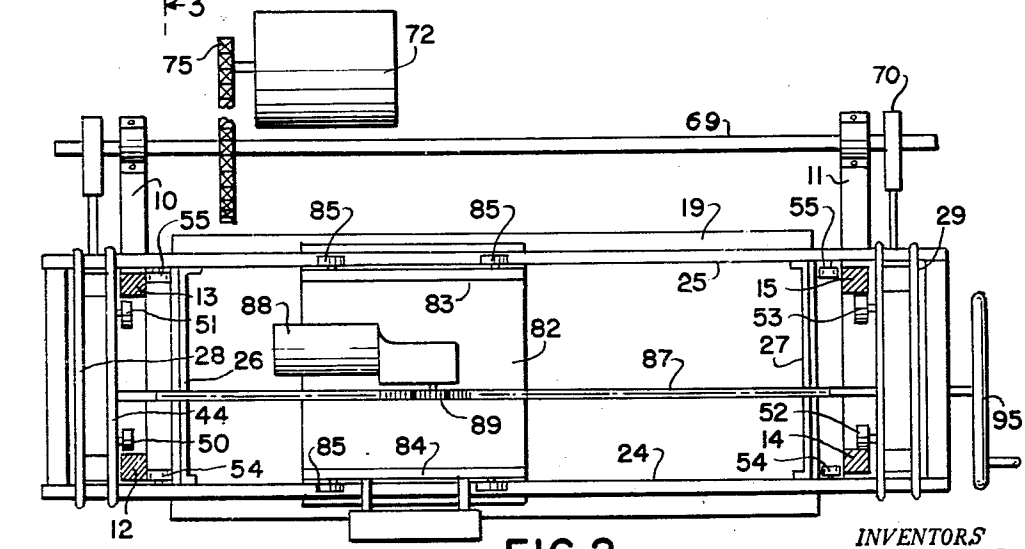


FIG.2

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DIE CUTTING PRESS

Filed June 21, 1961 2 Sheets-Sheet 2

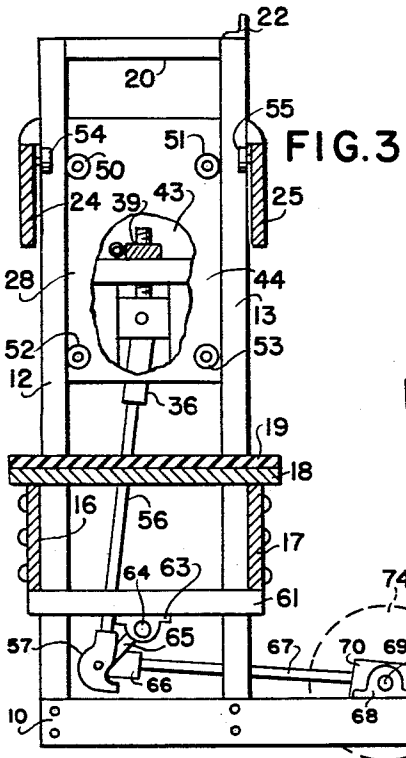


FIG. 3

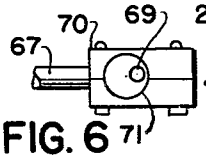


FIG. 6

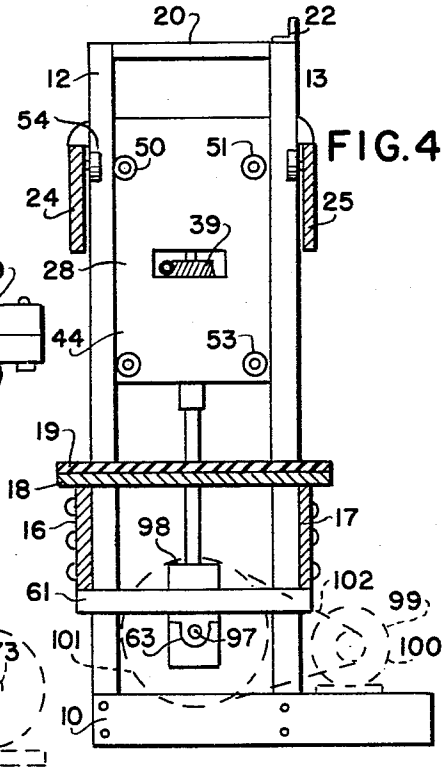


FIG. 4

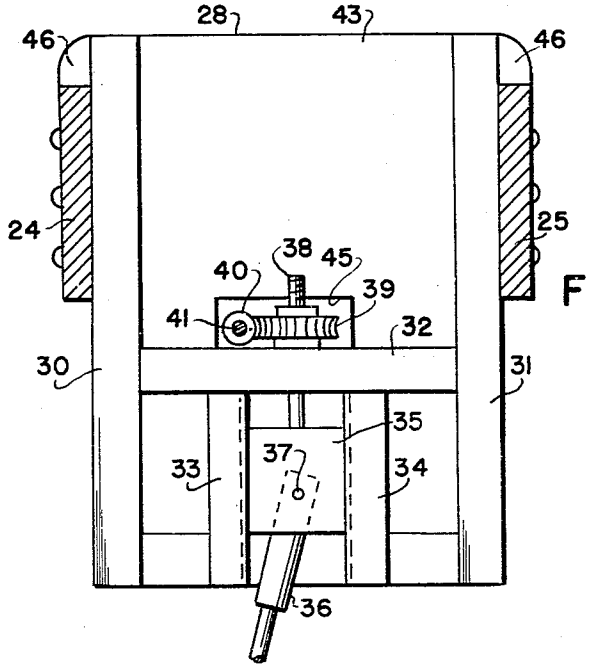


FIG. 5

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DIE CUTTING PRESS

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Filed June 21, 1961, Ser. No. 118,694
1 Claim. (Cl. 83—534)

This invention relates in general to presses and, more particularly, to die cutting presses having a vertically reciprocating platen which is laterally movable.

An object of this invention is to provide a more simple, rugged and fool-proof large capacity die cutting press.

Another object of this invention is to provide a large capacity and relatively rapid stroke die cutting press directly activated by an electric motor which applies a maximum force during the lower part of each stroke when the greatest resistances are encountered.

A further object of this invention is to provide a die cutting press which will apply large forces with a negligible distortion or flexing of the main machine elements.

Yet another object of this invention is to provide a die cutting press which may exert forces up to 100 tons while maintaining a true alignment between the platen and the bed of the press.

A still further object of this invention is to provide a large capacity die cutting press which may be fabricated and sold for a more moderate cost.

Many other objects, advantages and features of invention reside in the particular construction, arrangement and combination of parts involved in the embodiments of the invention as will be understood from the following description and accompanying drawings wherein:

FIG. 1 is a front view of the die cutting press;

FIG. 2 is a horizontal section taken on line 2—2 of FIG. 1;

FIG. 3 is a vertical section taken on lines 3—3 of FIG. 1 with the inner side plate of a vertical slide partially broken away to show interior construction;

FIG. 4 is a vertical section taken on line 3—3 of FIG. 1 showing a second embodiment of this invention;

FIG. 5 is a side view of a vertical slide with one side plate removed to show interior construction; and

FIG. 6 is a side view of an eccentric.

Referring to the drawing in detail, FIGS. 1, 2 and 3 show the overall appearance of the die cutting press. Two base members 10 and 11 have the four vertical uprights 12, 13, 14 and 15 bolted to them. The front and rear bed support beams 16 and 17 are bolted, respectively, to the foremost vertical uprights 12 and 14 and the rearmost vertical uprights 13 and 15. Disposed horizontally on top of the bed support beams 16 and 17 is the horizontal steel press bed 18 which has a hard rubber or other suitable covering 19.

Referring now to FIG. 1, it may be seen that the uppermost ends of the vertical uprights 12 and 13 are joined by an angle iron bracing member 20 and the upper ends of the vertical uprights 14 and 15 are likewise joined by a bracing member 21. One or more lateral braces 22 may extend between the braces 20 and 21.

As may be further seen in FIGS. 1 through 5, two lateral head members 24 and 25 extend in front and in back of the vertical uprights above the bed support beams 16 and 17. As shown in FIG. 2, two braces 26 and 27 secure the head members 24 and 25 relative to each other. Disposed beyond the vertical uprights are the two slide members 28 and 29.

As shown in FIGS. 3 and 5, the slide members are bolted between the head members 24 and 25. Each slide member consists of the two uprights 30 and 31 which are joined in their central portion by the cross member 32. Two ways 33 and 34 extend downward from the central portion of the cross brace 32 and slidably secure a block

35 between them. Each block 35 has a link 36 pivotally secured to it by means of a pin 37. A threaded shaft 38 extends upward from each block 35 through an aperture in the cross member 32 to have a worm wheel 39 turned downward about it. A worm 40 is mounted on each end of a shaft 41 so that two worms 40 engage the worm wheels 39. Therefore, as the worm wheels 39 are rotated by means of the worms 40, the shafts 38 will be drawn upward or allowed to move downward to position the blocks 35 along the ways 33 and 34.

Each slide member 28 and 29 has two side plates 43 and 44 bolted to it. These side plates 43 and 44 have suitable apertures 45 cut in them to accommodate each worm wheel 39 which is wider than the uprights 30 and 31 and the cross member 32. The upper portions of the side plates 43 and 44 extend outward to form the projections 46 which are beyond the uprights 30 and 31 and rest on top of the lateral head members.

Referring now to FIGS. 2 and 3, sealed ball bearing rollers 50, 51, 52 and 53 are mounted on the inwardly facing side plates 44 of each slide member 28 and 29. These rollers are sealed ball bearings which bear or ride on the inwardly facing surfaces of the vertical uprights 12, 13, 14 and 15. In addition, the rollers 54 and 55 are fixed to the inwardly facing surfaces of the lateral head members to bear on the other inwardly facing surfaces of the vertical uprights 12, 13, 14 and 15. Thus it may be seen that the entire assembly comprising the two lateral head members 24 and 25 and the two slide members 28 and 29 may move vertically upward and downward along the vertical uprights.

Referring now to FIGS. 1 and 3, it may be seen that a rod 56 extends downward from each link 36 to a lower connecting block 57. The rods 56 may be formed with right and left hand threads at their ends which engage the links 36 and the connecting blocks 57. Thus the rods 56 may be turned to adjust their effective lengths.

As shown in FIG. 1, a transverse member 60 extends between each end of the bed support beams 16 and 17 a short distance beyond the vertical uprights. Another transverse member 61 extends between the bed support beams 16 and 17 between the vertical upright and adjacent to them. These transverse members 60 and 61 rest against the lower edges of the bed support beams and they have the bearing blocks 62 and 63 fixed to their bottom surfaces.

A shaft 64 extends between each bearing block 62 and 63. As shown in FIG. 3, a link 65 is fixed to each shaft 64 and is pivotally secured within a lower connecting block 57. A second link 66 is also pivotally secured within the lower connecting block and has a rod 67 extending rearwardly from it. A bearing block 68 is fixed to the rearwardly disposed portion of each base member 10 and 11. A shaft 69 extends between the bearing blocks 68 and has the two eccentrics 70 mounted upon it. The shafts 67 are fixed to the eccentrics 70.

Referring now to FIG. 6, it may be seen that the eccentric 70 consists of an eccentrically mounted disk 71 which is mounted on and rotates with the shaft 69. Therefore, as the shaft 69 rotates, the eccentrically mounted disk 71 moves the eccentric 70 through a circular path in the same manner as would a conventional crank move a connecting rod.

Referring further to FIGS. 1 and 3, a large low-speed gear motor 72 drives shaft 69 by means of the two sprockets 73 and 74 and the chain 75. Therefore, referring again to FIG. 3, it may be seen that as the shaft 69 starts to make a rotation it moves the eccentrics 70 rearwardly drawing the rods 67 rearwardly with them. This causes each link 65 to pivot counter-clockwise about the shafts 64 and draw the lower connecting blocks 57

downward. As the lower connecting blocks **57** move downward, they draw the rods **56** downward and thus move the slide members and the lateral head members down also. As shaft **69** completes one revolution, the eccentric **70** returns to its forwardly disposed position and the slide members return upwards into the position shown in FIG. 3.

Referring now to FIGS. 1 and 2, a platen **80** consists of a square steel plate which is supported by a heavy metal cylinder **81**. Above cylinder **81** there is fixed a second plate **82** of the same size as platen **80**. Extending upward from the top of plate **82** between the two lateral head members **24** and **25** are the platen support plates **83** and **84**. Rollers **85** extend outward from each platen support plate **83** and **84** to ride upon the top edge surfaces of the lateral head members **24** and **25**. Thus the platen **80**, the cylinder **81** and the plate **82** are supported by rollers **85** below the lateral head members. There is a slight clearance between plate **82** and the bottom edges of the lateral head members.

A rack gear **87** is supported from the braces **26** and **27** parallel to the lateral head members. A gear head reversing motor **88** is mounted above the plate **82** and carries a single spur gear **89** which engages rack **87**. Control support braces **90** extend downward in front of the lateral head member **24** and are secured to the platen support plate **84** and the plate **82**. A reversing switch motor control unit **91** is mounted on the control support braces **90**. A large reversing switch toggle **92** and two button switches **93** are fixed to extend below a switch support bar **94**.

The reversing motor **88** is controlled by means of the reversing switch unit **91** and the reversing switch toggle **92** so that, when an operator moves the switch toggle **92** to the right, motor **88** will drive gear **89** clockwise to roll the entire platen assembly to the right on rollers **85**. In a like manner, when the toggle **92** is moved to the left, motor **88** drives gear **89** counter-clockwise to roll the platen **80** to the left.

This die cutting press is operated in the following manner. Referring now to FIG. 1, the shaft **41** is journaled within each slide member **28** and **29** so that it may be rotated by means of the hand wheel **95**. Referring now to FIG. 5, it may be seen that, as shaft **41** rotates, it turns the worm wheels **39** in the slide members to move the blocks **35** along the ways **33** and **34**. Thus the hand wheel **95** may be rotated to raise or lower the slide members and, thereby, the lateral head members **24** and **25**. When the platen **80** has been set by means of hand wheel **95** so that the bottom of its stroke will be at a desired height, the button switches **93** may be simultaneously depressed by an operator. The pressing of buttons **93** causes motor **72** to complete enough revolutions to rotate shaft **69** once. As shown in FIG. 3 and as has been described, one rotation of shaft **69** causes the lateral head members to move downward and then back upward once. FIG. 1 shows additional reinforcing plates **110** and **111** fixed inside the vertical uprights **12** and **13** and **14** and **15**. These plates contain elongated slots which allow the free passage and vertical motion of shaft **41**. Cylinder **81** also contains apertures allowing the free passage of shaft **41**.

Material to be cut on this die cutting press is drawn from a table behind the bed **18**. As many thicknesses as it is desired to cut are disposed in layers on top of the hard rubber or other suitable surface **19**. Multiple cutting dies of the desired shape are placed on the material to be cut whereupon the operator positions the platen **80** over the dies by means of the toggle **92** and then depresses the button switches **93** to cause the platen **80** to descend and cut the many layers of material. The cutting dies are then shifted to uncut portions of the material and the platen is again positioned over them and activated to descend.

As thick layers of material, such as plastic or cloth, are cut, little force is required in the beginning of the stroke as the layers of material are merely compressed and forced close together. As the dies bite into the material, greater and greater force is required to complete the cutting operation and bring the blades of the dies into contact with the surface **19** of the bed **18**. Heretofore, large capacity die cutting presses required outsize motors **72** to drive them. Otherwise, as the required force built up, the motors **72** would stall. However, as shown in FIG. 3, as the link **65** moves towards a vertical position and as the eccentric **70** moves towards its rearmost position, the mechanical advantage exerted by the motor **72** continues to increase until the end of the stroke. Furthermore, the platen moves downwardly more rapidly in the earlier portion of the stroke and then moves more and more slowly as the cutting dies are finally forced through the last layers of material by the platen. In one press built according to this invention, this particular mechanical linkage enable a die cutting press to operate at from 40 to 60 strokes per minute. Each revolution of shaft **69** completed one stroke of the press. This high speed, with the attendant large forces at the end of the stroke, is only possible because the platen moves more rapidly at the beginning of the stroke and then more slowly as the mechanical advantage increases.

In addition, the unique arrangement of the vertical uprights, the bed support beams and the lateral head members enables this die cutting press to exert greater forces without straining the machine elements. Thus the platen **80** remains parallel to bed **18** throughout each stroke. It is also to be noted that during the application of force, the rollers **85** are lifted from the lateral head members which then bear directly upon plate **82**.

Referring now to FIG. 4, a slight modification of this invention mounts a single shaft **97** through the bearing blocks **62** and **63** which are below the transverse members **60** and **61**. This single shaft **97** activates two eccentrics **98** to move the slide members **28** and **29** upward and downward in the same manner as has been described for the first embodiment of the invention. A motor **99** drives the shaft **97** by means of the two sprockets **100** and **101** and the chain **102**.

While we have disclosed our invention with particularity in the best forms known to us, it will nevertheless be understood that these are purely exemplary and that modifications may be made without departing from the spirit of the invention except as it may be more particularly limited in the appended claim wherein we claim:

A die cutting press comprising, in combination, four vertical uprights disposed in two pairs, one to the side of the other, bed support beams fixed to said vertical uprights in front and behind said uprights, a slide member guided by each pair of uprights and disposed above said bed support beams, lateral head members fixed to said slide members above said bed support beams, a press bed on said bed support beams, two inner transverse members extending across the bottom edges of said bed support beams between said pairs of uprights, two outer transverse members extending across the bottom edges of said support beams beyond said uprights, rods pivotally connected to each of said slide members and extending between said inner and outer transverse members, means mounted on said inner and outer transverse members to draw said rods downward, a plate having a flat top surface, a platen secured to said plate a given distance below said plate, rollers riding on the top surfaces of said lateral head members, means securing said rollers to said plate so that said plate is supported by said rollers slighly below and extending across said lateral head members, a reversible electric motor, and means driven by said motor rolling said plate and said platen along said lateral head members, said lateral head members having lower surfaces set parallel to said plate, said lower surfaces contacting the top surface of said plate to force said plate

and said platen downward as said means mounted on said inner and outer transverse members draws said rods downward.

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