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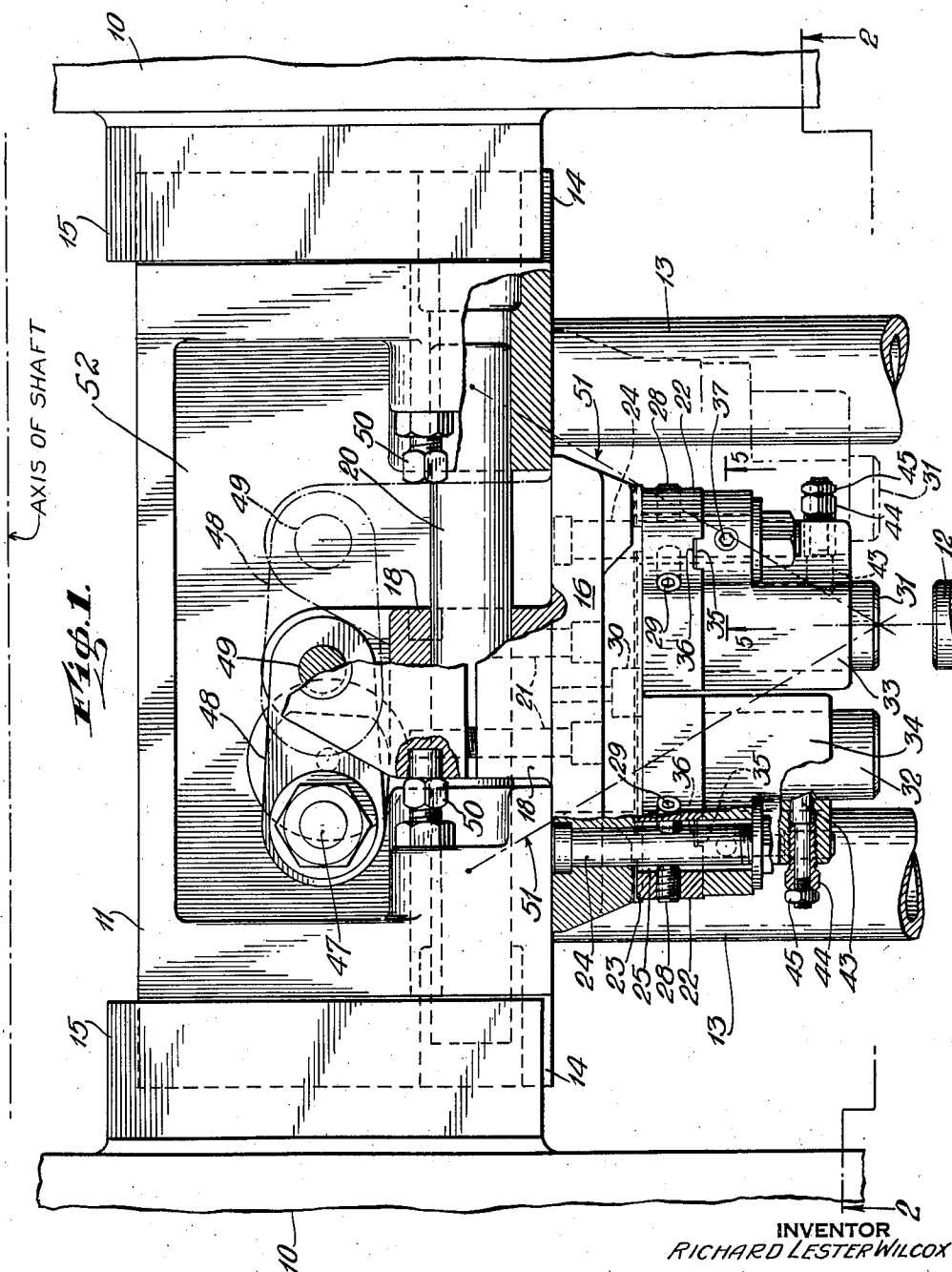
R. L. WILCOX

2,296,693

HEADER MECHANISM

Filed Oct. 3, 1941

3 Sheets-Sheet 1



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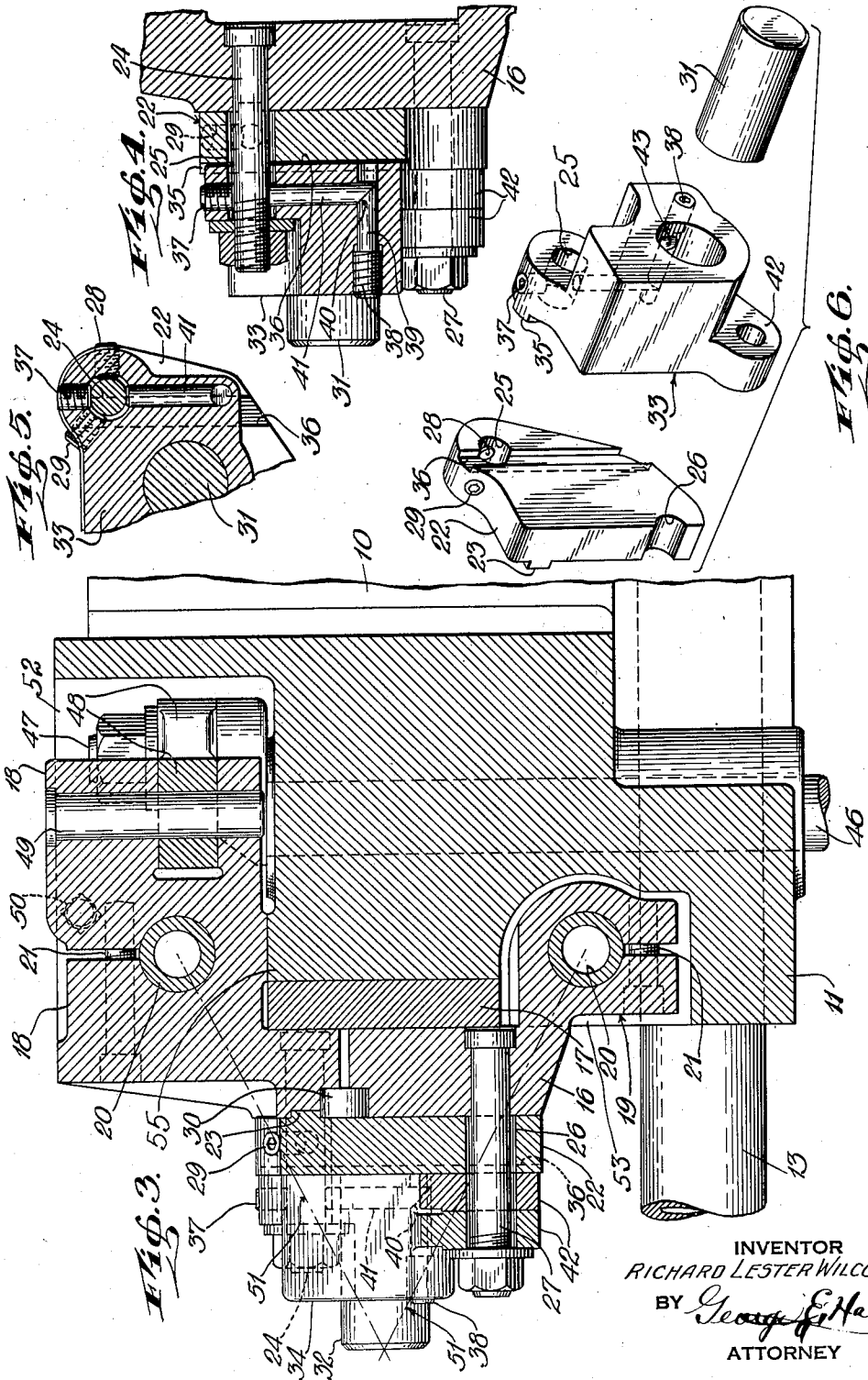
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HEADER MECHANISM

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30 Claims. (Cl. 10—12)

This invention relates to new and useful improvements in headers, upsetting machines, or the like.

Machines of this general character are provided with tools, such as dies, and a plurality of other tools, such as punches, which cooperate to fabricate a workpiece therebetween, the latter tools being shifted and successively moved into register with the die. Such machines are usually positioned to operate in a generally horizontal plane and the punches move in a plane perpendicular thereto, that is, a vertical plane.

The punches are associated with a punch slide and the die is generally held in a fixed position. The punch slide, punches and associated moving parts combined, have a substantial weight. The punch slide, with the punches thereon, is shifted after a punch has been brought into register with the die and then the direction of movement is reversed. This change of direction involves the movement of a substantial mass and weight of metal, that is, the punch slide, punch holder, punches and associated parts. This action in a machine prevents its operation at high speed and thereby reduces its output. To withstand the shock of this movement a heavier machine is required and increased power for its operation. At times one punch on the punch slide is below the plane of the die, and the workpiece, after being ejected from the die and falling by gravity, is liable to be caught by that punch, with resulting damage to the workpiece, as well as the tools. This danger is increased with the speed of movement of the slide. In the type of mechanism above described, independently actuated locking devices are required to hold the punches in position while under labor. To prevent an overthrow of movement of the punches and ensure the register of each with the die, compensating mechanism is provided. In the conventional mechanism of this character, the punch slide and cooperating mechanism is in part above the top of the gate. This is an obstruction that creates some hazards, both to the operator of the machine and to the mechanism itself, and prevents the installation of safety devices.

A principal object of this invention is to overcome all of the above and other objections with the type of mechanism described. This is accomplished generally by so arranging the punch carrying mechanism that its weight will not be upon the shifting mechanism, but taken by relatively non-moving parts. As so arranged, the punch carrying mechanism is mounted to move horizontally upon fixed parts instead of vertically,

and pushed by relatively light parts rather than lifted by heavy parts. Thus, the punches are shifted horizontally to bring them successively into register with the die without lifting the weight of the punch carrying mechanism, and at no time is there a punch below the die.

Another object is to so arrange the punch carrying mechanism that the thrust upon the tools when at labor is dissolved into a plurality of components and transferred to the gate at various points around the axis of the punch, instead of being limited to the axis of the punch, as heretofore, thus providing lateral stability in all directions. A further object is to operate the carrier slide by mechanism that will automatically lock itself in its extreme position and prevent lateral movement of the punches when under labor, an advantage of this feature being that the apportioned time for shifting the punches is increased, thereby permitting a higher speed of operation and a consequent increased product.

Other objects of the invention will become apparent from the following description of a preferred embodiment of the invention and of the accompanying drawings.

In the drawings like numerals of reference indicate like parts in the several figures, and wherein:

Figure 1 is a fragmentary plan view of the mechanism associated with a portion of a header or upsetting machine;

Figure 2 is an elevation thereof, the parts in section being taken upon line 2—2 of Figure 1;

Figure 3 is a sectional view thereof, the parts in section being taken generally upon line 3—3 of Figure 2;

Figure 4 is an elevation of a punch holder and some adjacent mechanism, the parts in section being taken generally upon line 4—4 of Figure 2;

Figure 5 is a fragmentary view of a portion of the mechanism, the parts in section being taken generally upon line 5—5 of Figure 1;

Figure 6 is a perspective view of a punch, its holder, and backing plate, for clarity, shown separated from each other; and

Figure 7 is a perspective view of the slide and its supporting members.

On the drawings, 10 indicates a portion of the body or frame of a header, upsetting machine or the like, 11 the gate which is mounted to reciprocate therein, and 12 a fragmentary view of a die or the like held rigid in the body or frame, usually on the center line of the machine.

In the illustration herein, the gate is fixed upon

rods 13 or the like, that are slidably mounted in the body or frame, such as is shown in Patent No. 2,205,507, dated June 25, 1940 and is designed to be actuated from a shaft, shown in the patent, and indicated on the drawings by the broken lines marked "axis of shaft."

The gate is provided with recesses 52 and 53, the former being in the top and the latter in the face thereof, and in operation reciprocates by any well known means toward and away from the die. In the embodiment herein the gate 11 is additionally supported by an offset portion 14, which slides upon the frame (Fig. 2) and against the gibs 15. Between the sides of the gate 11 and the adjacent walls of the frame 10 there is a slight clearance, so that the gate will reciprocate freely therebetween without contact. On the front wall of the gate 11 is a slide 16 which may move in contact with said wall or a plate 17 set therein. This slide at its top and bottom has rearwardly projecting lugs 18 and 19 which are clamped on the upper and lower supporting elements or cross bars 20 by means of screws 21 or the like. The lug 18 projects into a recess 52 in the gate, with the bottom face 55 thereof resting and sliding upon the gate (Fig. 3). The lug 19 projects into another recess 53 in the gate. The cross bars 20 are slidable at their opposite ends in the gate 11 and have an axial movement in respect thereto.

On the front face of the slide 16 are two backing plates 22, one right and one left. Each plate is provided with a tongue 23, which is fitted into a groove 54 in the slide, to permit the plate 22 to be moved in a horizontal plane on and relative thereto. Each plate 22 is separately secured in position by a bolt 24, which passes through openings 25 therein of larger diameter than the shank of the bolt. In the adjacent face of each backing plate 22, near its lower end, is a semi-circular recess 26, which partly surrounds the shank of a bolt 27. Relative movement of each plate 22 in respect to the slide 16 is accomplished by manipulation of screws 28 and 29, which impinge against the shank of the bolts 24. By loosening one of the screws 28 or 29, and tightening the other, a horizontal movement is imparted to the plate 22, toward and away from the other plate 22, as desired.

A plug 30 may be imbedded in the slide 16 to take the pressure of the plate 22 and prevent the same from being forced into the slide if the metal of the slide is not sufficiently hard to withstand the pressure.

As shown, there are two punches 31 and 32, the former being held within punch holder 33 and the latter in punch holder 34. These punch holders are substantially the same in design and structure, one being right and the other left. Each of the bolts 24 passes through an enlarged opening 25 in the punch holders and securely holds the same and a plate 22 rigidly on the slide. On the rear face of each punch holder is a tongue 35 which projects into a groove 36 in a face of a backing plate 22. Vertical adjustment of the die holder upon the plates 22 is obtained by manipulation of the screws 37 and 38. The former impinges against the shank of the bolt 24 and the other engages a plug 39 having an angular inner end 40. This inner end engages a similar angular end of a plug 41, one end of which engages the shank of the bolt 24 (Fig. 4). By manipulation of the screws 37 and 38, the plugs 39 and 41 acquire endwise movement, and by reason of the engagement of the plug 41 with the bolt 24,

a movement substantially perpendicular to the axis of the bolt 24 is obtained. Tightening the screws 37 and 38 holds the punch holder in any new and adjusted position. The punch holders and punches therein are thus adjusted toward and away from each other by the simple manipulation of the screws 28 and 29, as above described, and in paths parallel to each other, by the screws 37 and 38. As the machine is usually positioned, the former adjustment is horizontal and the latter vertical.

At the lower end of each die holder is a lug 42, to receive the shank of the bolt 27. As this bolt passes through the recess 26 in plates 22, tightening of the nuts on this bolt, as well as those on the bolts 24, rigidly secures the punch holders and plates 22 to the slide 16. Each punch is removably secured in a die holder by an anchor pin 43, having a bevelled end which projects into a notch in the wall of the die (Fig. 1). The shank of the anchor pin projects through a hollow screw 44 and is provided with a nut 45 upon its outer end. When in place the head of the pin 43 engages one end of the screw 44 and a nut 45 the other end. By loosening the nut 45, the screw 44 may be rotated within the die holder and the pin 43 withdrawn from its engagement with the punch 32, thus releasing the punch 32 for withdrawal from the die holder. Similar action in reverse order projects the pin 43 into the notch in the punch 32, thus holding the punch against relative movement.

Journalled in the gate is a crank shaft 45, having a crank pin 47 thereon near one end, substantially as shown in Figure 3. Connecting this crank pin and the lug 18 on the gate by the pin 49 is a link 48. As the shaft 45 is oscillated by any preferred mechanism (not shown) the crank pin 47 is moved through a path slightly less than 180°, during which time the slide 16 is moved horizontally across the face of the gate and back again. Thus the axes of the punches 32 and 33 are successively brought into register with the axis of the die 12. During this time the cross bars 20 slide within the gate with the slide 16. The limits of movement of the slide 16 are determined by stop screws 50, which are adjustable within the gate 11. As the crank 47 on the crank shaft 45 is nearly on a dead center at each of its two extreme positions, and the slide is against one of the screws 50, no relative movement of the slide can occur when in such extreme positions. Thus, it is unnecessary to provide a locking means to ensure the holding of the punches coincident with the die 12. The location of the extreme movement of the carrier slide 16 is immaterial, provided the extent of its movement is definite, because the position of each punch is independently adjusted, both vertically and horizontally to align with the die.

The support (cross rods 20) for the punch mechanism is spaced both horizontally and vertically at points distant from the axes of the punches, hence the lateral labor thrust of the tools is resolved into four components, indicated by the dash and dot lines 51. Heretofore the thrust was taken solely by the mechanism immediately in rear of the punch and consequently there was undue strain upon the parts, which resulted in early wear thereon and necessitated frequent adjustment and replacement. Resolving this thrust into four components provides lateral stability in all directions and the thrust is transferred to the gate at points substantially equidistantly spaced around the circumference

of a single center, which is located upon the median axes of the two punches, and the plane of which is perpendicular thereto and located behind the punches.

The slide and its associated mechanism move across the front face of the gate and between two spaced planes, each being a forward extension of one side of the gate. Practically no energy is required to move the slide, there being no weight to lift. In the conventional header the weight of the mass, including the punch carrier, slide, punches, stop mechanism, etc. is successively lifted to bring a punch into register with the die. This requires the application of considerable power. The difference between the two structures and their operation can be demonstrated by comparing the energy required to push a book on a smooth table top with the energy required to lift the same book off the table.

Minor changes and modifications may be made in this invention other than as shown and suggested.

What is claimed is:

1. In mechanism of the character described; a gate; a slide; punches carried by the slide; and means for reciprocating the slide in a straight path toward and away from and between planes extending forwardly from and coincident with the sides of the gate.
2. In mechanism of the character described; a gate; a slide supported at points above and below the punches; punches carried by the slide; and means for reciprocating the slide in a straight path toward and away from and between planes extending forwardly from and coincident with the sides of the gate.
3. In mechanism of the character described; a gate; a slide supported at points above and below the punches and in rear of the face of the gate; punches carried by the slide; and means for reciprocating the slide in a straight path toward and away from and between planes extending forwardly from and coincident with the sides of the gate.
4. In mechanism of the character described; a gate; a slide; and punches carried by the slide, said slide being movable thereon and supported at spaced points around the axes of the punches.
5. In mechanism of the character described; a gate; a slide; and punches carried by the slide, said slide being movable thereon and supported at spaced points around the axes of the punches substantially equally distant therefrom.
6. In mechanism of the character described; a slide; a plurality of punch holders mounted thereon and independently adjustable in substantially right angle paths; and a punch within each of the punch holders.
7. In mechanism of the character described; a gate; a slide; punches carried by the slide; and means for reciprocating the slide in a straight path, substantially parallel with the drive shaft.
8. In mechanism of the character described; a gate; companion bars mounted in said gate; means for securing the slide to said bars; and means for moving said slide and bars relatively to the gate in a path toward and away from and between planes extending forwardly from and coincident with the sides of the gate.
9. In mechanism of the character described; a slide; a plurality of punch holders mounted thereon and independently adjustable thereon; and a punch within each of the punch holders.
10. In mechanism of the character described; a punch holder carrier; a punch unit thereon having plural parts; and means for securing said parts on the carrier, whereby they are adjustable in a straight line path relatively to each other and in respect to the carrier.
11. In mechanism of the character described; a punch holder carrier; a punch unit thereon having a backing plate adjustable on the carrier in a straight line path; and a punch holder adjustable on the backing plate in a straight line path.
12. In a mechanism of the character described; a punch holder carrier; a punch unit thereon having a backing plate with an intermeshing lip engagement with the carrier and adjustable thereon in a straight line path; and a punch holder having an intermeshing engagement with the backing plate and adjustable thereon in a straight line path, said straight line paths being at substantially a right angle to each other.
13. In mechanism of the character described; a gate; a slide; punches carried by the slide; and oscillating means for reciprocating the slide in a straight path toward and away from and between planes extending forwardly from and coincident with the sides of the gate.
14. In mechanism of the character described; a gate; a slide; punches carried by the slide; an oscillating shaft journaled in the gate; and an operative connection between the shaft and slide, whereby the slide is reciprocated relatively to the gate in a substantially straight line.
15. In mechanism of the character described; a gate; a slide; punches carried by the slide; an oscillating shaft journaled in the gate substantially perpendicular to the path of movement thereof; and an operative connection between the shaft and slide, whereby the slide is reciprocated relatively to the gate.
16. In mechanism of the character described; a gate; a slide; punches carried by the slide; a crank shaft journaled in the gate; and an operative connection between the shaft and slide, whereby the slide is reciprocated relatively to the gate.
17. In mechanism of the character described; a gate; a slide; punches carried by the slide; a crank shaft journaled in the gate; and a link connection between the shaft and slide, whereby the slide is reciprocated relatively to the gate.
18. In mechanism of the character described; a gate having a recess in the top thereof and a recess in the front face thereof; plural bars movable in the gate, one of which projects across each of said recesses; and a slide movable thereon and having lugs that project into the said recesses and secured to said bars.
19. In mechanism of the character described; a gate; a slide movable on the face of the gate and having portions thereon that project rearwardly of the face of the gate; and supporting members for the slide, movably mounted in the gate, one of which is secured to each of said portions.
20. In mechanism of the character described; a gate; a slide movable on the face of the gate and having portions thereon that project rearwardly of the face of the gate, one of said portions resting upon the gate; and supporting members for the slide, movably mounted in the gate, one of which is secured to each of said portions.
21. In mechanism of the character described;

a gate; a slide supported at points above and below the punches and spaced upon opposite sides of the line of thrust upon the tools when the latter are at labor.

22. In mechanism of the character described; a gate; a slide movable across the face of the gate and supported at points above and below the punches and spaced upon opposite sides of the line of thrust upon the tools when the latter are at labor.

23. In mechanism of the character described; a gate; companion bars mounted in said gate; means for securing the slide to said bars between the ends thereof; and means for moving said slide and bars relatively to the gate in a path toward and away from and between planes extending forwardly from and coincident with the sides of the gate.

24. In mechanism of the character described; a gate; a slide movably supported at points in rear of the face of the gate; punches carried by the slide; and means for reciprocating the slide in a straight path toward and away from and between planes extending forwardly from and coincident with the sides of the gate.

25. In mechanism of the character described; a gate; a slide; punches carried by the slide; means for reciprocating the slide in a straight path toward and away from and between planes extending forwardly from and coincident with the sides of the gate; and adjustable members to limit the terminal positions of the slide.

26. In mechanism of the character described; a gate; a slide; punches carried by the slide; means for reciprocating the slide in a straight

path toward and away from and between planes extending forwardly from and coincident with the sides of the gate; and stop members threaded into a fixed part to limit the extent of movement of the slide at each end.

27. In mechanism of the character described; a gate; a slide; punches carried by the slide; means for reciprocating the slide in a straight path toward and away from and between planes extending forwardly from and coincident with the sides of the gate; and means for holding the slide against movement while the tools are at labor.

28. In mechanism of the character described; a gate; a slide; punches carried by the slide; a crank shaft journaled in the gate; and an operative connection between the shaft and slide, whereby the slide is reciprocated relatively to the gate, the path of movement of the connection between the limits thereof being slightly less than 180°.

29. In mechanism of the character described; a gate; a slide; punches carried by the slide; a crank shaft journaled in the gate; and an operative connection between the shaft and slide, whereby the slide is reciprocated relatively to the gate, the crank on the crank shaft being nearly on a dead center at its extreme positions.

30. In mechanism of the character described; a gate; a slide; punches carried by the slide; and means for reciprocating the slide in a straight path, substantially parallel with the drive shaft, the punches being on a line substantially parallel with the said drive shaft.

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