No. 821,685. PATENTED MAY 29, 1906.

H. E. WHITE.

MACHINE FOR EXPANDING METAL.

APPLICATION FILED MAR. 2, 1904. RENEWED APR. 11, 1906.

4 SHEETS—SHEET 1.

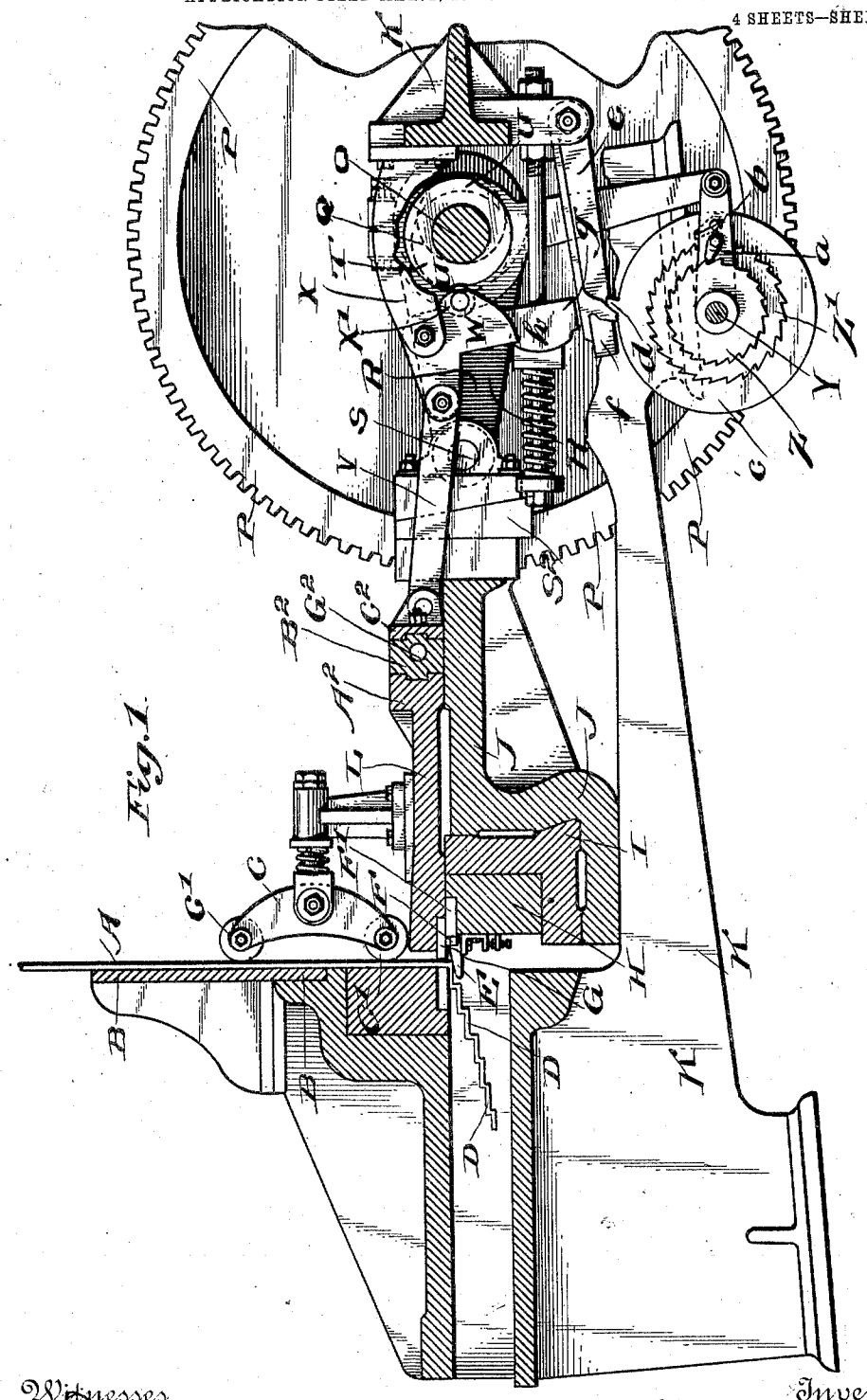


Fig. 1.

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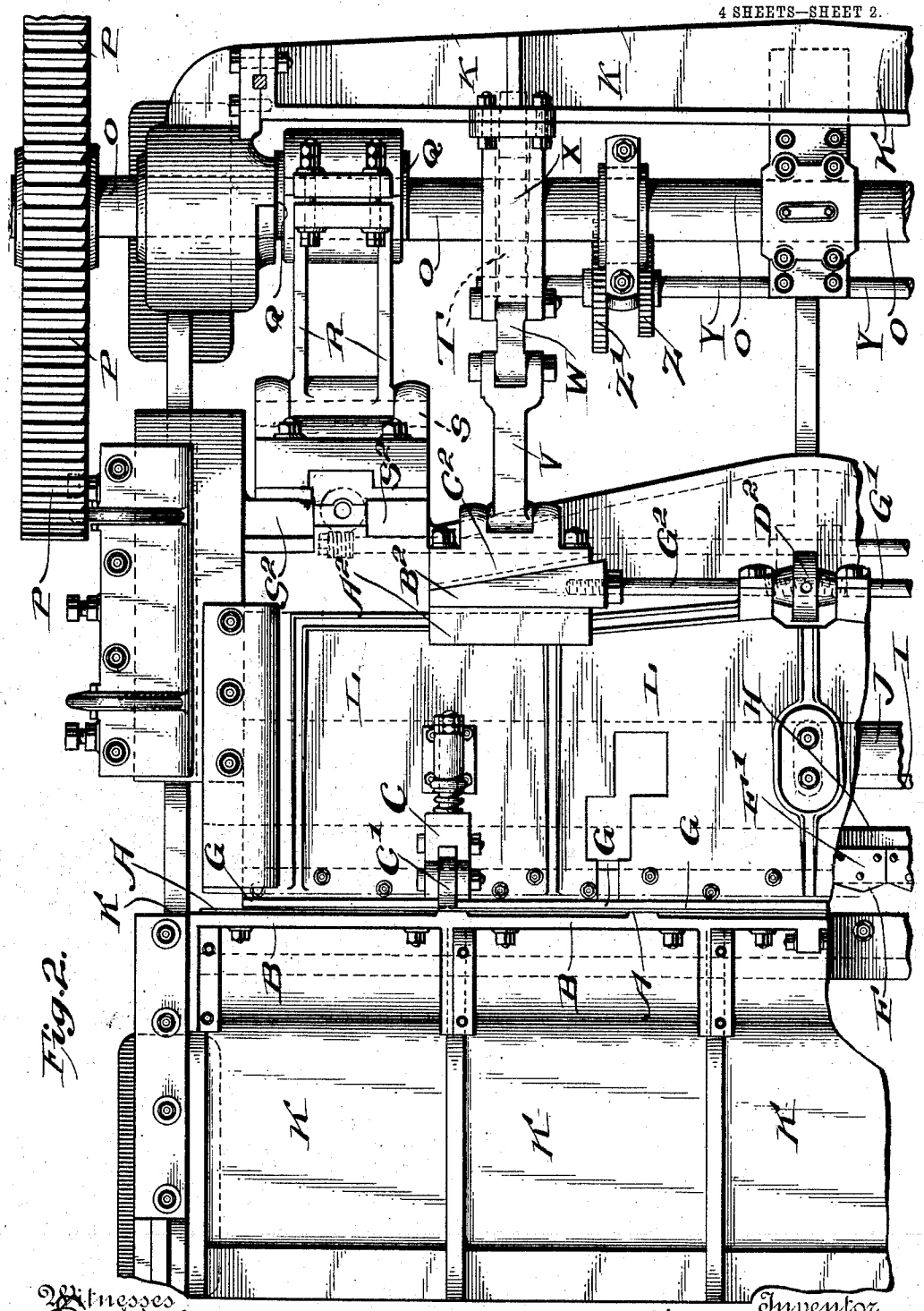


Fig. 2.

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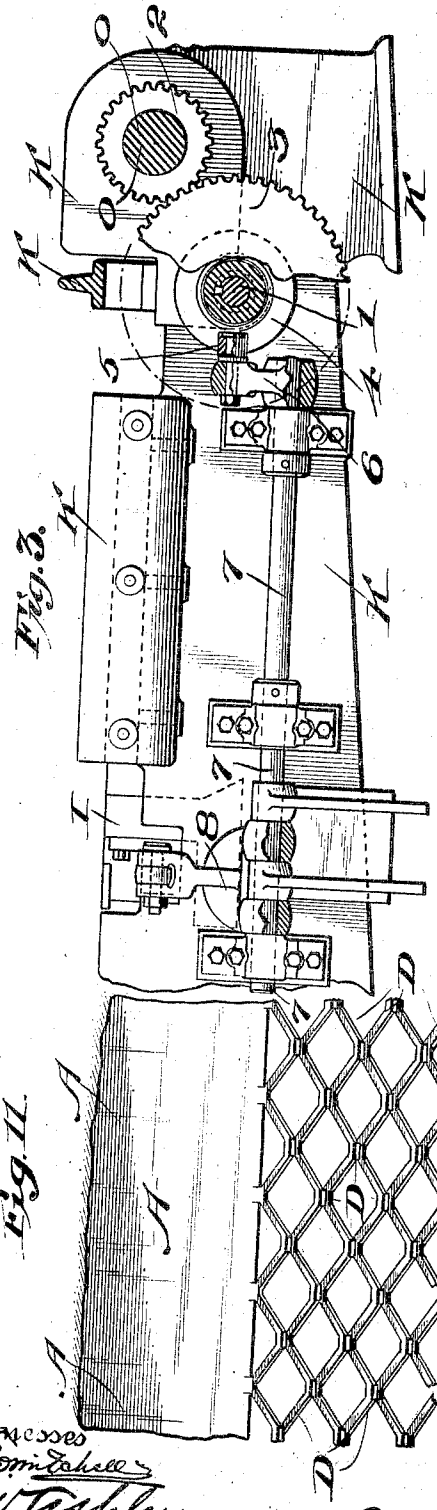


Fig. 3.

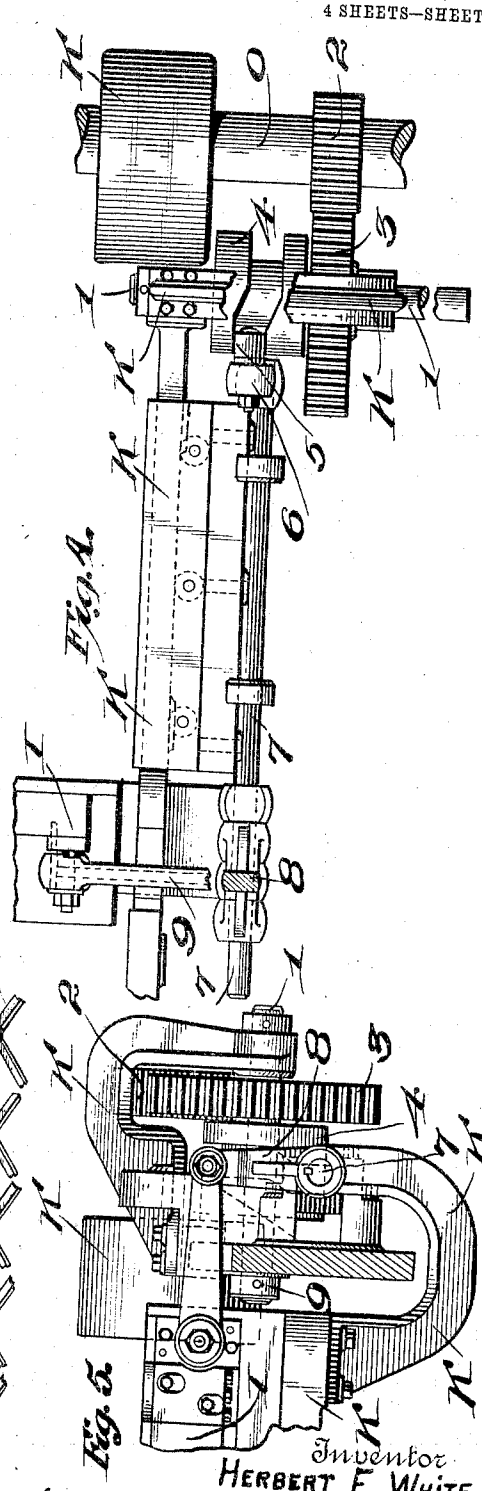


Fig. 4.

Fig. 1.

Fig. 5.

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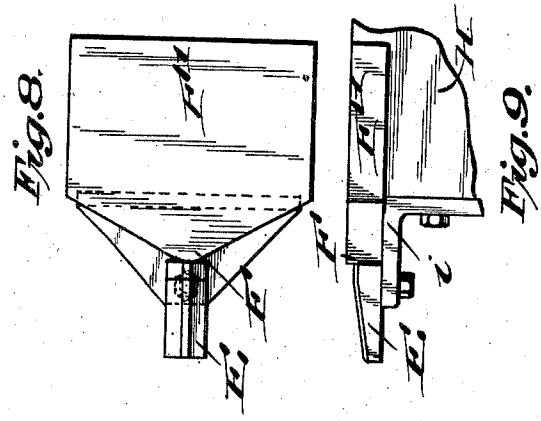
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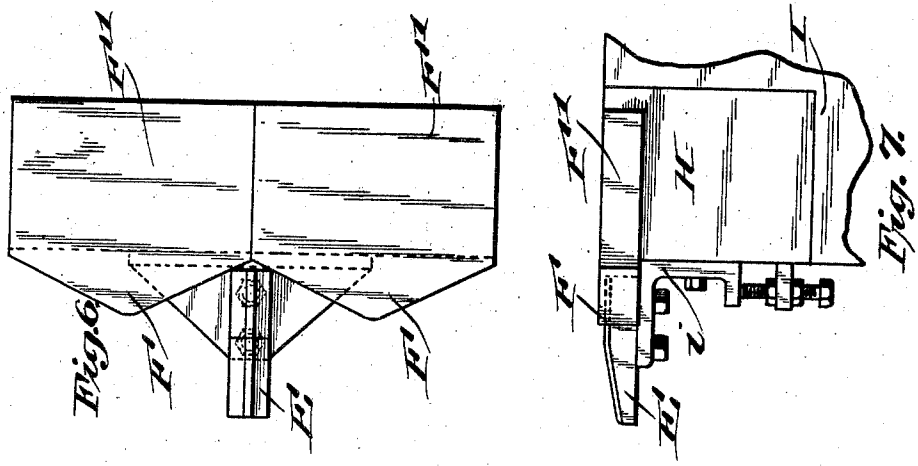
H. E. WHITE.

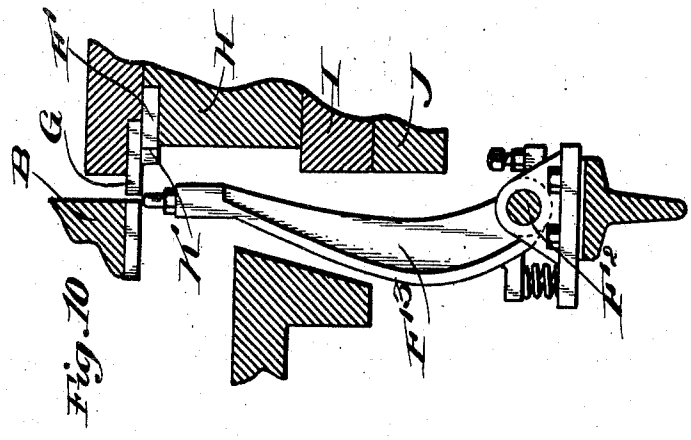
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4 SHEETS—SHEET 4.







Witnesses
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UNITED STATES PATENT OFFICE.

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MACHINE FOR EXPANDING METAL.

No. 821,685. Specification of Letters Patent. Patented May 29, 1906.

Application filed March 2, 1904. Renewed April 11, 1906. Serial No. 311,129.

To all whom it may concern:

Be it known that I, HERBERT EUGENE WHITE, a citizen of the United States, and a resident of Youngstown, Ohio, have invented certain new and useful Improvements in Machines for Expanding Metal, of which the following is a specification accompanied by drawings.

This invention relates to machines for expanding metal; and the objects of the invention are to improve upon the construction and operation of such machines and increase their efficiency with simplicity of parts.

Another object of the invention is to obviate the necessity of any positive feeding mechanism for feeding a sheet of metal to be operated upon, gravity alone being utilized for this purpose.

Further objects of the invention will hereinafter appear; and to these ends the invention consists of a machine for carrying out the above objects embodying the features of construction, combinations of elements, and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of the machine. Fig. 2 is a plan view of the same. Fig. 3 is a side view of the machine, partly in section, taken from the side shown broken away in Fig. 2. This figure, together with Figs. 4 and 5, illustrates the mechanism for shifting the punch-bar laterally. Fig. 4 is a plan view, partly in section, of the portion of the machine shown in Fig. 3. Fig. 5 is a front end view of Fig. 3. Fig. 6 is a detail plan view of a portion of the punch-bar and the support for the work. Fig. 7 is a side view of Fig. 6. Figs. 8 and 9 show a modification in plan and elevation of the support and punch-bar. Fig. 10 is a detail view showing the modification of the support for the work. Fig. 11 is a plan view of the product of the "diamond" expanded metal forming the product of the machine.

The diamond expanded metal forming the product of this machine is shown in Fig. 11, and in forming said product a sheet of metal A to be acted upon is arranged in the machine vertically, as shown in Fig. 1, against the support B, being held against the same by suitable means, as the spring-pressed device C, provided with the rollers C'. The metal of the sheet A is then slit and expanded by the operations of the machine. The expanded portions D of the sheet is forced in a substantially horizontal plane about at right angles to the plane of the unslitted portion A of the sheet. The long and heavy sheet of metal A, as shown, is supported loosely in an upright position upon the support E and is fed downward by gravity only, thus obviating the necessity of positive feeding means for the metal.

The lower edge of the sheet A, resting upon the support E, is slit and expanded by the diamond-shaped cutters F of the punch-bar F'. Portions of the lower edge of the sheet are first sheared by the punch-bar and then expanded, as described, in a plane substantially at right angles to the vertical plane of the sheet A. As the cutters F of the punch-bar are withdrawn said bar F' is moved automatically transversely to the machine to stagger the next row of slits for the sheet. As the knives F are withdrawn from the sheet its weight causes it to drop downward from the knives or cutters to the support E the distance of the width of one of the portions sheared from the lower edge of the sheet. In this way the sheet is fed downward by gravity step by step at each stroke of the machine the distance that is cut off of the lower edge.

When it is desired to cut off a given width of the sheet after it has been expanded, the clamp G is brought up against the lower portion of the sheet to prevent it from feeding downwardly, and then two strokes of the punch-bar are made in succession while shifting it transversely, so that a portion of the sheet is cut off along its entire length. All this may take place automatically in accordance with the construction of the machine. The knives or cutters F of the punch-bar are in this instance carried by a block or support H, movable transversely of the machine with the carriage I, and any suitable means may be provided for shifting the carriage I transversely and for timing said mechanism to carry out the objects of the invention.

The carriage I, with the block H, is carried upon the slidable carriage or member J, actuated to and from the sheet by suitable

mechanism. The carriage J in this instance slides upon the bed K. Sliding on top of the carriage J is the support L for the clamp G, as shown, the support L and carriage J being relatively movable in a direction to and from the sheet.

Operative connections are provided for the carriage J and support L, actuated from the main shaft O, to which power is applied through the large gear-wheel P, adapted to be suitably connected to a source of power. Upon the shaft O, as shown, is arranged the cam Q, driving the connecting-rod R, connected to operate the carriage J. As shown, the connecting-rod R is pivotally connected to the carriage by the pin S, and according to this construction the carriage will be given a reciprocating movement on the bed K of the machine. Upon the shaft O is also provided the cam T for operating the clamp G, carried by the slidable support L. The cam T is provided with a high portion, a low portion, and shoulders U. A link V is connected to the slidable support L, while another link or follower W, together with the link V, forms a toggle-acting joint pivotally connected to the support X. The follower W, forming one arm of the toggle, is provided with a roller X', bearing upon the periphery of the cam T. As the cam rotates it will be seen that the toggle will be made or broken to actuate the clamp G.

Suitable means are provided affording provision for clamping sheets of different thicknesses between the clamp G and the support B. For this purpose the link V is pivoted to a member C^2, while between said member and the abutting portion A^2 of the carriage L is arranged a wedge B^2. The wedge B^2 has its counterpart on the other side of the machine, (not shown,) and one wedge is connected to the bar G^2 and the other to the bar G'. Said bars are threaded right and left, respectively, and by turning the right-and-left nut D^2 the wedges B^2 may be moved in and out, thus adjusting the clamp G to grip different thicknesses of metal.

An adjusting-wedge S^2 is shown in Figs. 1 and 2 for varying the throw of the punch-bar. Any suitable means may be provided for adjusting said wedge vertically.

Upon a counter-shaft Y are provided ratchet-wheels Z Z', while suitable pawls *a* and *b* are arranged to coöperate with said wheels. Either one of the pawls *a* or *b* may be used at a time, but not both at once. At each revolution of the main shaft O the ratchet-wheel Z', for instance, will be moved one step. A disk *c* is rotated with the ratchet-wheel Z' and carries a finger or projection *d* on its periphery, which once in every revolution of the shaft Y raises the arm *e*, forcing the end *f* of said arm behind the projection *g* on the arm *h*, thereby clamping the clamp G against the sheet A. The arm *h* forms a continuation of the lower portion of the follower W. The parts are all so timed that the projection *f* will be raised to lock the projection *g* after the clamp G is closed. The object of locking the clamp G closed, as described, is to enable two strokes of the punch-bar to be made in succession to cut or sever a portion of the sheet, as desired. Referring to Figs. 3, 4, and 5, O represents the main driving-shaft, and 1 is a cam-shaft connected to be operated from the main shaft by means of the pinion 2 and gear 3. The cam-shaft 1 is timed to make one revolution for each two revolutions of the main shaft O. The carriage I for the punch-bar is operated from the cam-shaft 1. The shaft 1 is provided with a slotted cam 4, with which a follower 5 engages, carried by the arm 6 upon the rock-shaft 7, suitably supported on the machine. At the other end the rock-shaft is provided with an arm 8, connected by a link 9 with the sliding carriage I for the punch-bar. It will be seen that as the cam-shaft 1 rotates the shaft 7 will be rocked, and thus the punch-bar will be moved transversely of the machine to stagger the slits.

In Figs. 6 and 7 the support E for the sheet is carried by the bracket *i*, opposite the reëntrant angle *j* of the cutters F; but in Figs. 8 and 9 the support E, it will be seen, is carried opposite the points of the cutters F. Either arrangement produces the same form of expanded metal; but in the case of Figs. 6 and 7 the sheet of metal is always supported on the uncut edge between the apices of the portions that are expanded. In a construction like Figs. 8 and 9 the sheet is supported at the apices of the portions that are expanded. In Fig. 10 a further modification is shown, in which a support F^3 is pivoted at F^2 and adapted to be rocked by the operation of the punch-bar to permit the sheet A to feed downwardly by gravity after each stroke.

Obviously some features of this invention may be used without others, and the invention may be embodied in widely-differing forms.

Therefore, without limiting the invention to the constructions shown and described nor enumerating equivalents, I claim, and desire to obtain by Letters Patent, the following:

1. In a machine for expanding sheet metal, the combination of means for supporting the sheet in an upright position, and means for slitting and expanding the sheet substantially horizontally, for substantially the purposes set forth.

2. In a machine for expanding sheet metal, the combination of means for supporting the sheet in an upright position, means for slitting and expanding the sheet substantially horizontally, and provision for permitting the sheet to feed downward by gravity, for substantially the purposes set forth.

3. In a machine for expanding sheet metal, the combination of means for supporting the sheet in an upright position, a reciprocating punch-bar arranged to slit and expand the lower edge of the sheet, provision for permitting the sheet to feed downwardly by gravity, and means for shifting the punch-bar transversely after each stroke, for substantially the purposes set forth.

4. In a machine for expanding sheet metal, the combination of means for supporting the sheet in an upright position, a reciprocating punch-bar, means for shifting said bar transversely to the direction of reciprocation, and a clamp for holding the sheet and preventing feeding, for substantially the purposes set forth.

5. In a machine for expanding sheet metal, the combination with provision for maintaining the sheet in an upright position, of a punch-bar having a reciprocating movement in two directions at an angle to each other in a substantially horizontal plane, for substantially the purposes set forth.

6. In a machine for expanding sheet metal, the combination of a support for supporting the sheet in an upright position, clamping means for maintaining said sheet in such position, a reciprocating punch-bar, and means independent of said clamping means for automatically clamping the sheet as said sheet is cut and expanded by the punch-bar, for substantially the purposes set forth.

7. In a machine for expanding sheet metal, the combination of means for supporting the sheet in an upright position, a reciprocating punch-bar for slitting and expanding the sheet substantially horizontally, and means for automatically clamping the sheet at each stroke of the punch-bar, for substantially the purposes set forth.

8. In a machine for expanding sheet metal, the combination of a support for supporting the sheet in an upright position, another support against which the sheet is held by spring-pressure, and means for slitting and expanding the sheet substantially horizontally.

9. In a machine for expanding sheet metal, the combination of suitable supports for supporting the sheet in an upright position, devices for maintaining the sheet in said position, means for slitting and expanding the sheet substantially horizontally, and a horizontally-movable clamp for clamping the sheet against one of its supports to prevent feeding.

10. In a machine for expanding sheet metal, the combination of means for supporting the sheet in an upright position, a punch-bar provided with knives or cutters, a block or support for said punch-bar movable transversely of the machine, a transversely-movable carriage for said support, means for shifting the carriage transversely, a slidable carriage actuated to and from the sheet to be operated upon, and a cutter adapted to cooperate with said movable knives or cutters.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HERBERT EUGENE WHITE.

Witnesses:
FRANK K. CLARK,
ORSON D. KAISER.