H. M. SMITH.

SHEARS FOR CUTTING SHEET METAL.

APPLICATION FILED SEPT. 11, 1906.

906,572. Patented Dec. 15, 1908.

3 SHEETS—SHEET 1.

Fig. 1.

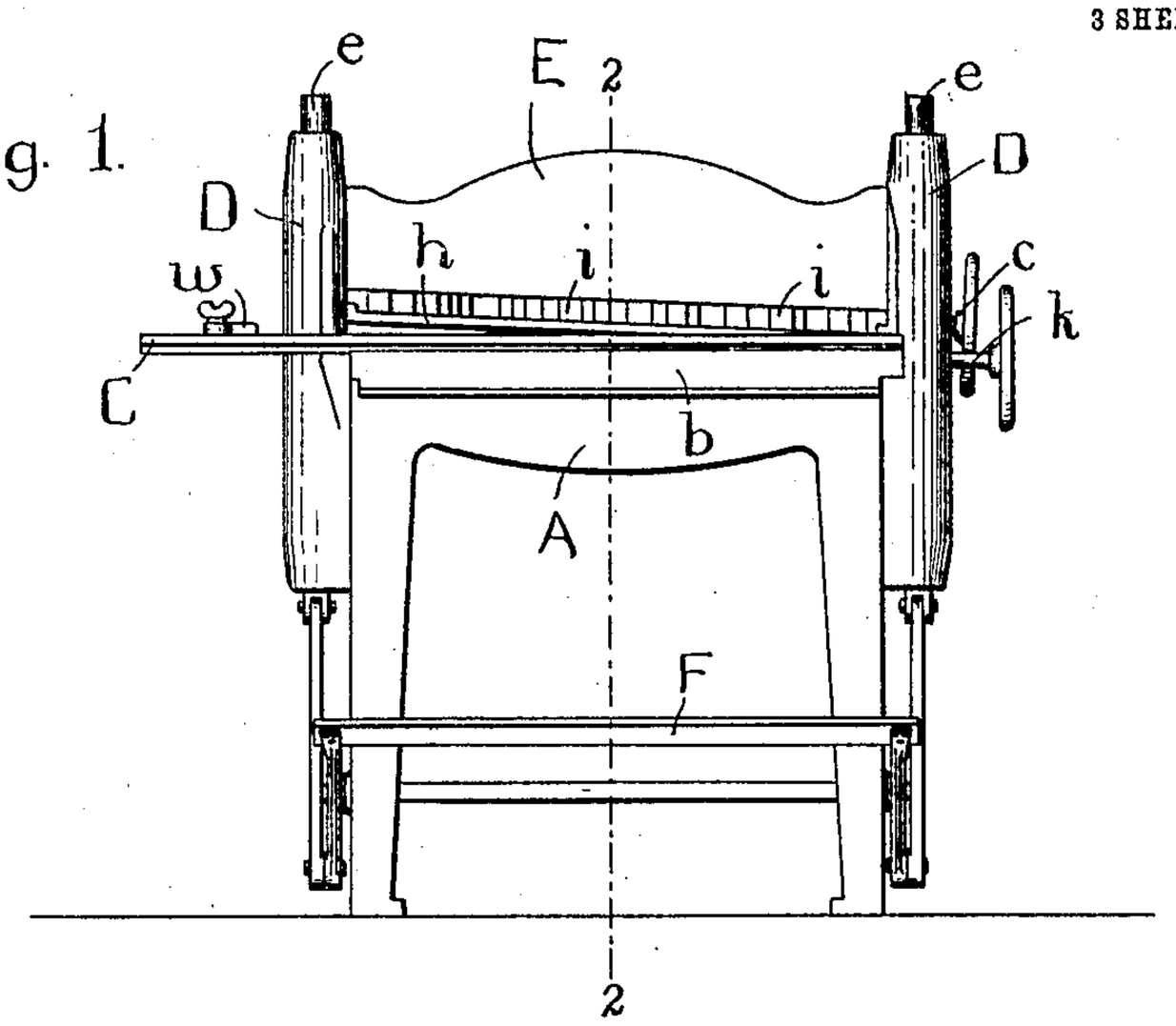
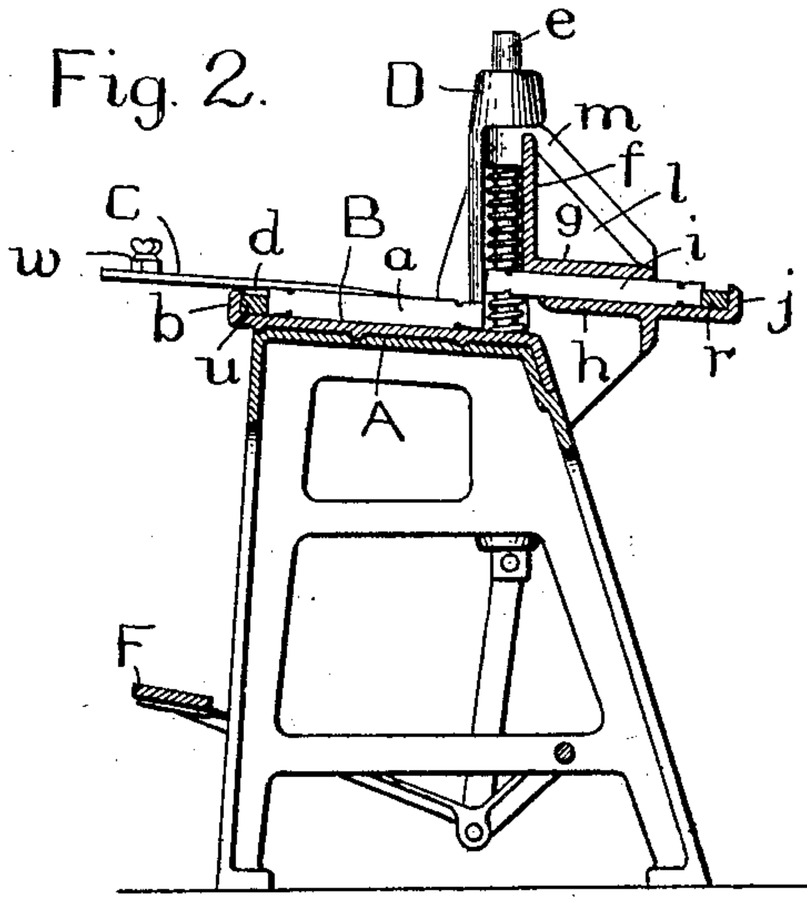


Fig. 2.



Witnesses
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3 SHEETS—SHEET 2.

Fig. 3.

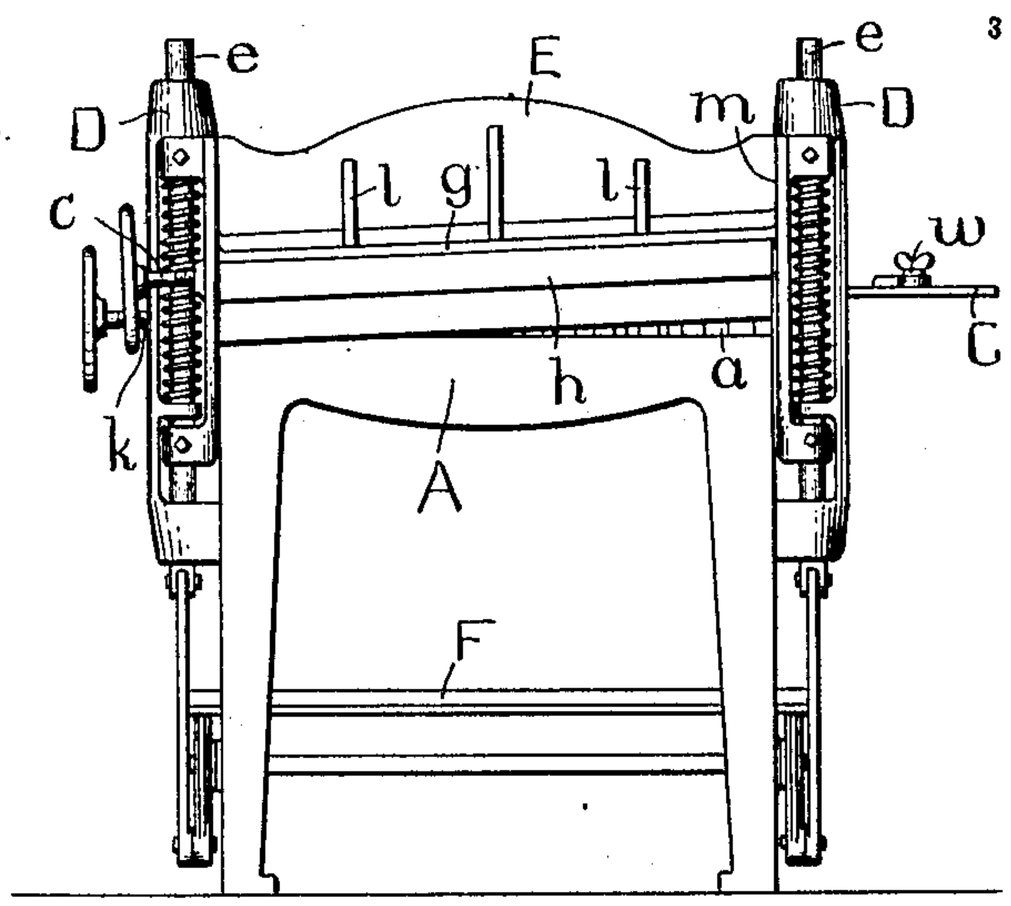
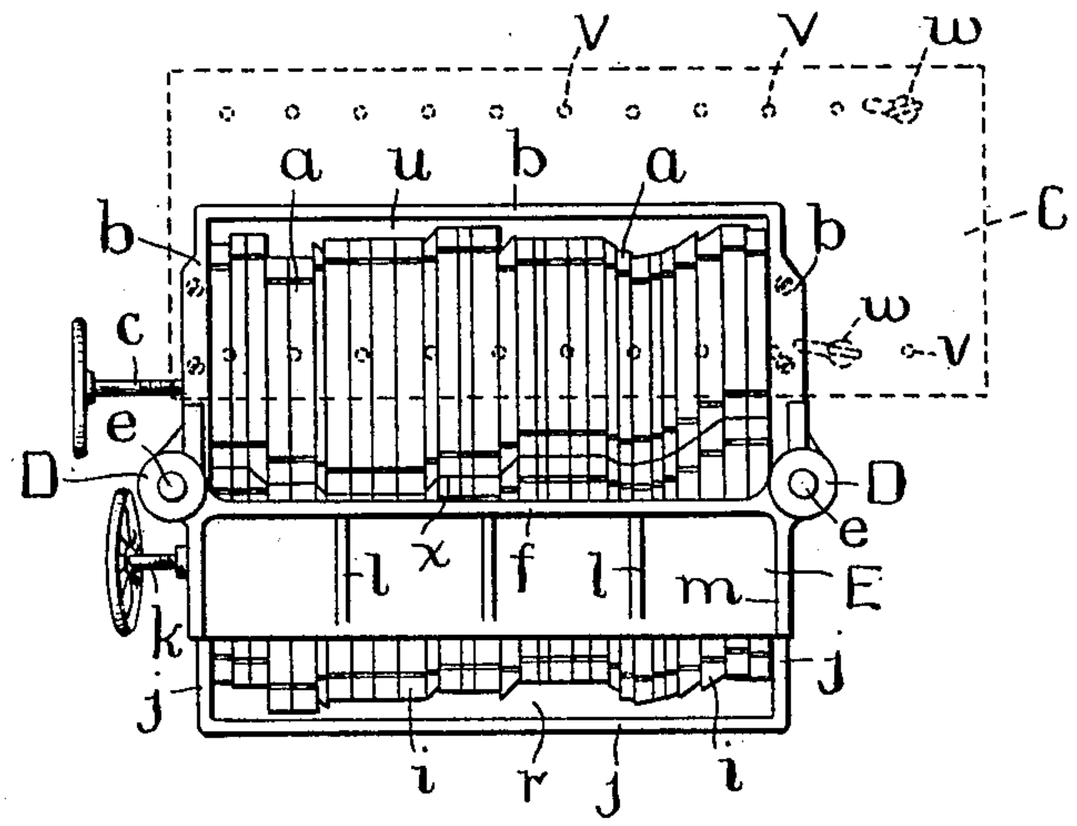


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

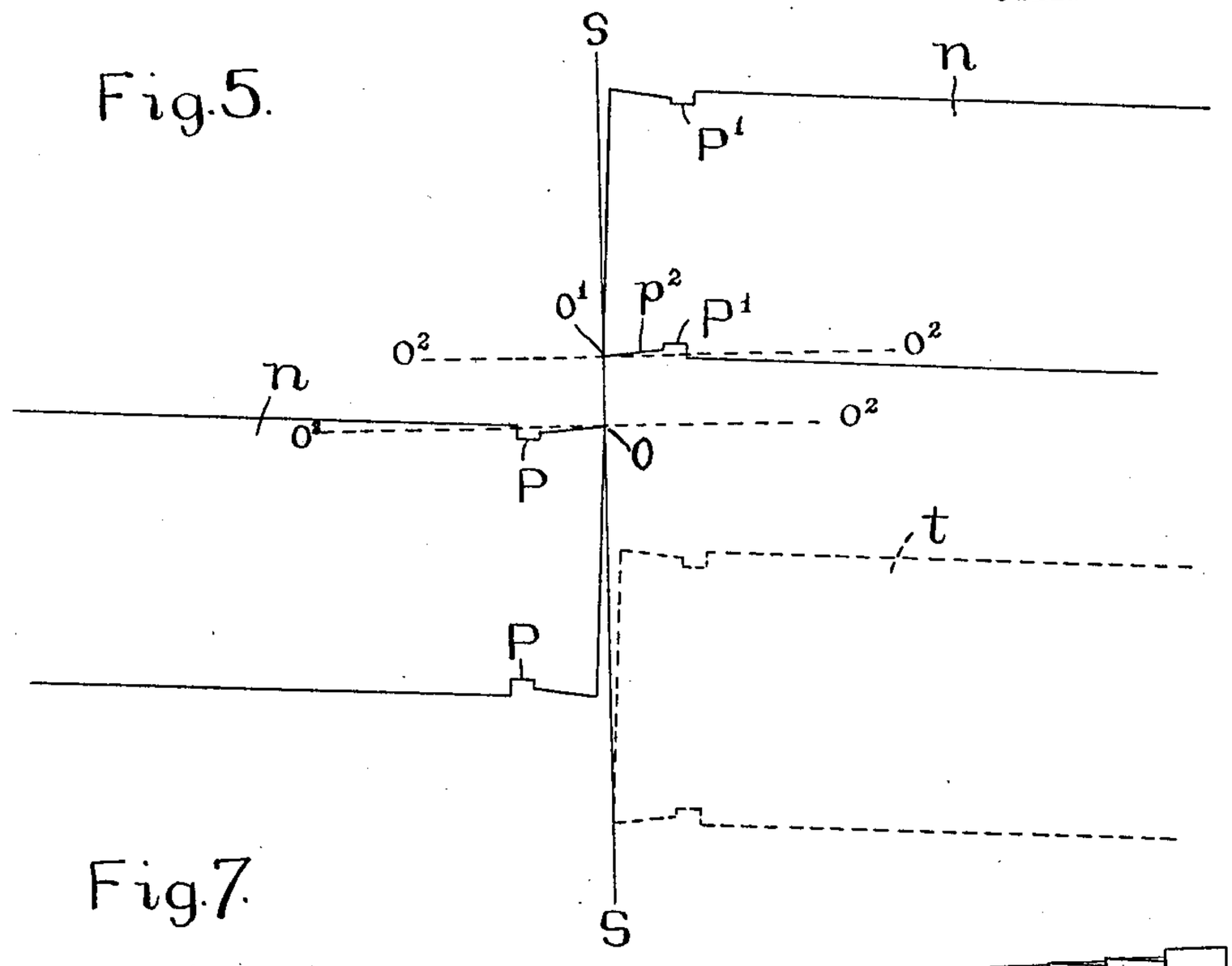
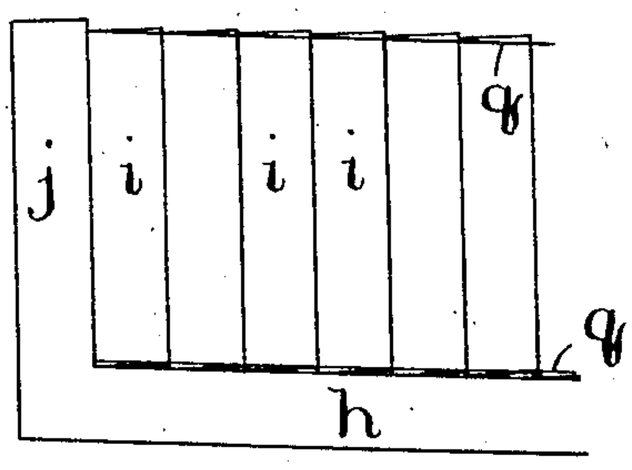


Fig. 7.



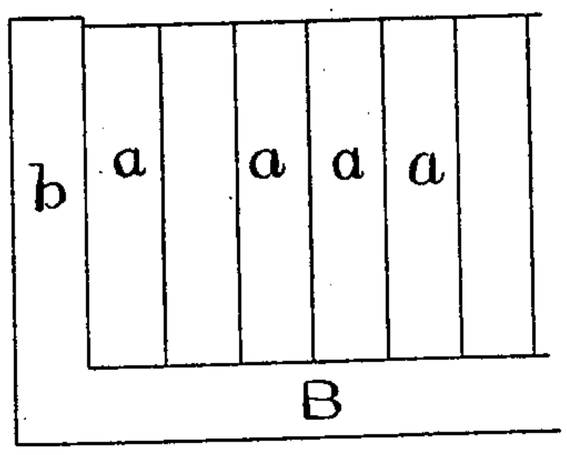
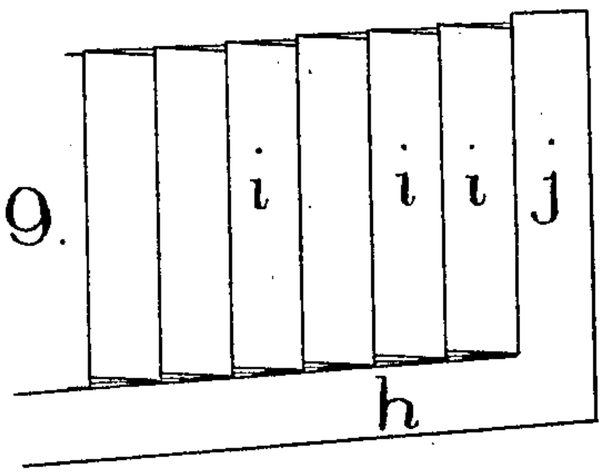


Fig. 6.

Fig. 9.



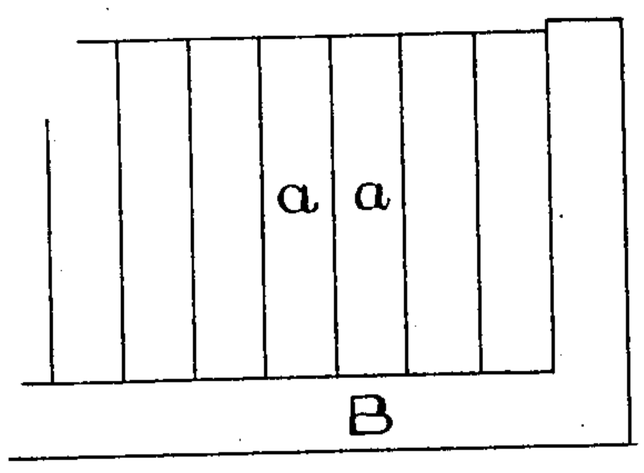


Fig. 8.

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UNITED STATES PATENT OFFICE.

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SHEARS FOR CUTTING SHEET METAL.

No. 906,572. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed September 11, 1906. Serial No. 334,124.

To all whom it may concern:

Be it known that I, HERBERT M. SMITH, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Shears for Cutting Sheet Metal, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

Figure 1 represents a front view of my invention complete with parts assembled in readiness for operation. Fig. 2 is a section of same on line 2—2, Fig. 1, the parts in front being removed. Fig. 3 is a rear view of the complete machine. Fig. 4 is a top view with the work supporting plate removed, but outlined in position by means of dotted lines. Figs. 5 to 9, inclusive, are diagrammatic views. Fig. 5 is a side view of a specimen fixed and movable knife, and shows the shape and location of the same with reference to the vertical plane S, S, in which the cutting edge of the movable knife works. Figs. 6 and 8 are front and rear end views, respectively, of a portion of the knives forming the lower fixed blade and showing their position in the supporting framework. Figs. 7 and 9 are front and rear end views, respectively, of a portion of the knives forming the upper movable blade showing their position in the supporting framework, and said figures also showing with reference to Figs. 6 and 8 the relative positions of the upper and lower cutting blades.

Similar reference letters and figures refer to similar parts in the different views.

The object of my invention is to provide a sheet metal shear capable of cutting an irregular line, and especially adapted for cutting sheet metal in a great variety of architectural designs, and my invention consists in the construction and arrangement of parts as hereinafter described and pointed out in the annexed claims.

The machine embodying my invention and represented in the accompanying drawings, comprises a table of cast iron or other suitable material, with legs and braces; a series of knives forming a fixed blade, a vertically operating gate in which are placed a series of knives forming a movable blade, means for imparting a reciprocating vertical motion to the gate, and means for supporting and guiding the work to the shear blades.

In Figs. 1 and 2, A is a table of convenient form and size, upon which the operating parts are fastened, the top of which should be slanted downward toward the rear, preferably at an angle of about 3°. Upon this table is set the bed B which is to hold the series of fixed knives *a*, best shown in Fig. 2. The forward and side edges of this bed are bent upward to a vertical position to form a flange *b* to brace the knives *a* when the machine is in operation. The series of knives *a* are shoved against this side flange and secured in a vertical position by means of the screw bolt *c* provided with a hand wheel. The knives having been set in position, a plate C, shown in Figs. 2 and 4, is screwed to the frame and is used to support the work. Between the rear end of the knives and the front flange *b* is a space *d* for the purpose hereinafter described.

At the rear corners of the table A are placed guides D, within which the rods *e* work, and upon which a gate E is fastened. This gate comprises a vertical rib *f* and two parallel plates *g* and *h* at an oblique angle to the vertical rib *f*, preferably of three degrees and lying in planes parallel to that of the bed. Between the plates *g* and *h* are inserted the moving knives *i* resting upon the plate *h* and with their cutting edges toward the front of the table. The plate *h* is provided at its sides and rear edge with an upturned flange *j* similar to flange *b* of the bed B. As in the fixed blade, there is a screw bolt *k* provided with a hand wheel for a similar purpose. The gate is braced by the braces *l* and *m*, Fig. 2. The gate E is fastened to the rods *e* and is operated by the foot treadle F or other suitable means of securing vertical reciprocating motion.

The knives *a* and *i* of the fixed and movable blades, respectively, are about eight inches long by one and one quarter to one and three quarters inches wide vertically, the thickness being variable and depending on the shape of the line to be cut. These knives have four cutting edges, at the top and bottoms of each end, so that four different cuts may be made by the same knife depending on the way it is placed in the frame. They are made of steel and the cutting edges are hardened. Their form is best shown in the diagrammatical Figs. 5 to 9 inclusive.

In Fig. 5 the fixed knife is designated by *n* and the movable by n^1. In the position

shown, the cutting edges are o and o^1 respectively. The knives are preferably set at an angle of three degrees, which is the angle of their supporting beds B and h. A short distance from each end of the knife and at its opposite edges are grooves P, P¹, as shown in Fig. 5, and the surface p^2 between the grooves and the cutting edges o, o^1 form an angle of preferably about three degrees with a horizontal plane, indicated by the broken line o^2, o^2 so as to form a beveled cutting edge. The grooves P, P¹ facilitate the grinding of the surfaces p^2 in order to sharpen the knives. The bed of the movable blade formed by the knives i is slightly inclined from end to end so as to produce a shearing cut with the lower blade. As the knives i are held in a vertical position, with one of their edges resting upon the bed h, their cutting edges must be beveled sidewise in order that the edges of the several knives may present a straight cutting edge. This beveling is shown in Fig. 7 by the line q, q. Each machine is provided with an assortment of knives for the upper and lower blades, having their ends cut at different angles so that a selection can be made when assembled, to produce a blade corresponding in its cutting edge to the desired pattern to be cut.

The method of assembling the knives in the blades is as follows:—The proper knives are selected for the upper blade to cut the line desired and placed in the gate between the plates g and h, as previously described, with the cutting edges of adjacent knives in alinement. They are then fastened in position by tightening the screw bolt k and melted lead is poured between the rear ends of the knives and the flange j as shown at r, Fig. 2. The gate is then depressed to the level of the bed B and the proper knives of the fixed set are selected to correspond with the movable knives placed side by side on the bed B with their cutting ends crowded against the cutting ends of the movable blade. The gate is now allowed to rise, which pushes the fixed knives back until their cutting edges are brought into the vertical plane, indicated by the line S, S, which is also the plane in which the cutting edges of the movable blade move, as shown in Fig. 5, in which the broken line t indicates the lowest position of the movable blade. Lead is then poured into the space between the end of the fixed knives a and the flange b, as shown at u, Fig. 2, and the screw bolt c is also tightened. The movable and fixed blades are now in position for the operation of the machine.

For the purpose of guiding the sheet metal to be cut, I have provided two parallel rows of screw threaded holes v, v, in the work supporting plate C for the attachment of guides w.

The method of use of my invention is as follows:—A sheet of metal is placed upon the work supporting plate C and guided by the guides w is pushed forward to the proper place between the fixed and movable blades. The gate E is lowered causing the metal to be served on the irregular line formed by the cutting ends of the fixed and movable knives, the cutting line being indicated in the present instance by the line x, Fig. 4.

In the operation of the shear, the cutting edge of the movable blade in passing from its highest to its lowest position moves in a vertical plane, with a shearing cut as it passes the cutting edge of the fixed blade and in contact therewith, and the continued downward movement of the movable blade carries it away from the fixed blade, producing a space or clearance between the opposing ends of the blades as illustrated in Fig. 5, in which the broken line t denotes the depressed position of one of the movable knives with a clearance space between it and the fixed knife n. This clearance space is secured by inclining the knives relatively to the vertical plane S, S.

I claim,

1. In a shear, the combination with a fixed and a movable blade, each of said blades comprising a series of knives having at their ends a single transverse cutting edge, with each knife in said fixed blade arranged to coöperate with a corresponding knife in said movable blade, of means for supporting the knives of each blade with their sides in contact and with the cutting edges of each pair of coöperating knives in any desired vertical plane.

2. In a shear, a blade composed of a series of knives having a transverse cutting edge and placed side by side to form a continuous cutting edge for said blade, and means for holding the cutting edges of the individual knives of said series in any desired vertical plane.

3. In a shear, a fixed blade composed of a series of knives placed side by side and in contact with each other, each of said knives being provided with a single transverse cutting edge, a movable blade composed of a series of knives placed side by side in contact with each other, each of said knives being provided with a single transverse cutting edge, with the knives of said fixed and movable blades being inclined at an angle to the plane of movement of said movable blade, and means for imparting a vertically reciprocating motion to said movable blade.

4. In a shear, a composite blade composed of a series of knives placed side by side, with their longer dimension transverse to the line of movement of said blade, each of said knives having a transverse cutting edge at each end thereof.

5. In a shear, a blade composed of a series

of knives placed side by side and in contact with each other, and provided at their ends with transverse cutting edges at each corner of the knife, means for supporting said knives in vertical planes, with the cutting edges of said knives slightly beveled to bring the cutting edges of adjacent knives in alinement.

6. In a shear, a reciprocating gate having a bed plate for a series of knives forming a movable blade, said bed plate being inclined, whereby one end of the movable blade is raised higher than the other, a series of knives rectangular in cross section and supported by their longitudinal corners in a vertical position, with each of said knives beveled transversely at its end to form cutting edges in alinement.

7. In a shear, a reciprocating gate having a bed plate for a series of knives forming a movable blade, said bed plate being inclined, whereby one end of the movable blade is raised higher than the other, a series of knives rectangular in cross section and supported by their longitudinal corners in a vertical position, and with each knife longitudinally inclined to the plane of movement of said movable blade.

8. In a shear, the combination with fixed and movable blades having coöperating continuous cutting edges, said blades composed of a series of knives, each knife provided with a transverse cutting edge, of means for imparting a vertical reciprocating movement to said movable blade, and means for supporting the knives of said fixed and said movable blades with their longitudinal dimension at an angle to the vertical.

9. In a shear, the combination with a bed plate provided with an upturned flange, a blade on said bed plate having a continuous cutting edge, comprising a series of knives with their sides in contact, and means for securing said knives within the flange of the bed plate with their cutting edges in any desired vertical plane.

10. As an article of manufacture, a cutting knife for a shear consisting of an angular bar, with the plane of the surface of an end of the bar at right angles to the axis of the bar, and with a portion of the side of the bar adjacent to the end beveled to form a cutting edge at the intersection of said side and said end.

Dated this sixth day of September 1906.

HERBERT M. SMITH.

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