C. SONNEBORN.

EDGING DIE.

APPLICATION FILED APR. 1, 1914.

1,151,624.

Patented Aug. 31, 1915.

3 SHEETS—SHEET 1.

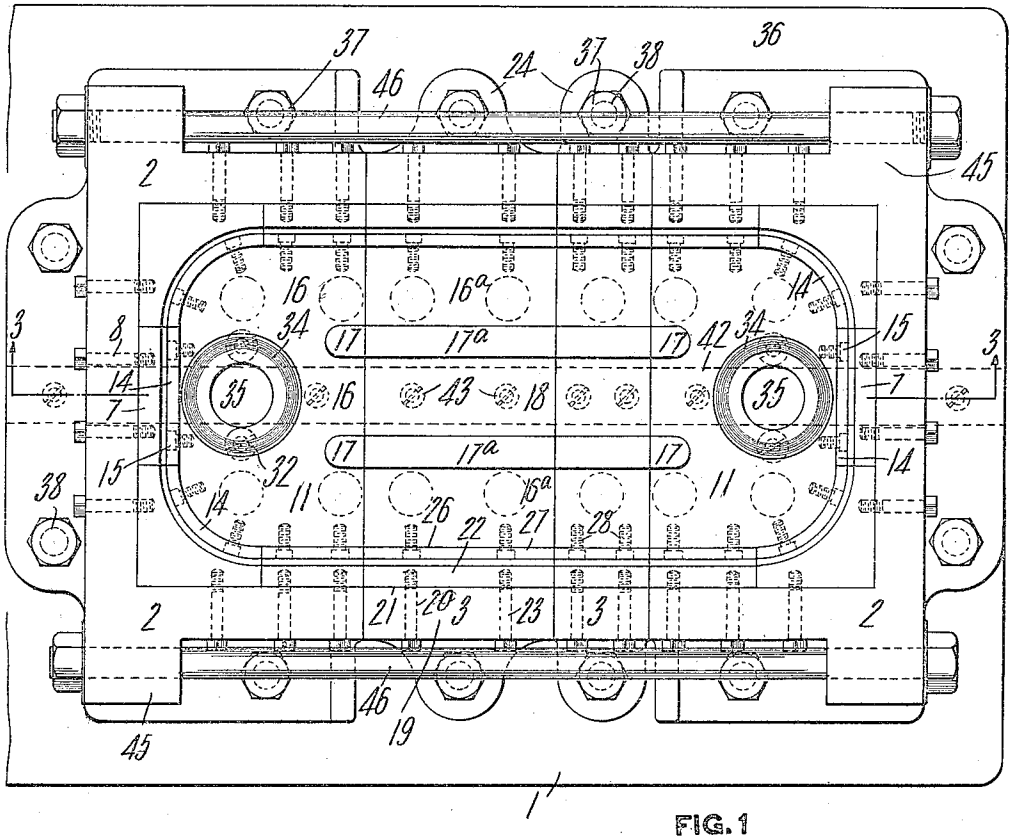


FIG. 1

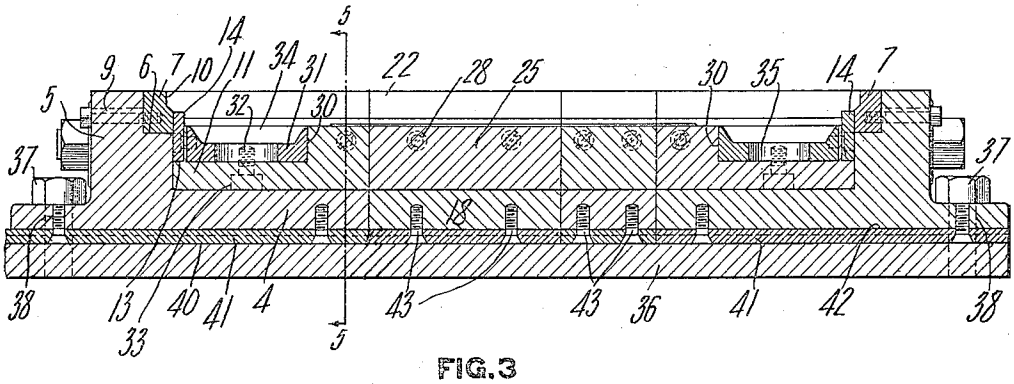


FIG. 3

WITNESSES

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3 SHEETS—SHEET 2.

FIG.2

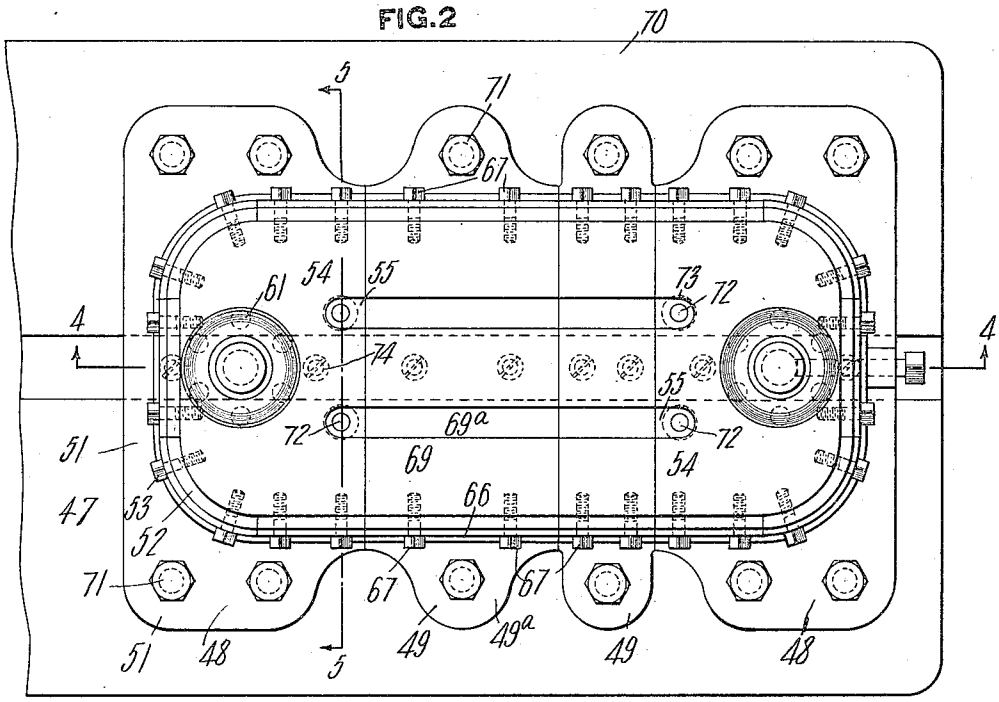
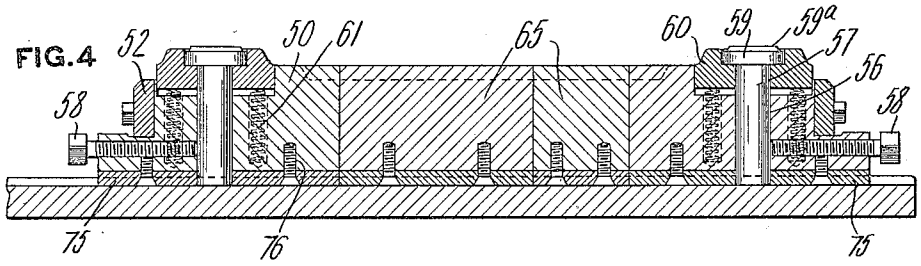



FIG.4



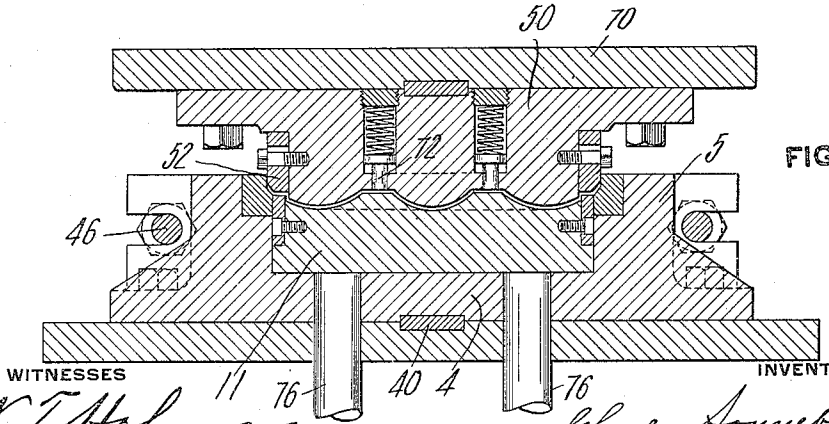




FIG.6

WITNESSES

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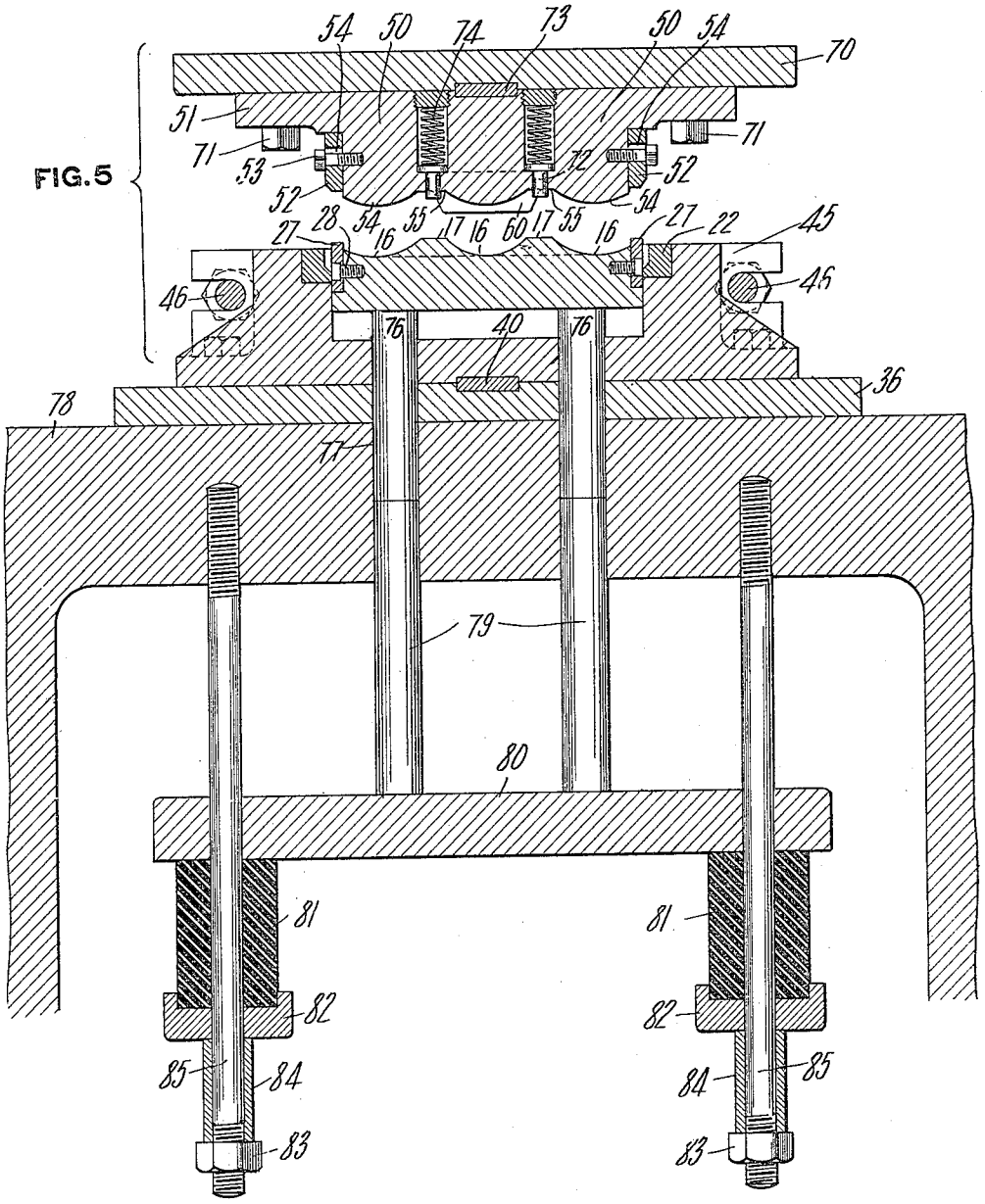
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3 SHEETS—SHEET 3.

FIG. 5




WITNESSES

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# UNITED STATES PATENT OFFICE.

CHARLES SONNEBORN, OF WEST PITTSBURG, PENNSYLVANIA, ASSIGNOR TO PRESSED METAL RADIATOR COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## EDGING-DIE.

1,151,624. Specification of Letters Patent. Patented Aug. 31, 1915.

Application filed April 1, 1914. Serial No. 828,858.

*To all whom it may concern:*

Be it known that I, CHARLES SONNEBORN, a resident of West Pittsburg, in the county of Lawrence and State of Pennsylvania, have invented a new and useful Improvement in Edging-Dies, of which the following is a specification.

This invention relates to dies for shaping sheet metal articles.

The object of the invention is to provide dies for this purpose by means of which a partially shaped sheet metal article can be shaped around its edges, that is, can have its entire edge bent up to form a flange or to otherwise shape the same, and which also will shape or flange the edges of openings through the blank, which dies are adjustable to adapt them for shaping similar articles of different sizes, and are also formed in sections, so that each part can be readily replaced or renewed when worn.

In the accompanying drawings Figure 1 is a face view of the bottom die; Fig. 2 is a similar view of the top die; Fig. 3 is a longitudinal section through the bottom die on the line 3—3 Fig. 1; Fig. 4 is a longitudinal section through the top die on the line 4—4 Fig. 2; Fig. 5 is a cross-sectional view through both dies in assembled relation on the line 5—5 Figs. 2 and 3, and showing the lower die in position before the edging operation; and Fig. 6 is a similar view, showing the die parts at the conclusion of the edging operation.

The dies illustrated are adapted to be actuated by any suitable press, the bottom die being suitably secured to the frame or bed of the press and the top die being carried by the vertically movable platen or press head. The means for securing these dies to the press bed and platen may be varied within wide limits. Both the top and bottom dies are of sectional or built up construction for the purpose of adjustability, accuracy of construction and the replacing of worn pieces. The dies have been illustrated for shaping the peripheral edges and the edges of openings through partially formed sections for sheet metal radiators, and for providing said edges with a flange or rim, and will be described in connection with such use, although it is obvious that the main features of construction may be adapted for shaping the edges of various articles.

As illustrated the bottom die 1 comprises a pair of end sections or pieces 2 and one or more intermediate sections or pieces 3, depending upon the length of the article being shaped. By moving the end sections farther apart and interposing between the same a larger number of intermediate sections or an intermediate section of greater length the die can be increased in length within the limits of any desired extent.

Each end section 2 comprises the main body or web portion 4, which is a comparatively thin plate, and the outer portion of which is thickened to form a wall portion 5 having a seat 6 for receiving a shaping die member 7, which is secured to the end section 2 by tap bolts 8 extending through elongated apertures 9 in the wall 5. The inner working face 10 of the die member 7 extends crosswise of the end section 2 and at its ends is curved and terminates in straight portions substantially longitudinal of the die, and which serve to shape the edge of the curved end portion of the radiator section. The die member 7 may be a single piece but is shown as five parts, an end portion, two corner portions and two side portions, each of which may be separately replaced when worn. The thickened outer portion of the end section 2, together with the thinned web 4, form a socket or seat for an inside piece 11, the outer surface of which is provided with a rabbet or seat 13 to receive a shaping die member 14, which has a transverse intermediate portion, curved corner portions, and two side portions, which portions are secured to the inside piece by tap bolts 15 extending through openings in the die member 14, and into the side piece 11. The working surface of the die member 14 forms a continuation of the shaping surface 10 of die member 7. The upper face of the inside piece 11 is also provided with longitudinally extending alternate depressions 16 and projections 17 which are curved to fit the already partially formed surface of the radiator section, or may act as forming or shaping die portions in operating upon a flat sheet, and

which coöperate with similar curved portions of the upper die member hereinafter described, to securely hold the radiator section and avoid wrinkling or stretching thereof while its edge is being shaped.

The intermediate sections 3 consist of a comparatively thin portion or web 18 which at each end is provided with upwardly extending portions 19 having transverse elongated slots 20 and having their inner faces forming seats 21 for the die members 22, which are secured to the intermediate sections by tap bolts 23 extending through the slots 20 and entering holes in the die members. The end portions of the intermediate sections are provided with perforated ears 24 for securing them to the base or bolster plate hereinafter described, while the outer faces of the projections 19 are left open and accessible so that the shaping die portions 22 can be readily removed for replacement or repair. Each of the intermediate sections 3 of the bottom die is provided with an inside piece or member 25 whose end is rabbeted to form a seat 26 for the die member 27, which is secured to said inside piece by tap bolts 28 extending through holes in the die members into the inside piece. The upper faces of the inside pieces 25 are also provided with alternate depressions and projections $16^a$ and $17^a$ which match those on the end pieces 2.

The inside piece 11 of the end section 2 is provided on the central longitudinal line of the die with an opening 30 for receiving a female flanging or edging die member 31 which is secured to the inside piece by tap bolts 32 extending through openings in the inside piece and into the flanging die member 31, and which tap bolts have large heads seated in undercut sockets 33 of the back face of the inside piece. The female flanging die member 31 has its face 34 of substantially the configuration of the boss previously pressed or formed in the sheet metal article, or to be formed, and is provided with a central opening or aperture 35 to receive the male flanging die member hereinafter described.

The die sections 2 and 3 are secured to a suitable base plate or bolster member 36, which plate is provided with threaded holes for receiving tap bolts 37 extending through holes 38 in the peripheral portions of the end and intermediate sections 2 and 3. The base or bolster plate is also provided with a longitudinal seat or groove 40 for receiving and interlocking with a guide strip or strips 41, which also enter corresponding grooves or seats 42 in the bottom faces of the intermediate sections 2 and 3, said guide strip being secured to the several die sections by suitable tap bolts 43. The end sections 2, at each side of the die are also provided with slotted ears or lugs 45 for receiving longitudinally extending tie rods or bolts 46 for securely clamping together all of the several sections of the die.

The inside pieces 11 and 25 of the bottom die are movable therein and act in conjunction with the upper die member to either shape or partially form the radiator section as the dies come together or to securely hold said section during the edging operation. In the arrangement shown the several inside pieces rest on pins 76 slidable in holes 77 in the frame 78 and bolster plate and which pins rest on the upper ends of rods 79, which in turn are supported by a common pressure plate 80. Plate 80 is supported by a series of yielding or spring members, such as the rubber blocks 81 carried by washers or seats 82 held by nuts 83 and filling tubes 84 on rods 85 threaded into the frame. By turning the nuts 83 the upward pressure against the inside piece 75 may be increased or diminished, and its position may be adjusted by inserting loose pins 76 or filling tubes 84 of the necessary length, as will be readily understood. The inside pieces normally project outwardly from the face of the die, as shown in Fig. 5, and sink to their seats as the dies come together, as shown in Fig. 6, and thus act as holding or forming members as before described. As the dies open the inside pieces move outwardly and strip the radiator section from the dies.

The top die 47 comprises two end sections 48 and one or more intermediate sections 49, which, as in the case of the bottom die, are divided on straight transverse lines so that any number of intermediate sections of any length within limits can be assembled between the two end sections to build up a die of the proper length.

Each end section 48 comprises a comparatively thick central portion 50 surrounded by a thinner peripheral portion 51, the outer surface or wall of the thickened portion 50 forming a seat for receiving a die shaping member 52, preferably formed of several parts like the die 14, and which has an intermediate transverse portion extending crosswise of the die and curved at its ends and terminating in straight portions extending longitudinally of the die. Said die member is secured to its seat by tap bolts 52 threaded into the end section through elongated slots 54 of the die. The outer face of the die member 52 coöperates with the working face 10 of the female die 7 and the die 14. The front face of the thickened portion 50 of the end section 48 is provided with longitudinal curved projections 54 alternating with depressions 55 and which coöperate with the alternate depressions and projections 16 and 17 of the die section 2 to shape the central portion of the radiator section or hold the partially formed radia-

tor section during the flanging operation. Each end section 48 is also provided with two ejector pins 72 projecting from the bottoms of the grooves 55 and having a large head 73 seated in a countersunk recess, said pins being forced outwardly by suitable springs 74.

The end section 48 is provided on the central longitudinal line of the die with a through opening 56 for receiving the shank of a male flanging die 57, which is rigidly held in proper relation to the female flanging die by a tap bolt 58 threaded through the wall of the laterally extending opening in the end section 48, and accessible at the outer end of the said opening for adjusting the male flanging member. The male flanging member has a head 59 provided with shaping portions 59a, and is arranged to enter the opening 35 in the female flanging die member and turn over a rim or flange around the edge of the previously formed opening of the boss or projection on the radiator section.

Surrounding and sliding on the shank of the male flanging die member 57 is a stripping ring 60 having its face shaped to form or to correspond with the configuration of the boss or projection on the radiator section and which coöperates with the shaping face 34 of the female flanging die 31 and which stripping ring is normally pressed outwardly by suitable springs 61.

The intermediate sections 49 of the upper die member are provided with thickened central portions 65 having their outer ends rabbeted on their inner edges to form seats for die members 66 which are held to said seats by tap bolts 67 extending through openings in the die members into the thickened portions of the intermediate sections. The front faces of the intermediate sections are also provided with curved projections 69 and depressed portions 69a which are shaped to correspond with or match the faces of the inside pieces of the corresponding intermediate sections of the bottom die member. Said intermediate sections are also provided with end ears or lugs 49a.

The upper die sections are secured to a suitable base or bolster plate 70 by means of bolts 71 extending through holes in the peripheral web portions 51 of the end sections and in the ears or lugs 49a of the intermediate sections and entering tap holes in the bolster plate and are held in proper alinement and relative position by means of an interlocking guide strip 75 fitting in alining grooves formed respectively in the back faces of the die sections and in the front face of the base or bolster plate, and secured to the die sections by means of tap screws 76.

When flat sheets are fed to the dies the central die portions shape and emboss the central portions of the radiator sections, while the peripheral die portions turn or form an edge flange, but the dies can also be used for merely flanging the edges of a partially formed section, in which case the inside or central die parts merely act as holding members to prevent the sheet from wrinkling or stretching during the flanging operation.

The dies described are of sectional construction so that they can be readily adjusted to shape or flange sections of various lengths, by merely taking out certain ones of the intermediate sections and replacing them by others of different lengths, or a different number of intermediate sections. The wearing portions may also be readily replaced or renewed as often as desired without dismantling the entire die and can be replaced by other die shaping members designed to give a different configuration or a different shape of flange to the section. The manner of building up the dies also enables them to be very accurately constructed so as to produce absolutely uniform shaped and flanged sections.

It is also obvious that the construction of dies described can be adapted to shape and flange articles of different forms and kinds.

What I claim is:—

1. A die comprising end sections and one or more changeable intermediate sections having working surfaces matching those of the end sections, said sections being each provided with flanging die members, a base plate, and an interlocking guide member extending longitudinally of the die and engaging registering grooves in the base plate and in the back faces of the end and intermediate sections.

2. A die comprising end sections and one or more changeable intermediate sections, said sections being provided with curved inner working faces arranged to hold the sheet being operated upon, said sections also being each provided with flanging die members arranged to form a continuous flanging die member peripherally of said die, and a base plate to which all of said sections are secured.

3. A die comprising end sections and one or more changeable intermediate sections, said end sections being provided with inner seats, inside members lying in said seats and having shaped surfaces arranged to act upon the central portion of the sheet, and flanging die members on said end and intermediate die sections arranged to form a flange on the edge of the sheet.

4. A die comprising end sections and one or more changeable intermediate sections, each of said sections being provided with a central web portion and wall portions forming a seat, inner members in said seats hav-

ing curved faces arranged to engage the central portion of the sheet, and flanging die members secured to said sections and matching each other and arranged to form a flange on the edge of the sheet.

5. A die comprising end sections and one or more changeable intermediate sections, each of said sections being provided with a central web portion and wall portions forming a seat, inner members in said seats having curved faces arranged to engage the central portion of the sheet, and flanging die members secured to said sections and matching each other and arranged to form a flange on the edge of the sheet, a base plate, and an interlocking guide member engaging registering grooves in the base plate and die sections.

6. A die comprising end sections, and one or more changeable intermediate sections, said sections being provided with a central web portion and wall portions forming a seat, yielding inner members having shaped surfaces to act on the central portion of the sheet and lying in said seat, and flanging die members secured to said sections and to said inner member.

7. A die comprising end sections and one or more changeable intermediate sections, each of said sections being provided with a central web portion and wall portions forming a seat, inner members in said seats having curved faces arranged to engage the central portion of the sheet, and flanging die members secured to said sections and matching each other and arranged to form a flange on the edge of the sheet, and die members carried by said end sections for flanging the edges of holes through the sheet being operated upon.

8. A die comprising end sections and one or more changeable intermediate sections, each of said sections being provided with a central web portion and wall portions forming a seat, inner members in said seats having curved faces arranged to engage the central portion of the sheet, and flanging die members secured to said sections and matching each other and arranged to form a flange on the edge of the sheet, male die members carried by said die sections and arranged to flange the edges of holes through the sheet, and a yielding stripper ring slidable on the shank of said male die member.

In testimony whereof, I have hereunto set my hand.

CHARLES SONNEBORN.

Witnesses:
ELBERT L. HYDE,
WILLIAM B. WHARTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."