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FLANGING MACHINE

Filed June 7, 1937

2 Sheets-Sheet 1

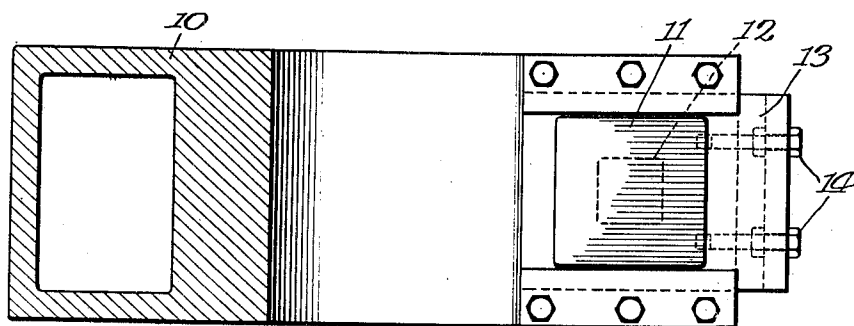
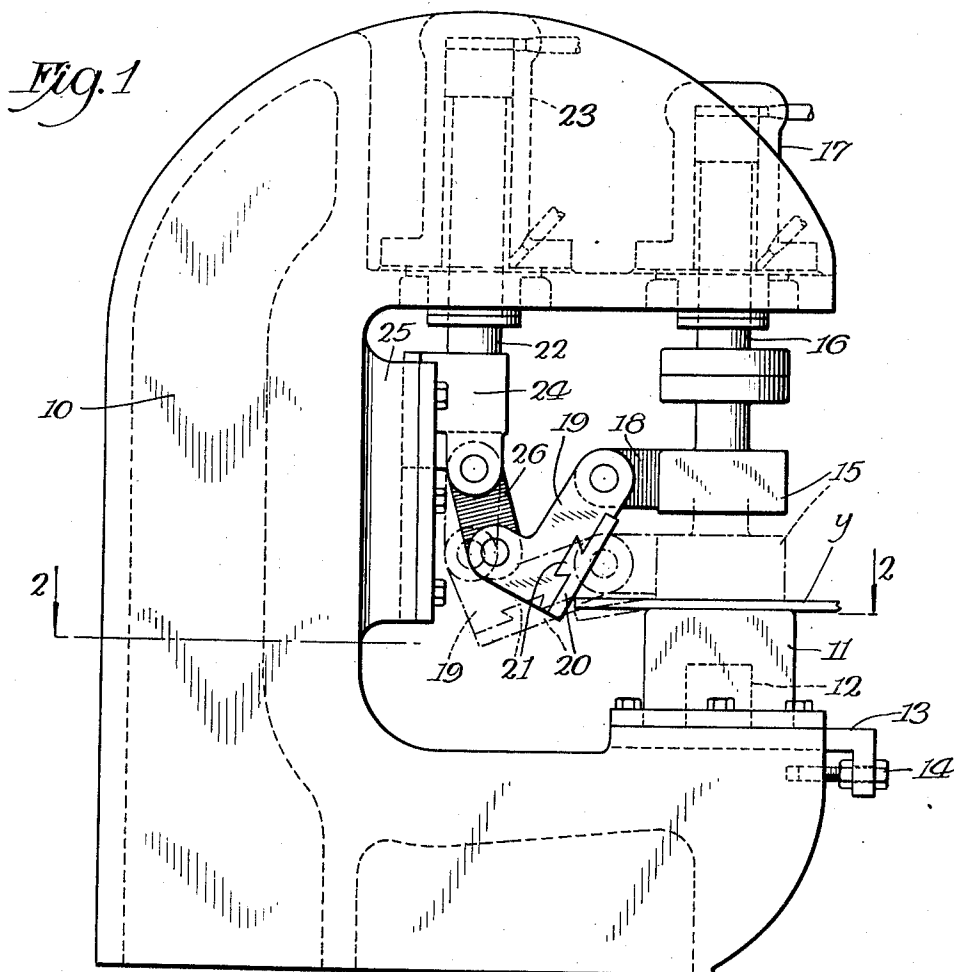


Fig. 2

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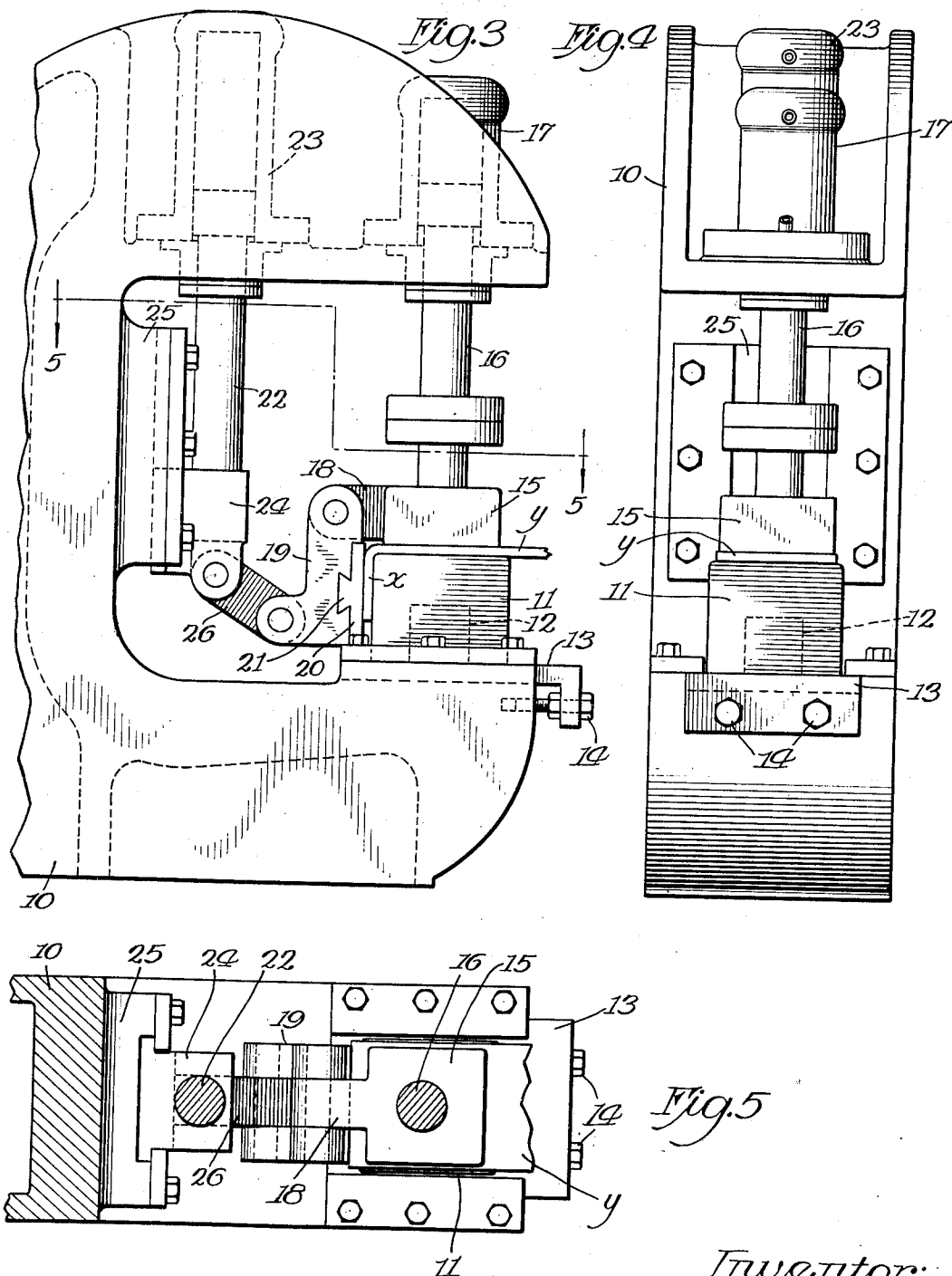
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UNITED STATES PATENT OFFICE

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FLANGING MACHINE

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10 Claims. (Cl. 153—16)

The invention relates to machines for developing flanges on sheet metal plates; and has for its objects simplicity of construction and action, reliability and efficiency in operation, and ease of adjustment to the character of the work to be performed.

The accompanying drawings illustrate the invention and indicate the mode of operation.

Fig. 1 is a side elevation of the machine, showing the parts as they are positioned at the commencement of a flanging operation;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1, showing the parts as positioned at the completion of an operation;

Fig. 4 is a front elevation of the machine; and

Fig. 5 is a sectional view on the line 5—5 of Fig. 3.

The frame 10 of the machine is a heavy casting, generally U-shape in form, the opening, however, being horizontal. A removable and adjustable die block 11 is mounted upon the lower arm of the frame and adjacent its outer end. This block is apertured in its lower face, as indicated in dotted lines at 12, to fit upon a tenon carried by an adjustable plate 13, slidable in suitable ways in the upper face of the lower arm of the frame and being adjustable by means of screw bolts 14 engaging suitable threaded sockets in the frame.

A clamping head 15, which cooperates with the die block, is carried by a vertically reciprocable shaft 16, carried in the upper arm of the frame and being actuated by a motor, conventionally shown at 17 as of the hydraulic type. A lateral arm 18 projects inwardly from the clamping head 15, and to it is pivotally attached an oscillatable jaw 19, which cooperates with a side face of the die block 11 to form a flange, as *x*, on a sheet of metal, indicated at *Y*.

The jaw 19 carries on its face a removable plate 20, of such form as to produce the desired flange. This plate is removably secured to the face of the jaw in any suitable manner, in order that it may be replaced by another of different face form. As indicated it is provided with a rib 21 across its back face, being of dove-tail configuration to fit within a correspondingly shaped channel across the face of the jaw.

The jaw 19 is actuated by a reciprocable shaft 22, mounted in the upper arm of the frame and being parallel with the shaft 16 and controlled by a motor mounted on such upper arm, and conventionally indicated at 23 as of the hydraulic

type. The shaft 22 carries adjacent its lower end a guide block 24, which reciprocates within a channel formed in a longitudinal bearing abutment 25 on the inner face of the vertical element of the frame. The shaft 22 is connected with the jaw 19 by means of a link 26.

When the clamping head 15 is raised, as shown in Fig. 1, the shaft 22 is also drawn upwardly and the jaw 19 is swung backwardly with reference to the head, as shown in Fig. 1. The sheet *y* of metal to be operated upon having been placed upon the forming die, the clamping head is lowered to the dotted lines position of Fig. 1, the jaw 19 being swung backwardly by this operation. The shaft 22 is now forced downwardly by its motor, the jaw 19 being swung downwardly and forwardly to the position of Fig. 3, and in this movement forming the flange *x*. Preferably the parts are so proportioned and related that when the head 15 is lowered to clamp the sheet *y* to the block 11, the shaft 22 remaining in the withdrawn position, the link 26 is substantially aligned with this shaft, and the jaw 19 is approximately horizontal, and bears lightly on the sheet *y*, at its margin (see dotted lines, Fig. 1). During the early part of the downward stroke of the shaft 22, the link 26 functions as a pitman, swinging the jaw downward with a gradually diminishing movement about its pivot until the link is deflected to approximately forty-five degrees. The link now assumes the character and action of the link of a toggle joint, receiving pressure laterally from the shaft 22, transmitting it longitudinally to the jaw, and reacting longitudinally against the abutment 25, which performs the corresponding duty rendered by each link of a toggle joint for its companion link (see Fig. 3).

The pivotal attachment of the jaw to the clamping head insures ample clearance for the introduction and removal of the work and provides for the application of the maximum bending pressure at the inner margin of the overhang and augmentation of such pressure as the movement of the jaw proceeds.

It being important that final pressure of the jaw 19 upon the newly formed flange shall be delivered directly perpendicular thereto, the die block is adjusted to insure this action according to the thickness of the sheet being operated upon.

While I have shown and described a desirable and highly efficient form of embodiment of the invention, it may be given other forms within the scope of the appended claims.

I claim as my invention:

1. In a flanging machine, in combination, a laterally adjustable die block, a clamping head cooperating with the block, an oscillatable jaw carried by the head, a toggle link connected with the jaw, means for applying power to the link to force the jaw toward the side of the block, and an abutment against which the link reacts.

2. In a flanging machine, in combination, a U-shaped frame having its opening horizontally disposed, a die block mounted on and adjacent the outer end of the lower arm of the frame, a power-actuated reciprocating shaft carried by the upper arm thereof, a clamping head carried by the shaft and cooperating with the die block, a clamping jaw pivoted to the head and cooperating with the side face of the die block, a second power-actuated reciprocating shaft carried by the upper arm of the frame and being parallel with the first-named shaft, a toggle link connecting the second-named shaft with the jaw, and an abutment against which the link reacts.

3. In a flanging machine, in combination a frame including substantially horizontal upper and lower members and an upright member rigidly connected together, a die block mounted on the lower member, a reciprocable shaft mounted in the upper member, a clamping head carried by the shaft and cooperating with the die block, a flange forming jaw pivoted to the side of the head facing the upright member, a second reciprocable shaft mounted in the upper member, parallel with the first-named shaft and nearer the upright member, and a force-transmitting link connecting the second-named shaft with the jaw.

4. In a flanging machine, in combination, a frame including substantially horizontal upper and lower members and an upright member rigidly connected together, a die block mounted on the lower member, a reciprocable shaft mounted in the upper member, a clamping head carried by the shaft and cooperating with the die block, a flange forming jaw pivoted to the side of the head facing the upright member, a second reciprocable shaft mounted in the upper member, parallel with the first-named shaft and nearer the upright member, a force-transmitting link connecting the second-named shaft with the jaw, and separate power means independently operable to reciprocate said shafts.

5. In a flanging machine, in combination, a frame including substantially horizontal upper and lower members and an upright member rigidly connected together, a die block mounted on the lower member, a reciprocable shaft mounted in the upper member, a clamping head carried by the shaft and cooperating with the die block, a flange forming jaw pivoted to the side of the head facing the upright member, a second reciprocable shaft mounted in the upper member, parallel with the first-named shaft and nearer the upright member, guide means carried by the upright member, a guide block carried by the second-named shaft and slidable in said guide means, and a force-transmitting link connecting said jaw and guide block.

6. In a flanging machine, in combination, a frame including substantially horizontal upper and lower members and an upright member rigidly connected together, a die block mounted on the lower member, a reciprocable shaft mounted in the upper member, a clamping head carried by the shaft and cooperating with the die block,

a flange forming jaw pivoted to the side of the head facing the upright member, a second reciprocable shaft mounted in the upper member, parallel with the first-named shaft and nearer the upright member, a force-transmitting link connecting the second-named shaft with the jaw, and means cooperating with the lower member of the frame and with the die block to adjust the die block toward and from the jaw.

7. In a flanging machine in combination, a suitable frame, a die block, a power actuated reciprocable clamping head cooperating with the block, a flange forming jaw pivotally carried by the head and adapted to cooperate with the side face of the block, a power actuated reciprocable shaft parallel to the path of movement of the head for oscillating the jaw, a link connecting the shaft with the jaw, the parts being so proportioned and related that as the jaw completes its advance stroke the link is deflected more than 45° from the axial line of the shaft, and a longitudinally disposed lateral bearing for the shaft.

8. In a flanging machine in combination, a suitable frame, a die block, a power actuated reciprocable clamping head cooperating with the block, a flange forming jaw pivotally carried by the head and adapted to cooperate with the side face of the block, a power actuated reciprocable shaft parallel to the path of movement of the head for oscillating the jaw and spaced approximately the length of the jaw from the pivot thereof, a link connecting the shaft with the jaw, the parts being so proportioned and related that as the jaw completes its advance stroke the link is deflected more than 45° from the axial line of the shaft, and a longitudinally disposed lateral bearing for the shaft.

9. In a flanging machine, in combination, a die block having a work piece receiving surface and a side face forming an angle with said surface at one edge of the side face, a flange-forming jaw cooperating with the side face and mounted to swing toward the side face about a pivot connecting one end of the jaw and a part of the machine relatively near the named edge of the side face and relatively remote from the opposite edge thereof so that a point on the jaw spaced from the pivot describes the arc of a circle during such movement, a link pivoted at one end to the jaw at said point and positioned substantially tangent to the circle at the beginning of a flange-forming operation, movable thrust means engaged with the other end of the link and arranged to apply to the link force in the line of said tangent, and a fixed abutment against which said other end of the link reacts during the latter part of its movement, whereby the jaw-moving component of the force applied by the thrust member increases from a minimum at the beginning of the flange-forming operation to a maximum at the end thereof.

10. In a flanging machine, in combination, a die block having a work receiving face and a face forming an angle with such surface, a flange-forming jaw cooperating with the second named face and mounted to swing toward such face about a pivot mounted on a part of the machine adjacent to the named meeting edges of the die block, a link pivoted at one end to the jaw adjacent to its outer end and positioned approximately tangent to the arc of movement of such pivot at the commencement of the flange-forming operation, thrust means connected with the opposite end of the link and movable in a line

parallel with the second named face of the die block and adapted to apply pressure to the link initially approximately in the line of such tangent, the link swinging laterally toward the die block as the pressure continues and reaching an angle of more than forty-five degrees to the

direction of the line of thrust before the jaw completes the flange-forming movement, and a fixed abutment against which the rear end of the link reacts during the latter part of its stroke.

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