C. A. ELIGH.

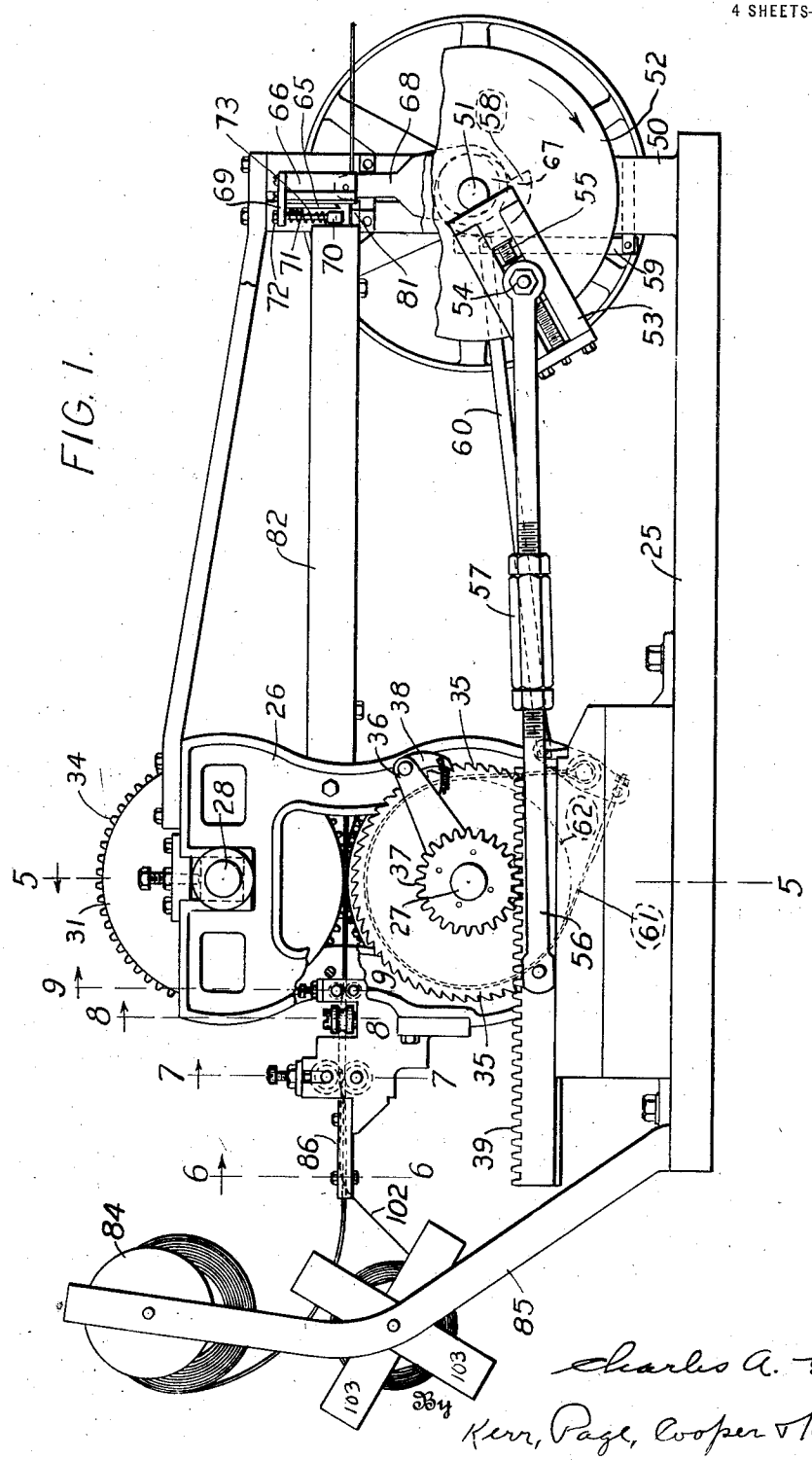
MACHINE FOR AUTOMATICALLY EDGING, PERFORATING, AND CUTTING OFF STRIPS OF METAL.

APPLICATION FILED DEC. 5, 1916.

1,379,005. **Patented May 24, 1921.**

4 SHEETS—SHEET 1.

FIG. 1.



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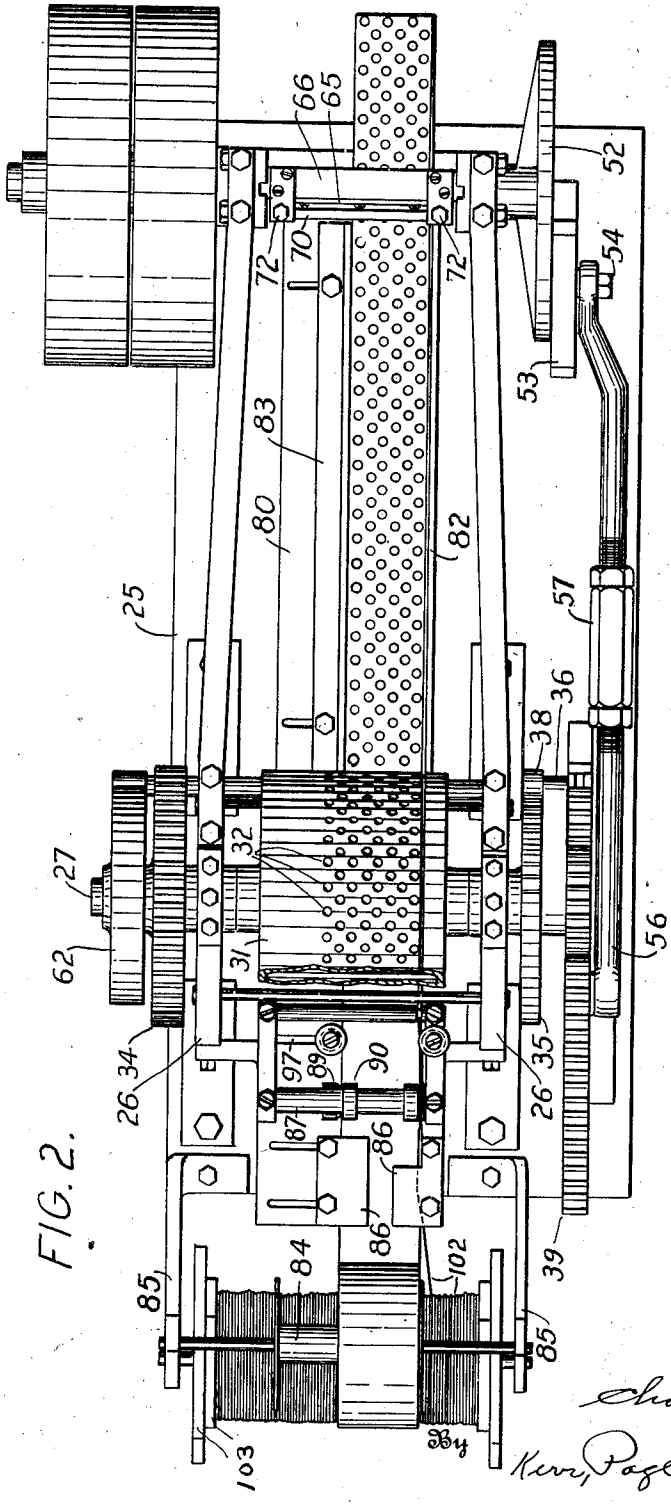

FIG. 2.

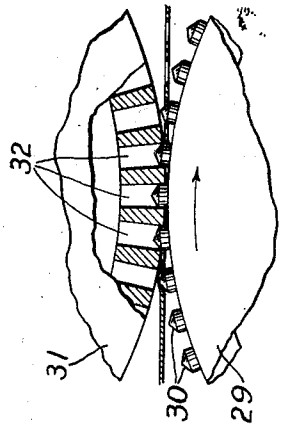

FIG. 3.

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4 SHEETS—SHEET 3.

FIG. 4.

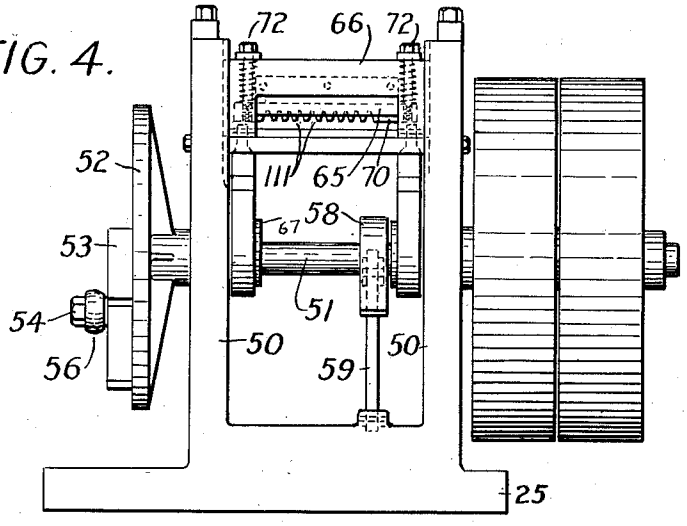
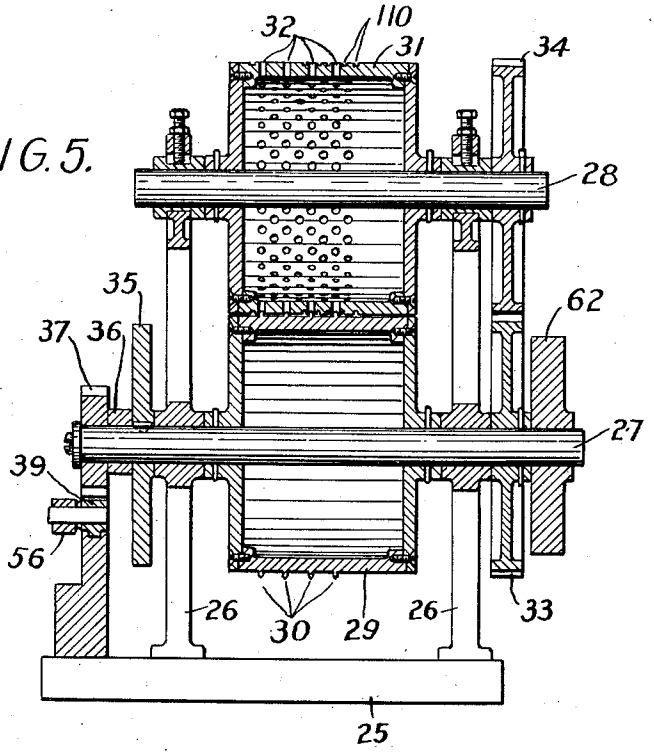


FIG. 5.



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4 SHEETS—SHEET 4.

FIG. 6.

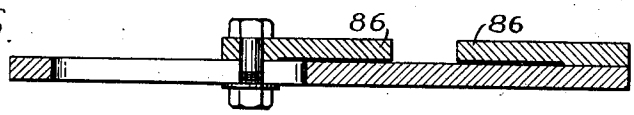


FIG. 7.

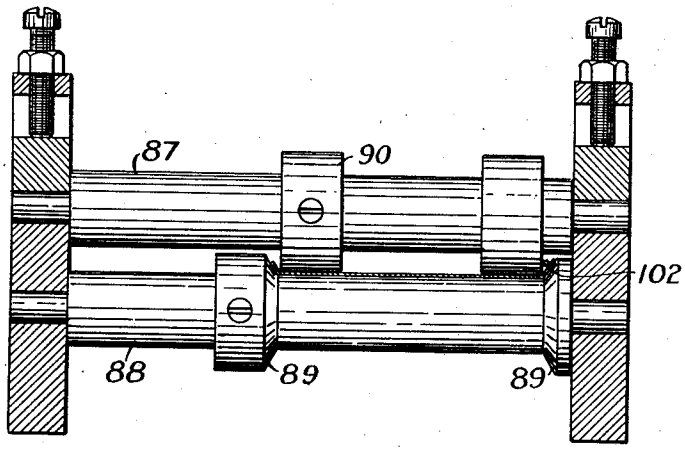


FIG. 8.

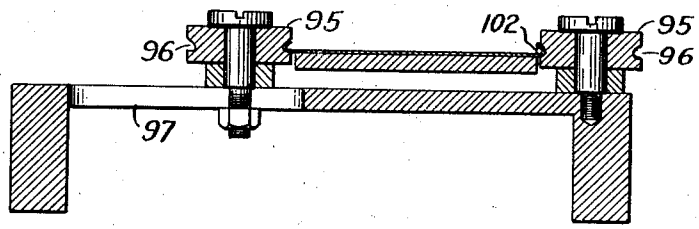
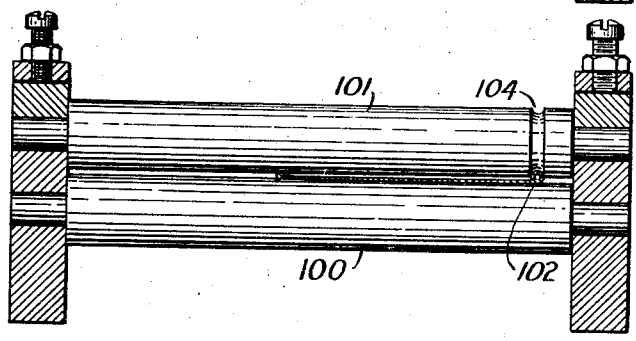


FIG. 9.



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UNITED STATES PATENT OFFICE.

CHARLES A. ELIGH, OF DETROIT, MICHIGAN, ASSIGNOR TO LONG MANUFACTURING COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

MACHINE FOR AUTOMATICALLY EDGING, PERFORATING, AND CUTTING OFF STRIPS OF METAL.

1,379,005. Specification of Letters Patent. Patented May 24, 1921.

Application filed December 5, 1916. Serial No. 135,102.

To all whom it may concern:

Be it known that I, CHARLES A. ELIGH, a citizen of the United States, residing at Detroit, Wayne county, Michigan, have invented certain new and useful Improvements in Machines for Automatically Edging, Perforating, and Cutting Off Strips of Metal, of which the following is a full, clear, and exact description.

While my invention is adaptable to a variety of purposes I have shown it as applied to the manufacture of fins for automobile radiators. The device here disclosed consists of a machine, on one end of which is mounted a coil of thin narrow sheet metal and a coil of wire. The metal is drawn through a series of bending rolls whereby one edge of the strip is folded over and rolled down flat, while the other edge is folded around wire drawn from the coil. After the edges are thus strengthened the metal passes between rotating die-members and is perforated. These die-members are in fact the means by which the metal is carried through the machine, and as the perforating punches pass through and remain in the metal while the die-members rotate through a substantial arc, and as some of the punches are always in the metal, the metal is positively propelled; *i. e.*, much as though the metal were a rack and the punches teeth of a driving gear. The die-members rotate intermittently and between periods of rotation, while the metal is stationary, a shear blade cuts off the protruding end, thereby completing a fin. Means are provided for running out a predetermined length of metal between strokes of the shear and adjustments are provided for centering the perforations, so there will be the same distance between the last holes and each end of the fin. The positive feed afforded by the perforating mechanism enables the edges to be folded and one of them wired with but a few operations, and it insures uniformity of the fins as to length, notwithstanding the numerous operations performed on the metal as it traverses the machine.

In the accompanying drawings,

Figure 1 is a side elevation of my fin making machine, and

Fig. 2 is a plan thereof.

Fig. 3 is a fragmentary view of the perforating mechanism.

Fig. 4 is an elevation of the pulley end of the machine, and

Fig. 5 is a sectional end elevation on line 5—5 of Fig. 1.

Fig. 6 is a fragmental section on line 6—6, Fig. 1.

Fig. 7 is a fragmental section on line 7—7, Fig. 1.

Fig. 8 is a fragmental section on line 8—8, Fig. 1.

Fig. 9 is a fragmentary section on line 9—9, Fig. 1.

Similar numerals refer to like parts in the several views.

Referring to the drawings, 25 is a base on which are journaled shafts 27 and 28 (Fig. 5). Shaft 27 has rigidly secured to it a drum 29 which is studded with punches 30. A drum 31 is rigidly secured to shaft 28, this drum having apertures 32 adapted to register with and receive the punches 30 as the drums rotate, the two drums therefore constituting respectively the male and female members of a rotary perforating die. The drums are compelled to rotate at a uniform velocity ratio by a pair of timing gears 33 and 34 secured respectively to shafts 27 and 28. Outside but next to one of the frames 26 a ratchet wheel 35 is rigidly secured to shaft 27, and next to this wheel an arm 36 is loosely mounted on the shaft. A pinion 37 is rigidly attached to arm 36 and adapted to rotate on the shaft in unison with the arm. The arm carries a pawl 38 which engages the teeth of the ratchet wheel. A rack 39 mounted in a suitable guide carried by the base 25, meshes with the pinion, and as the rack is reciprocated the dies are rotated intermittently by the pawl and ratchet wheel.

At a suitable distance from the frames 26 a pair of uprights 50 are mounted on the base 25, in which is journaled a shaft 51. This shaft is adapted to rotate constantly, and is equipped with the ordinary tight and loose pulley for belt driving. Outside of one upright 50 the shaft carries a rigidly attached disk 52. On one side of this disk and extending radially is a guide frame 53 in which a wrist pin 54 is arranged to move radially, a screw 55 serving to move it and to hold it in the required position. A pitman 56 connects the wrist pin to the rack. The length of the pitman may be varied by means

of a turnbuckle 57 intermediate its ends. A cam 58 mounted on shaft 51 engages the free end of a lever 59, which is pivotally attached to the base 25, and through a connecting rod 60 operates a band brake 61 (Fig. 1), the brake band encircling a brake wheel 62 rigidly attached to shaft 27. A shear blade 65 is carried by a frame 66 which is arranged to reciprocate vertically in guides formed in uprights 50. This frame is reciprocated by eccentrics 67 on shaft 51 and pitmen 68. Means (not shown) is provided for adjusting the position of the eccentrics on the shaft so the movements of the shear blade will be properly timed with reference to the movements of other parts. Two laterally extending arms 69 attached to the frame carry a pressure bar 70, the attachment of the bar consisting of two rods 71 fixed to the bar and extending upward through apertures in the arms 69, with nuts 72 screwed on their upper ends. Springs 73 encircling the rods and confined between the arms 69 and bar 70 enable the bar to maintain a yielding pressure for a purpose hereinafter set forth.

A table 80 connects and is supported by frames 26 and uprights 50 and at one end of this table is secured the stationary shear blade 81. One edge of the table is stiffened by a flange 82, between which and an adjustable guide 83 the strip of metal is carried from the perforating dies to the shears, where it is cut to lengths. The sheet metal is supplied from a reel 84 carried by uprights 85, and after passing through guides 86 (see also Fig. 6) the metal passes between a pair of rolls, 87—88, which turn both edges upward. These rolls are so well illustrated in Fig. 7 that but little need be said of them except that one of the beveled flanges 89 is made adjustable on the roll 88 to accommodate metal of different widths. In like manner the flange 90 is adjustable on the roll 87. The metal next passes between rolls 95 (see Fig. 8). Each of these rolls has a groove 96 through which the turned up edge of the metal passes and whereby the edge is turned over so as to overhang the body of the sheet, as shown in Fig. 8. One of these rolls is movable in a slot 97 for adjustment. The metal next passes between rolls 100 and 101 whereby the edges are rolled down to final position (see Fig. 9). A wire 102 from reel 103 passes one of the guides 86 and as will be seen in Figs. 7, 8 and 9 this wire is gradually inclosed in the turned over edge. Roll 101 has a groove 104 which accommodates the wired edge and at the same time rolls it down closely around the wire.

The operation of the machine is almost obvious from the foregoing description. Figs. 1 and 2 show the perforated metal passing through the machine. The disk 52 rotates in the direction shown by an arrow in Fig. 1 and the dies are therefore rotating. Their rotation will continue until the wrist pin 54 reaches "dead center" which it has nearly reached in this figure. After passing "dead center" the rack will move in the reverse direction and the pawl 38 will pass idly over the teeth of the ratchet wheel. The timing is such that the brake comes into action after the wrist reaches "dead center," and stops the rotation of the die members. Then the pressure bar 70 is brought down on the metal a little in advance of the shear blade and as the frame 66 continues to descend the springs yield, their pressure being exerted to hold the bar down on the metal, which is thus firmly pressed against the table. While so held the shear blade descends and cuts off the protruding end of the metal. As seen in Fig. 3 there are always several of the punches in the metal and the metal is therefore propelled positively, preventing slipping of the metal and consequent inequality in the lengths of metal cut off which might occur were the metal moved by friction. The importance of this positive drive for the metal may be appreciated when it is remembered that the edge forming devices tend considerably to retard the metal. Operating the pawl arm 36 by a rack and pinion has the advantage that there is practically no limit to the distance the dies may be rotated; they may be rotated a whole revolution, or even more, if desired. This could not be done were the pitman connected directly to the arm 36. By means of the adjustable wrist pin fins of any desired length may be made and the turnbuckle in the pitman permits the shearing to be done at any desired point, say midway between two rows of holes. It will be noted that the female die-member 31 has several concentric grooves 110. These are to accommodate the wired edge, so that the punches can pass through the metal and enter the holes 32 without being excessively long. Notches 111 in the pressure bar 70 are to enable the bar to rest on the body of the metal, the wired edge entering one of the notches.

While I have shown the preferred embodiment of my invention it is to be understood that I do not limit myself to the exact structural details shown, as various changes might be made without departing from the spirit or exceeding the scope of my claims.

What I claim is as follows:

1. A machine for punching and forming sheet metal, comprising a pair of rotary work advancing die members, one of said members being studded with punches and the other correspondingly apertured for engagement by said punches, means for intermittently driving said rotary members in

accurately timed relation, a shearing blade, and means for actuating the same during the intermissions of rest of said die members.

2. A machine for forming and punching sheet metal, comprising a pair of rotary work-advancing die members, one of said members being studded with punches and the other correspondingly apertured for engagement by said punches, means for driving said rotary members in accurately timed relation, edge-forming means engageable with the work in advance of said rotary members, and means for cutting the work into predetermined lengths.

3. A machine for punching and forming sheet metal, comprising a pair of rotary work advancing die members, one of said members being studded with punches and the other correspondingly apertured for engagement by said punches, means for driving said rotary members intermittently and in accurately timed relation, and means for varying the intermittent angular advance of the rotary members.

4. A machine for punching and forming sheet metal, comprising a pair of rotary work-advancing die members, one of said members being studded with punches and the other correspondingly apertured for engagement by said punches, a rack and pinion drive mechanism for said rotary members, means for reciprocating said rack and means for varying the stroke of the rack, pawl and ratchet means for driving the rotary members intermittently in a constant direction from said rack and pinion mechanism, and means for shearing the work during the intermissions of rest of said rotary members.

5. A machine for punching and forming sheet metal, comprising a pair of rotary work advancing die members, one of said members being studded with punches and the other correspondingly apertured for engagement by said punches, a step by step drive mechanism for intermittently rotating the work advancing members in a constant direction, means for varying the rotative feed of said members and means for shearing the work during the intermissions of rest of said members.

In testimony whereof I affix my signature in the presence of two subscribing witnesses.

CHARLES A. ELIGH.

Witnesses:
J. VERNON KEMP,
J. LESTER DRYDEN.