No. 625,789. Patented May 30, 1899.

C. E. MACBETH.

FLANGING MACHINE.

(Application filed Jan. 27, 1899.) 2 Sheets—Sheet 1.

(No Model.)

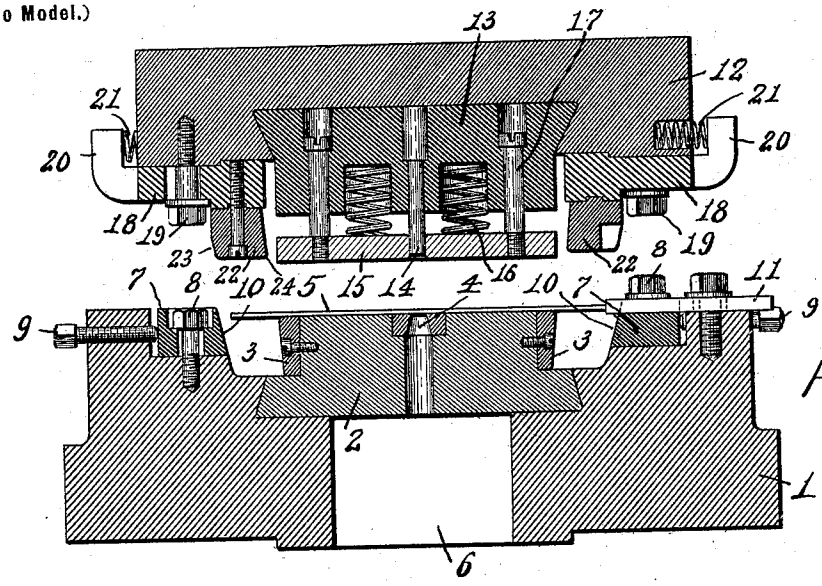


FIG. 1.

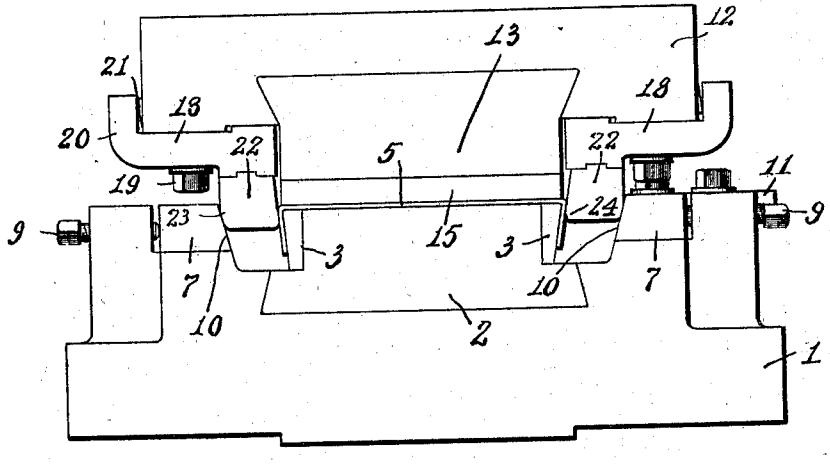


FIG. 2.

Witnesses:
E. R. Shipley.
M. S. Belden.

Charles E. Macbeth
Inventor
by James W. See
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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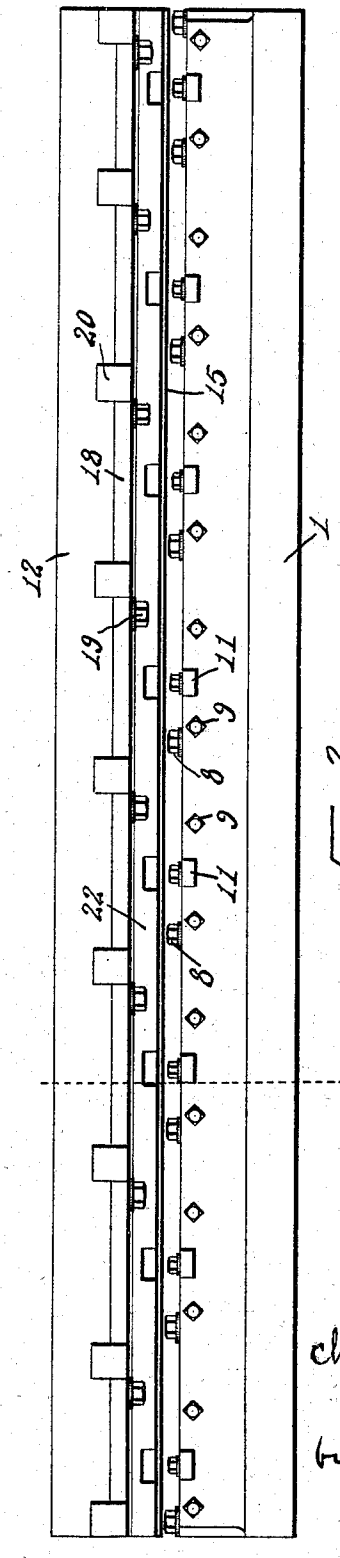


FIG. 3.

Witnesses:
E. R. Shipley.
M. S. Belden.

Charles E. Macbeth
Inventor
by James W. See
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES E. MACBETH, OF HAMILTON, OHIO.

FLANGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,789, dated May 30, 1899.

Application filed January 27, 1899. Serial No. 703,553. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. MACBETH, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Flanging-Machines, of which the following is a specification.

Necessity frequently arises for strips of plate metal to be formed into channels by having flanges bent upon their edges. For instance, in the construction of certain kinds of wheels for agricultural implements the rim of the wheel is formed by taking a long strip of plate metal and flanging its edges and punching it for spokes and other attachments and then rolling the channeled iron into rim form. My invention pertains to a machine for flanging such strips and, if desired, for simultaneously punching the holes therein.

My invention will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a vertical transverse section of the machine in the plane of the dotted line appearing in Fig. 3, the dies being open and the plate 5 being in position in flat form ready to be acted upon; Fig. 2, an end elevation of the same, the dies being closed and the plate 5 having been flanged and punched; and Fig. 3, an elevation of the right-hand side of Fig. 1.

In the drawings, confining attention for the present to Fig. 1, 1 indicates the lower-die holder of the machine in the form of a bed-piece having a length and width suited to the strip to be flanged; 2, the lower die, secured fixedly therein and presenting a flat upper surface having a width less than that of the strip to be flanged and having a length at least equal to the length of the strip; 3, cheek-strips secured to the side edges of and forming parts of die 2 and being made separable therefrom only by reason of the desire to provide renewable hardened parts at the main working points of the die, the outer faces of these cheek-strips being somewhat undercut or beveled, so as to give the upper portion of die 2 a dovetail cross-section; 4, punch-dies secured in the upper face of die 2 at points corresponding with holes desired to be punched in the strip which is to be flanged, these punch-dies being disposed singly or in groups, as required, and die 2 being perforated below them in order to permit the downward passage of the wads produced by the punches; 5, the strip of metal to be flanged, the same resting on the upper surface of die 2, with its edges projecting over the sides of the die a distance corresponding with the desired width of the flanges; 6, suitable opening through die-holder 1 to permit the downward passage of the punch-wads from punch-dies 4; 7, abutments firmly secured to die-holder 4, one at each side of die 2, these abutments having the form of long bars bolted to the die-holder, channels being thus formed between the inner faces of the abutments and the outer faces of die-cheeks 3; 8, bolts securing abutments 7 to the die-holder, these bolts engaging slots, so that the abutments may be adjusted transversely; 9, set-screws in the die-holder 1, impinging against abutments 7 and serving as means for adjusting the abutments transversely and for resisting their outward movement under working strains; 10, the inner surfaces of abutments 7, the same being beveled to form upward flares; 11, gages supported by die-holder 1 at one side of die 2 to serve in gaging the setting position for strip 5 when it is inserted in the machine; 12, the upper-die holder, being a long structure much like the lower-die holder; 13, the upper die, firmly secured therein, its lower face corresponding in dimensions substantially with those of the upper face of die 2 and its cheeks 3; 14, punches secured in die 13 and projecting downwardly therefrom and adapted to coöperate with punch-dies 4; 15, a stripper-plate disposed below die 13 and having corresponding horizontal dimensions, this stripper-plate forming in effect the upper-die element coming in contact with the upper surface of the strip to be flanged; 16, springs engaging between die 13 and stripper-plate 15 and urging the stripper-plate downward away from die 13; 17, vertical screws fixed in stripper-plate 15 and having sliding engagement with suitable holes in die 13, these screws permitting the stripper-plate to move upwardly against die 13, while the heads of the screws limit the downward movement of the stripper-plate with reference to that die; 18, side-die plates carried by the under side of die-holder 12 at each side of die 13, these side-die plates extending the length of

die-holder 12 and being capable of transverse sliding motion on the die-holder to and from die 13; 19, screws securing plates 18 to die-holder 12 and engaging slots in the plates, so as to permit of the transverse sliding motion just referred to; 20, ears projecting up from plates 18 outside die-holder 12; 21, springs engaging between die-holder 12 and ears 20 and urging plates 18 outwardly; 22, side dies in the form of bars firmly secured to the lower inner portions of and forming rigid parts of the plates 18, the inner faces of these dies being beveled in correspondence with the bevel of cheeks 3 of the lower die and the lower face of dies 22 being somewhat above the plane of the lower face of stripper-plate 15 when the stripper-plate occupies its downward position relative to the die 13; 23, the outer surfaces of dies 22, the same being beveled in correspondence with the bevel of abutments 7, and 24 the inner lower corners of dies 22.

The die-holders are to be secured in any suitable machine adapted for giving the dies the proper motion of approach and recession. For instance, they may be used in an ordinary gang-punching machine having appropriate dimensions and suitable power, the lower-die holder 1 being secured to the bed-jaw of such machine and the upper-die holder 12 being secured to the ram. The dies being open, as in Fig. 1, strip 5 is placed in position on die 2, with the edges of the strip projecting appropriately over the edges of the die. The upper die now descends, the first effect being to bring stripper-plate 15 in contact with the upper surface of the strip and to clamp the strip between the stripper-plate and the lower die and over the entire surface of the lower die. The continued descent of the upper-die holder results in punches 14 producing the desired holes in the strip. At about the time the strip is attacked by the punches side dies 22 reach the upper surface of the strip, and as the upper die descends side dies 22 bend the sides of the strip downwardly and form the flanges, as indicated in Fig. 2. If side dies 22 were immovably fixed to die-holder 12 and the distance between corners 24 equaled the total width of lower die 2 plus double the thickness of strip 5, then the strip would obviously have the flanges bent upon it, in which case the working of the machine would represent a very common flanging operation; but in the case just assumed the corners 24 would attack the strip very close to the corners of the lower die, over which the bending is to take place, and the result would be that the metal of the strip would be subjected to an extremely sharp and sudden and violent bending operation. As the grain of the metal runs lengthwise of the strip, this violent and sudden bending is liable to split and destroy the strip. Again, the accuracy of the bending in the assumed case would be dependent upon the distance between dies 22 being accurately in correspondence with the total width of die 2 plus the double thickness of strip metal. Uniformity in the thickness of a large number of strips cannot be depended upon, and consequently the accuracy of the corner-bending would be interfered with and, as may be well understood, a very slight excess in thickness in strips would bring extraordinary and possibly fatal strains upon the side dies. Again, in the assumed case the action would permit the flanges to be bent downwardly at right angles only, and the elasticity of the metal of the strip would cause more or less recovery at the bend, thus interfering with uniformity of the bend at the corners of the flanging; but in the construction described let it be noticed that when the side dies 22 first attack the strip their corners 24 stand outwardly away from the corners of the lower die a distance considerably in excess of the thickness of the metal of the strip. Hence when the bending of the strip begins the projecting portions of the strip act as bending-levers and take a somewhat free curve over the corners of the lower die—a curve to which the metal of the strip may well lend itself without danger of destruction of the strip. Up to this stage the bending may be described as curved bends taking place over the comparatively sharp corners of the lower die. When this preliminary curved bend has been produced, outer surfaces 23 of the side dies engage surfaces 10 of the abutments 7, and as the upper work continues to descend the side dies are forced inward, until finally at the completion of the operation the inner faces of the side dies, moving inwardly as they move downwardly, have sharpened up the corner-bends and pressed the flanges of the strip fairly against the side faces of the lower die. By this method the corner-bending is produced by starting it easily and later giving it the desired sharpness. At the same time the flanges may be bent inwardly beyond a right angle, thus permitting the formation of a dovetailed channel-strip, if such be desired. If, however, only a right-angled flanging be desired, then the dovetailing action of the dies may be limited to such degree as will merely compensate for the recovery or outward springing of the flanges after being released from the dies. Thus, desiring flanges at right angles to the strip and ascertaining the angle of recovery due to the elasticity of the material, the dies may be cast to produce an excessive angle of flanging, which excess will be absorbed by the elastic recovery of the material.

In the illustration much of the multiplicity of parts is incident to the desire to provide for ready renewal or adjustment of parts. Thus dies 2 and 13, forming when in operation integral parts of their holders, are made separable from them. Similarly, side dies 22 are separably secured to the plates 18, with which they are integral in operation, and so with die-cheeks 3 and punch-dies 4. Abutments 10 are in the operation of the machine rigid with reference to the lower die, but be-

ing separably secured with relation thereto provision is had for their replacement and adjustment, set-screws 9 serving as means for adjusting the abutments inwardly to suit various thicknesses of strip metal.

I claim as my invention—

1. In a flanging-machine, the combination, substantially as set forth, of a lower die having a cross-section corresponding with the channel to be produced in a flanged strip, an upper die, a plate disposed between the upper die and the lower die and arranged for limited motion downward from the upper die, springs urging said plate away from said upper die, side dies carried with the upper die and capable of motion transverse thereto, and means for moving said side dies inwardly during the latter part of their descending motion.

2. In a flanging-machine, the combination, substantially as set forth, of a lower die having a cross-section corresponding with the channel to be produced in a flanged strip, a punch-die in said lower die, an upper die, a punch carried thereby to coöperate with said punch-die, a stripper-plate yieldingly mounted between the upper and lower dies, side dies carried with the upper die and capable of motion transverse thereto, and means for moving said side dies inwardly during the latter portion of their descending motion.

3. In a flanging-machine, the combination, substantially as set forth, of a die-holder, a lower die supported thereby and having a cross-section suited to the channel to be produced in a flanged strip, beveled abutments movably mounted on the die-holder at the sides of said lower die, screws for adjusting said abutments inwardly, an upper-die holder, an upper die carried thereby, a stripper-plate carried by said upper die, side-die plates carried by said upper-die holder and capable of horizontal motion thereon, side dies carried by said plates and adapted to engage said beveled abutments and be moved inwardly thereby, and springs engaging said upper-die holder and die-plates and urging the latter outwardly.

CHARLES E. MACBETH.

Witnesses:
SAM D. FITTON, Jr.,
CHARLES M. ROBERTSON.