

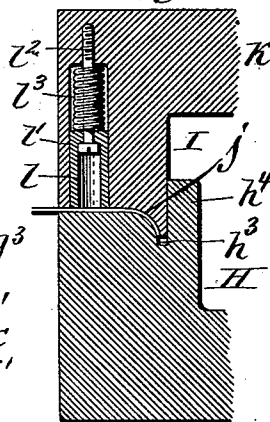
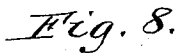
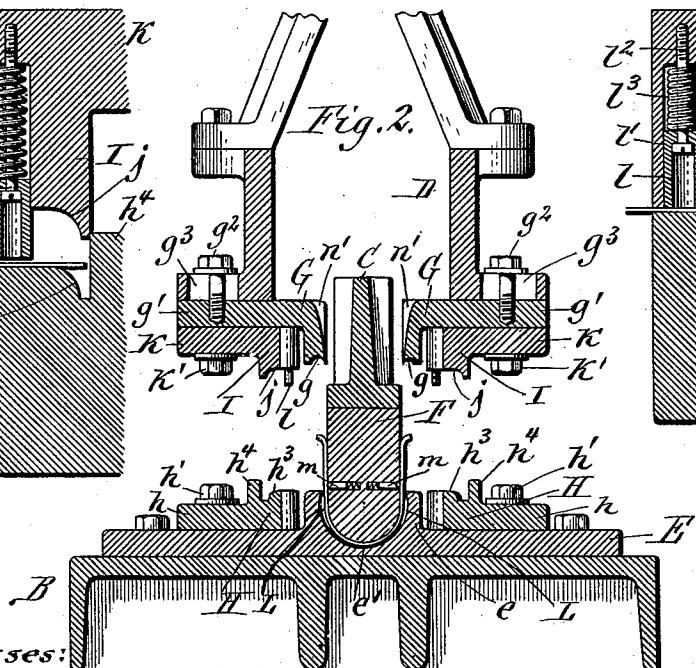
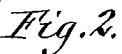
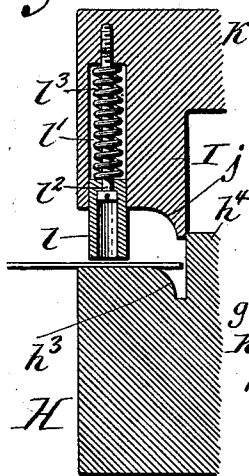
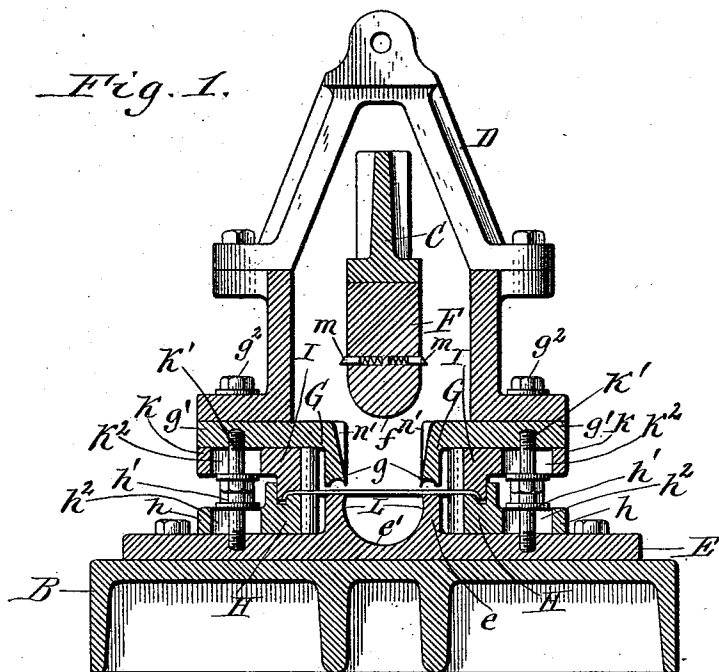
(No Model.)

2 Sheets—Sheet 1.

F. A. JUERGENS.
GUTTER FORMING MACHINE.

No. 530,275.

Patented Dec. 4, 1894.



Witnesses:

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(No Model.)

2 Sheets—Sheet 2.

F. A. JUERGENS.
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Fig. 3.

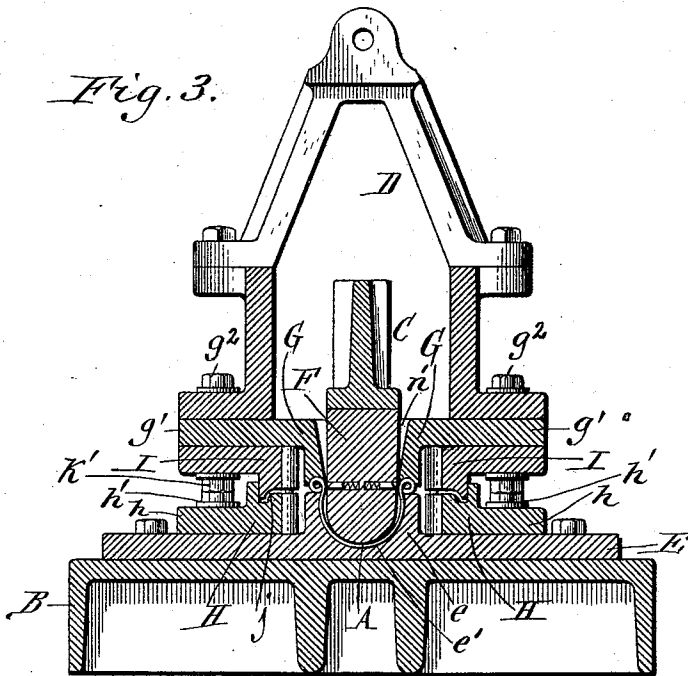


Fig. 4.

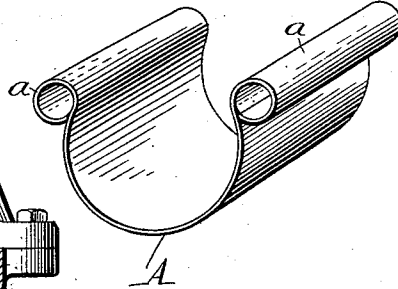


Fig. 5.

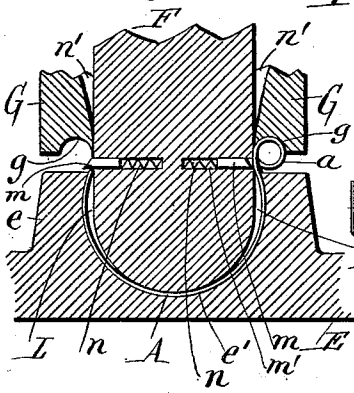
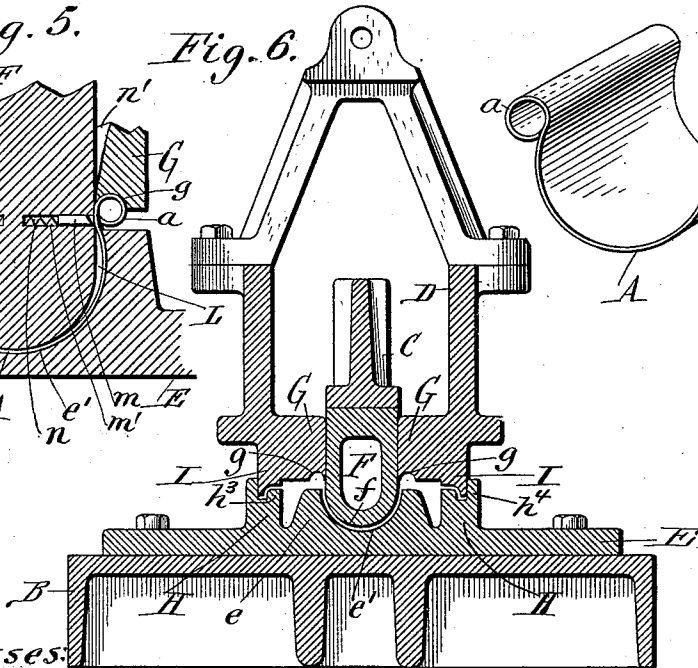


Fig. 6.



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UNITED STATES PATENT OFFICE.

FREDERICK A. JUERGENS, OF BUFFALO, NEW YORK, ASSIGNOR TO THE
NIAGARA STAMPING AND TOOL COMPANY, OF SAME PLACE.

GUTTER-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 530,275, dated December 4, 1894.

Application filed May 18, 1894. Serial No. 511,657. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. JUERGENS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Gutter-Forming Machines, of which the following is a specification.

This invention relates to a machine for making sheet metal gutters with a bead on one or both of its longitudinal edges.

The object of my invention is to produce a simple and reliable machine for this purpose.

In the accompanying drawings consisting of two sheets:—Figure 1 is a transverse sectional elevation of my improved gutter forming machine, showing the position of the parts while effecting the preliminary bending of the longitudinal edges of the gutter blank. Fig. 2 is a similar view, showing the position of the parts, while forming the gutter blank into the shape of a trough. Fig. 3 is a similar view, showing the position of the parts while curling the beads on the longitudinal edges of the gutter. Fig. 4 is a perspective view of a finished gutter having two beads. Fig. 5 is a fragmentary transverse section, on an enlarged scale, of the trough forming die and punch and connecting parts showing the manner of making a gutter with a bead on only one of its longitudinal sides. Fig. 6 is a vertical cross section, showing a modification of my invention. Fig. 7 is a fragmentary cross section, on an enlarged scale, of the blank holding or clamping device, showing the same in its inoperative position. Fig. 8 is a similar view showing the blank holding device in operation.

Like letters of reference refer to like parts in the several figures.

The sheet metal gutter which my machine is designed to make consists of a trough shaped body A provided on one or both of its longitudinal edges with a bead *a*, as represented in Figs. 3, 4 and 5.

B represents the bed or table of the machine and C, D, are inner and outer cross heads arranged above the table and capable of vertical movement independent of each other in any ordinary or well known manner.

E represents a die plate secured upon the

table and provided centrally on its upper side with a forming die *e* having a concave face *e'*.

F represents a forming punch secured to the inner cross head C and provided on its under side with a convex face *f* which is adapted to operate in conjunction with the concave face *e'* of the forming die for bending the sheet metal blank into the form of a trough.

G G represent curling or beading punches arranged on opposite sides of the forming punch and provided on their under sides with concave curling or beading faces *g* which are adapted to engage with the marginal portions of the blank and curl the same into the form of cylindrical beads. The beading punches are provided with outwardly projecting flanges *g'* which are secured to the under side of the outer cross head by bolts *g²*, passing through transverse slots *g³* formed in flanges on the outer cross head as represented in Fig. 2.

H I represent preliminary bending dies and punches which co-operate with each other for bending the longitudinal marginal portions of the sheet metal blank to enable the beading punches to properly curl the beads on the blank. A pair of these bending dies and punches are arranged on each side of the forming die and punch. Each bending die is provided with an outwardly projecting flange *h* and is adjustably secured to the top of the die plate by bolts *h'* passing through the slots *h²* formed transversely in the flanges *h*, as represented in Fig. 1. Each of the bending dies is provided on its upper side with a convex bending face *h³* and a guide rib or flange *h⁴* along the outer side of the bending face. The bending punches are arranged above the bending dies and provided on their under sides with concave bending faces *j* which co-operate with the convex faces of the bending dies. The bending punches are provided with outwardly projecting flanges K and are adjustably secured to the under sides of the flanges of the beading punches by bolts K' passing through transverse slots K² formed in the flanges of the bending punches, as represented in Fig. 1.

While the bending, beading and forming

punches are elevated a rectangular blank of sheet metal is placed with its longitudinal marginal portions on the convex faces of the bending dies and is held against lateral displacement thereon by the guide ribs. The outer cross head is next lowered so that the preliminary bending punches press the marginal portions of the blank against the faces of the bending dies, thereby bending the same into a curve, as represented in Fig. 1, after which operation the outer cross head and the punches connected therewith are raised. The forming punch is now lowered thereby pressing the central portion of the blank downwardly into the forming die and carrying the marginal portions of the blank upwardly against opposite sides of the forming punch so that the blank assumes the form of a trough, as represented in Fig. 2. While the forming punch is still in its lowered position the outer cross head is again lowered, which causes the beading punches to engage with the bent marginal portions of the blank and curl the same into the form of beads as shown in Fig. 3, after which the inner and outer cross heads are both raised, thereby permitting the finished gutter to be removed from the forming die.

l represents movable holding or clamping heads which are adapted to bear upon the blank and prevent its central portion from buckling or bending upwardly during the operation of bending its edges. These heads are arranged between the beading and bending punches and are guided in vertical sockets l' formed in the inner portions of the bending punches. The downward movement of the holding heads is limited by screws l^2 and they are normally held below the faces of the bending punches by springs l^3 arranged in the sockets.

When the holding heads are projected in to their normal inoperative position they are arranged a sufficient distance below the faces of the bending punches to cause the heads in their descent with the bending punch to bear upon the blank and hold the same against the bending die before the bending punch bears upon the blank. After the holding heads bear upon the blank their further descent is arrested and the bending punches continue their downward movement independent of the holding heads, thereby bending the edges of the blank without buckling its central portion upwardly.

It has been found in practice that large sized gutters have a tendency to spring apart somewhat after being removed from the forming die owing to straining of the sheet metal in forming the trough. In order to prevent this the face of the forming die is provided on opposite sides with undercut recesses or enlargements L , into which the body portion of the gutter is forced by the downward pressure which is exerted upon the blank during the operation of curling the beads. This causes the resilience of the sides of the gutter

as they are bulged outwardly into the recesses L to be destroyed so that they have no further tendency to spring apart after they are removed from the forming die.

The machine may also be used for forming gutters having a bead on only one of its longitudinal sides, in which case the blank is proportionately narrower. When making single bead gutters the plain or unbeaded side of the body is forced into the undercut recess in one side of the folding die by means of a laterally projecting stop bolt m which is arranged to slide in a socket m' formed transversely in the forming punch and bears against the plain edge of the blank, as represented in Fig. 5. This bolt is yieldingly held in an outward position by a spring n arranged in said socket and is provided at its outer end with an inclined face which is adapted to engage against the adjacent beading punch during the upward movement of the forming punch between the beading dies, thereby forcing the bolt into its socket. Both sides of the forming punch are preferably provided with stop bolts, so as to permit of forming a single bead on the gutter by either of the beading punches. When the forming punch is elevated the stop bolts are projected and overhang the beading punches. During the downward movement of the forming punch the stop bolts engage against inclined faces n' on the adjacent inner sides of the beading punches, whereby the bolts are forced into the sockets to clear the beading punches. When both edges of the gutter are to be beaded the stop bolts on opposite sides of the forming punch are both forced into their sockets by the marginal portions of the blank as they are folded against the sides of the forming punch.

As represented in Figs. 1, 2, and 3 the preliminary bending dies and punches and the beading punches are capable of lateral adjustment which enables gutters of different sizes to be made on the same machine by simply changing the forming die and punch and then adjusting the beading punches and the bending dies and punches with reference to the forming die and punch. In the modified construction represented in Fig. 6 the bending dies and the beading and bending punches are not adjustable but are fixed, which construction permits of making but one size of gutter.

I claim as my invention—

1. The combination with the forming die and punch whereby the body of the blank is stamped into form, of a curling punch arranged adjacent to the forming die and punch and provided with a concave face which engages with the edge of the blank and curls the same into cylindrical form, substantially as set forth.

2. The combination with the forming punch having a convex face, of a forming die having a concave face provided in its side wall with an undercut portion adapted to receive

the side of the gutter body, and a curling or beading punch arranged adjacent to the forming die and punch and adapted to operate upon the edge of the body, substantially as set forth.

3. The combination with the forming punch provided with a stop, adapted to engage against the edge of the blank, of a forming die having an undercut face and a beading punch arranged adjacent to the forming punch and die, substantially as set forth.

4. The combination with the forming die provided with an undercut face, of a forming punch having a socket in its side, a stop bolt arranged to slide in said socket, a spring arranged in said socket and adapted to project said bolt beyond the side of the forming punch, and a beading punch arranged adjacent to the forming punch, substantially as set forth.

5. The combination with the curling punch having a concave face which engages with the edge of the blank and curls the same into cylindrical form, of a forming die and punch arranged on one side of the curling punch and engaging with the body of the blank for

stamping the same into form, and a preliminary bending die and punch arranged on the opposite side of the curling punch and engaging with the marginal portion of the blank for bending the same preparatory to curling it, substantially as set forth.

6. The combination with the forming die and punch, of a beading punch, a preliminary bending die having a convex face and a guide rib on one side of said face and a preliminary bending punch provided with a concave face, substantially as set forth.

7. The combination with the forming die and punch, of beading punches arranged on opposite sides of the forming punch preliminary bending dies arranged on opposite sides of the forming die and preliminary bending punches arranged on the outer sides of the beading punches, substantially as set forth.

Witness my hand this 20th day of April, 1894.

FREDERICK A. JUERGENS.

Witnesses:

GEO. A. LANTZ,

THEO. L. POPP.