J. Waugh.

Shearing Metal.

No. 28,027. Patented Apr. 24, 1860.

Fig: 1.

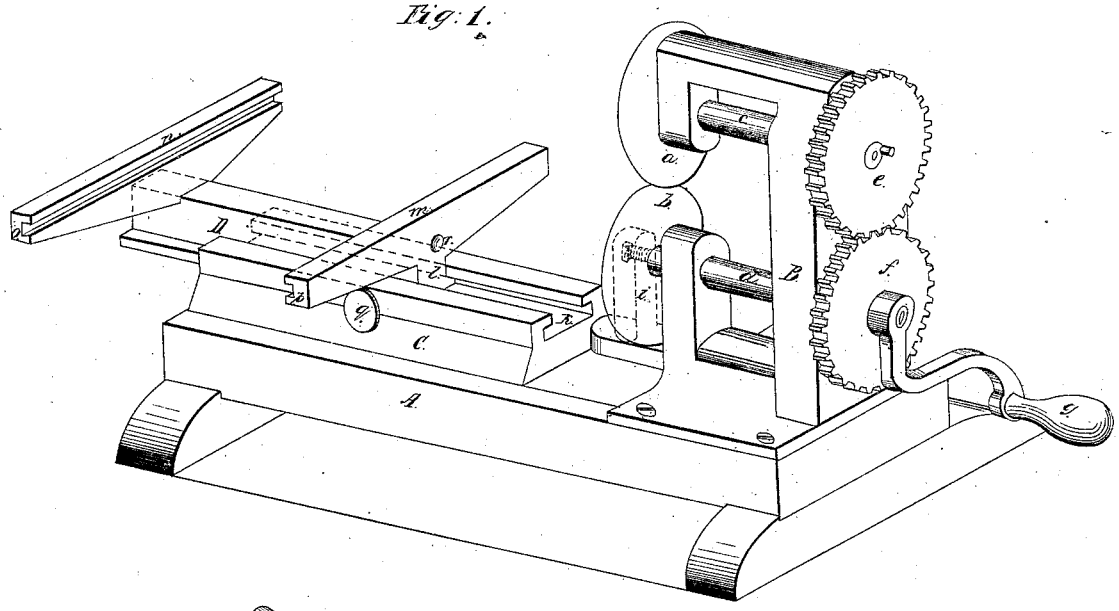


Fig: 2.

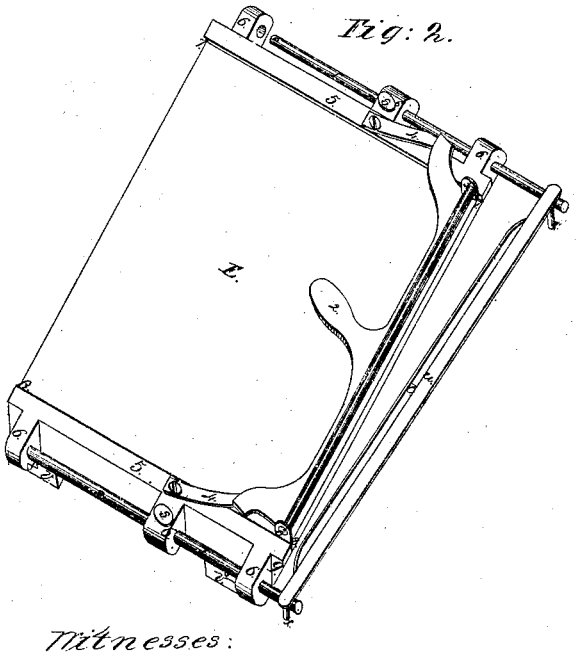
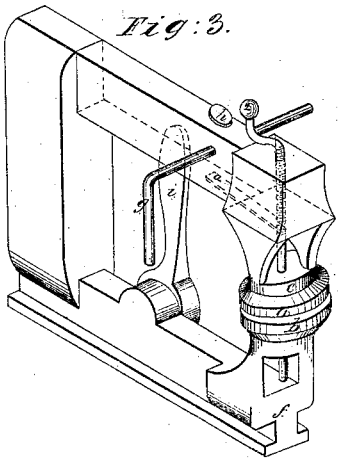


Fig: 3.



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JOHN WAUGH, OF ELMIRA, NEW YORK.

MACHINE FOR CUTTING SHEET METAL.

Specification of Letters Patent No. 28,027, dated April 24, 1860.

To all whom it may concern:

Be it known that I, JOHN WAUGH, of Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Machines for Cutting Sheet-Tin and other Sheet Metals; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification.

On the bed-plate A, Figure 1, is bolted, or otherwise firmly secured, the shears-head, B, having its rotary disk-shears, *a*, *b*, shafts, *c*, *d*, gearing, *e*, *f*, and winch, *g*, hung and arranged as delineated. The pressure with which these shears are made to contract at their cutting point, is regulated by the set screw, *h*, working in the standard, *i*, and against the center of the disk, *b*.

The way, C, having the groove or channel, K, cut through its length is permanently attached to the bed-plate, with one of its ends near to the shear-head, being so disposed, that a vertical plane passing through the cutting point of the shears, would cut the bottom surface of the groove, in a line running longitudinally along its middle, and parallel to the sides of the bed-plate. This groove is the means of combining, severally, the sheet-head, Fig. 2, and the rotary clamp-head Fig. 3 with the shears-head, according as it may be required to cut sheets, segments of circles, strips or bevels; or to cut circular sheets, respectively. But I do not limit myself to using the connecting groove in a separate but attachable piece, for such a groove may be made in the bed-plate A when this has received the proper modification to allow of the groove being disposed in the manner just indicated for the way, C.

The sheet-head carriage, D, Fig. 1, is formed of two cheeks or side pieces, *m*, *n*, joined to the flanged base-rail, *l*, so as to be at right angles to it, and therefore parallel to each other. On the inner side of each cheek a groove is cut at the same height above the base-rail, and parallel to the bed-plate A, as shown at *o*, *p*. The base-rail is made conformable to, and freely movable, but without shake, within the groove K; so that by simply inserting it into this groove, the sheet-head when attached to this carriage, can be readily combined with the shears-head; and as readily disconnected from said head by withdrawing this rail from the groove.

Fig. 2, is a perspective view of my improved sheet-head, in detail, E, being the table on which the sheets are firmly held by the clamp, 2, hinged at the eyes (3) and actuated by the springs (4).

The end pieces (5) each carrying three perforated lugs (6), rise sufficiently above the plane of the table to form the narrow ledges, (7, 7) (8, 8),—it being against the latter that the sheets are abutted, when necessary. These ledges are truly squared to the sides (7, 8), which are themselves parallel to each other, that near the clamp being beveled from the under to the upper surface of the table as shown at 9. The gage rods, *r*, which may be graduated into inches and parts, are carried by the perforated lugs, and in which they are retained by the set screws, (S). The gage plate formed of a flat plate, *t*, permanently fixed on a connecting bar, *u*, can be attached to these rods, by inserting on the holes made in them for the purpose, the pins (X) with which the ends of the connecting bar are furnished. The tongued rails (*v*) serve to connect the sheet-head with its carriage, and to operate it with the shears-head.

The rotary clamp-head, Fig. 3, is of very simple construction. The clamp is formed by two circular plates, *a*, *b*, the free end of the stem of plate, *a*, terminating in a pivot, at a short distance above a narrow groove worked around the stem. After being passed through its guide, *e*, this stem is engaged at the groove, by the forked end of a spring, *d*, secured by the other end to the upper part of the clamp-head, the tension of the spring always keeping the pivot in contact with the cavity made for it in the lower end of the hand screw, *e*, whether the screw itself be run up or down. The stem of the clamp plate, *b*, likewise terminates in a pivot, which is supported by a step on the base-rail, *f*. By depressing the screw, the clamp plate, *a*, can be brought into contact with the plate, *b*, but both plates may be easily rotated about their common axis.

The flanged base rail, *f*, which sustains the clamp, and other parts of the clamp-head, is like the base-rail, *l*, Fig. 1, adapted by form and dimension, to the groove, *k*, of

the piece C, same figure; and consequently, to combine easily and readily the clamp-head with the shear-head, in a way similar to that already described for combining the sheet and shears-heads, by means of the said groove. The bent rod, *g*, Fig. 3 is intended to regulate the position of the sheet in the clamp when to be cut to a given diameter, being secured to its place by the set screw, *h*. The lever, *i*, may be used in conjunction with the set screw, *q*, Fig. 1, to give the clamp-head greater steadiness; and a similar lever can be employed for the same purpose, on the carriage, D.

To cut circular plates, or sheets, the clamp-head Fig. 3, is connected with the shears-head by inserting its base rail, *f*, into the groove, K, Fig. 1, the sheet to be cut being adjusted between the clamp plates, by eye, or by the gage rod, *g*, Fig. 3, and clamped by means of the screw, *e*. The clamp-head is then brought up properly to the shears and fixed in this position by the lever, *i*, Fig. 3, or by the set screw *q* Fig. 1, or by both, and the sheet rotated against the shears with one hand while the winch, *g*, Fig. 1, is turned by the other. Parts of a circle may be cut on sheets by a similar operation.

To square, size and cut metallic sheets, to cut strips, bevels, &c., &c., the sheet head must be used in the following manner, premising, however, that it may be attached to its carriage either before or after this shall be placed on the bed-plate; and, that in either case, the attachment is made by inserting the tongues of the rails (*v*) Fig. 2, of the sheet-head, into the grooves, *o*, *p*, Fig. 1, of the carriage, and in such manner that the clamping side of the head will be next to the rotary shears. The rail *f*, Fig. 1, having been introduced into the groove, K, the carriage is moved toward the shears-head till it abuts against and engages the head of the screw, *h*, by means of the cavity, *r*, made in the cheek, *m*, whereto it is secured by clamping with the set screw, *q*,—thus attaining the requisite position and stability for the proper working of its sheet head. The sheet head being now, so far drawn out, that the metallic sheet to be squared, could not touch the shears,—the clamp, 2, Fig. 2, is raised, and the sheet placed on the table, E, with one of its edges, or sides as they are sometimes termed, in close contact with the ledge, 8, 8, Fig. 2,—the edge to be removed, projecting beyond the side of the table toward the shears; but only so far however, that the cutting may be done with the least possible waste of metal. The clamp, being released, and confining the sheet to the table at every point near the line of cutting,—the sheet-head is steadily toward the shears which are at the same time being rotated; and the sheet is cut, having a new edge square to that in contact with the ledge 8, 8. Other oblique sides of the sheet are removed in the same manner.

To cut a squared sheet into strips of a given breadth, the sheet with this breadth marked on its off-edge, must be clamped on the table so that its near edge may be in close contact with the ledge 8, 8, the edge toward the shears lying near or along the beveled side of the table (9). The sheet-head is then pushed into its carriage until the cutting point of the shears is in line with the off-edge of the metallic sheet, when, the clamp being raised, the sheet is pushed to the right-hand till the breadth-mark on said off-edge reaches the cutting point of the shears, its near edge, being kept during the motion of the sheet in close contact with said ledge, and then clamped in this position. The gage-rods, *r*, are now drawn out so that their ends project a little beyond the shears, when the gage-plate is passed between the shafts, *e*, *d*, Fig. 1, and its pins, *a*, Fig. 2, inserted into the end pin holes of the rods. The plate, *t*, being brought up evenly against the projecting edge of the sheet, the rods are clamped by the screws, *s*, the gage plate is adjusted for the given breadth, and the strip is cut from the sheet by pushing the sheet against the rotary shears, as in the case of squaring. This single adjustment will serve to cut any number of sheets rapidly, into strips of the same gage, all that is necessary for this, after cutting off the first strip being to draw back the sheet-head, unclamp the sheet, push it with the new edge against the gage-plate, clamp and cut off strip, repeating this series of operations as long as the sheet-metal lasts.

If the gage-rods were graduated, the cutting point of the shears might be taken as a starting point, beyond which the end pin holes of the rods could be pushed, till the divisions marked on the rods and coinciding with the said starting point should be equal to the width of strip required. The rods could then be clamped, the gage-plate applied, and the cutting of strips effected as before. Segments of circles, also, may be rapidly cut from circular sheets by adjusting the gage-plate to the required width of segment, and proceeding as in the cutting of strips.

When it is required to cut sheets into halves, or to cut very wide strips, it will be found preferable to apply the gage-plate close to the left side 7, 8, Fig. 2, of the sheet-head, and to bind it there by clamping the gage-rods, with which it must be connected. The sheet however must first be squared, by resting it on the top edge of the gage-plate, bringing its near-side edge against the ledge, 8, 8, clamping the end to be

squared, in the manner already pointed out for squaring sheets, and then cutting. The sheet is now turned over, the new edge is pushed close against the gage plate (without however confining the near side of the sheet to the ledge 8, 8,), then clamped and cut. But this mode of gaging can be used, only when the distance of the left side of the table, from the cutting point is equal to that of the cutting point from the inner surface of the back of the shears-head frame. When, however, the former distance is the greater, the gage-plate connected with the rods, may be fixed on the surface of the table parallel to, and at such a distance from the side of the table, that the cutting point of the shears shall be midway it and said surface. Lastly, for very broad strips, the gage plate, connected with the rods, may be fixed on the table parallel to the sides thereof, at a distance from the cutting point equal to the given width of strip; and sheets, previously squared, abutted against it and cut into strips as before.

To cut bevels, the sheet-head is pushed forward till the ledge 8, 8, lines with the cutting point of the shears, or as close to this as the near gage rod, when drawn out, will permit. The gage rods are then drawn out toward the shears, the near rod first so much so, as that the near end of the gage-plate, *t*, Fig. 2 will nearly, but not quite touch the shears, if said gage were arranged in the desired line of bevel; and the off-rod sufficiently beyond the shears, to allow of connection with the gage plate, so arranged. The rods are then set by the screws, *s*, Fig. 2, the gage-plate passed between the shafts *e*, *d*, Fig. 1, and attached to the rods by means of its pins. The relative positions of rods and gage, when arranged for bevels is shown, generally, in Fig. 2. The sheet-head is now drawn back again, the sheet to be cut into bevels, being placed on the table, E, is pushed toward the gage till its projecting edge contacts at every point with the plate, *t*, with its near angular point coincident with the near end of said plate, and then clamped. The first bevel being cut away and the sheet-head drawn back, the sheet is turned over on the table, with the newly cut edge toward the shears, arranged in reference to the gage-plate as at first, and again cut. By observing to turn the sheet after cutting away a bevel, the sheet will be cut into bevels of the size, and figure, and, without any waste.

It must be particularly observed, that when the length of the back or extension bar, *u*, of the gage-plate, does not exceed that of the sheet-head, it is only by the spring of the off rod, *r*, Fig. 2, that the gage-plate can be connected with it, in the manner just described for cutting bevels; and, that consequently the pieces cut from the sheet will have but a limited bevel. To cut the pieces with a bevel exceeding this limit, it is required that the bar, *u*, should have its off-end lengthened out, so that it may be easily connected with the off-rod, for the greatest bevels ordinarily required, and this without springing this rod, and also to adapt a sliding and adjustable, instead of a fixed, pin to work on this longer end, somewhat after the manner of the sliding leg of a beam compass. The gage-plate constructed with such a bar and pin, will then be applicable to the gaging of any of the usual bevels.

Having thus described the construction and operation of my improvements on machines for cutting sheet tin, and other sheet metals, I will now briefly notice some results that are obtained by their use, viz.—that by my clamping of the metallic sheet near to and along the whole extent of the line to be cut, a straight-line cut is insured, instead of the wave-line cut which so frequently attends the old manner of clamping; that by the use of my sheet-head, and its gage-plate, gage-rods and carriage in combination with the rotary shears-head, a sheet can be squared, or can be sized and cut at one handling; that after making but a single adjustment proper for the particular case, and which consumes but very little time, sheets can be cut, without waste, into halves, strips, and bevels, respectively uniform in figure and size, with a rapidity that has never till now been attained; and finally, that by using my simple means of combination, I can replace the sheet-head by the rotary clamp head as constructed for this end, and thereby use the same rotary shears-head for cutting circular sheets that is used with my sheet-head for squaring sheets, and cutting strips, bevels and segments.

The machine "for cutting sheet-metal," embodying these, my improvements, will consequently produce its effects in a cheaper, more expeditious, and—with regard to the accuracy and identity of those of the same class—in a far more reliable and better manner, than can be done by any single machine hitherto contrived for the same purposes. Besides this, its simplicity and compactness, reduces the cost of construction so much, that it can be afforded at a price that will be within the means of every worker in sheet metal.

I am aware that rotary shears have been used for cutting sheet metal; and that rotary clamps, also, have been employed in cutting circular sheets, and therefore, I do not claim them; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The sheet-head, Fig. 2, composed of the table E, with its tongued rails (*v*) and pieces (5), carrying the perforated lugs (6); the gage rods (*r*), the clamp 2, with its springs

(4) and the gage-plate (t, u) when constructed and arranged substantially as herein described.

2. The combination of the rotary-clamp head, Fig. 3, and of the said sheet-head connected with its carriage D, Fig. 1 severally, with the groove, k, and rotary-shears-head, B—when they are arranged as herein described.

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