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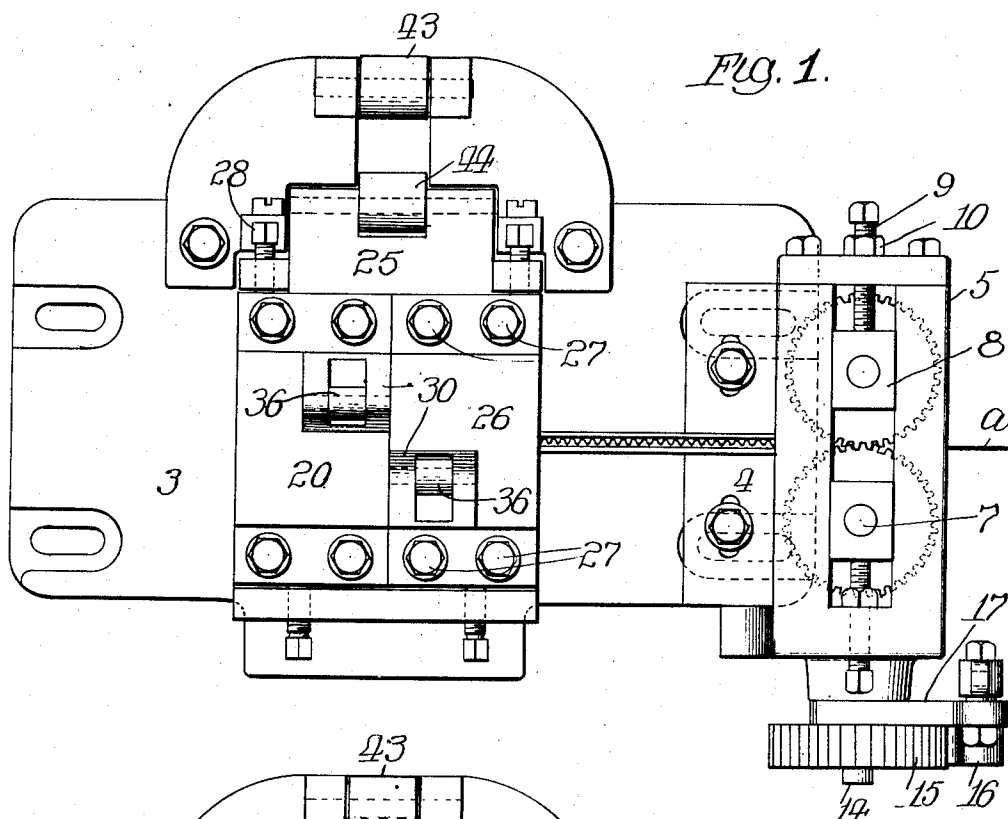
PATENTED JULY 9, 1907.

E. S. NORTON.

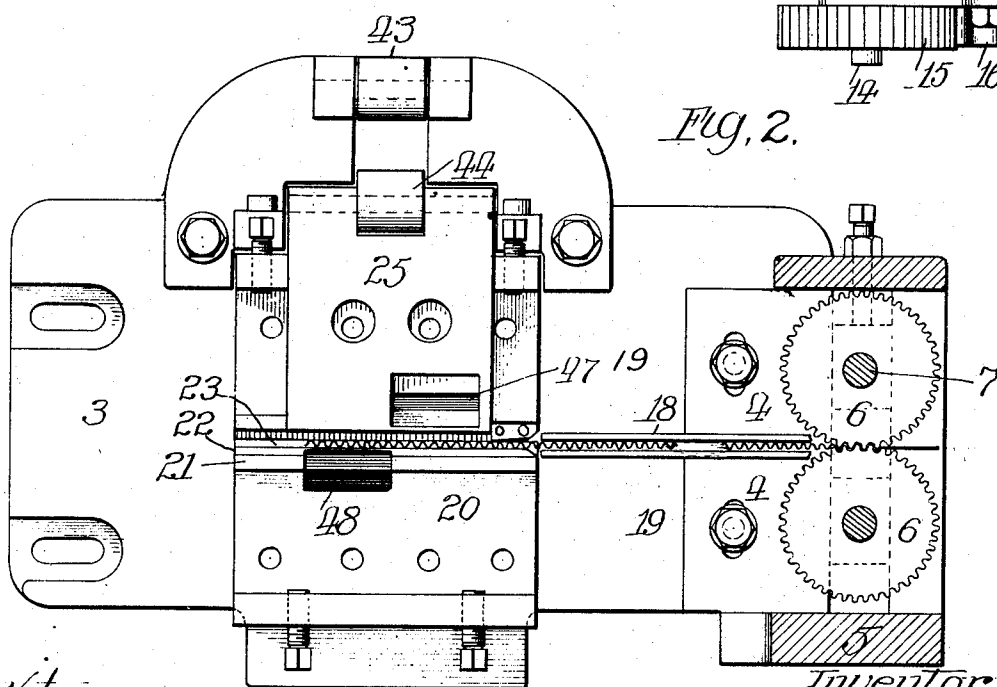
## METHOD OF MAKING CORRUGATED METAL FASTENERS.

APPLIOATION FILED AUG. 14, 1906.

2 SHEETS—SHEET 1.



*Fig. 2.*



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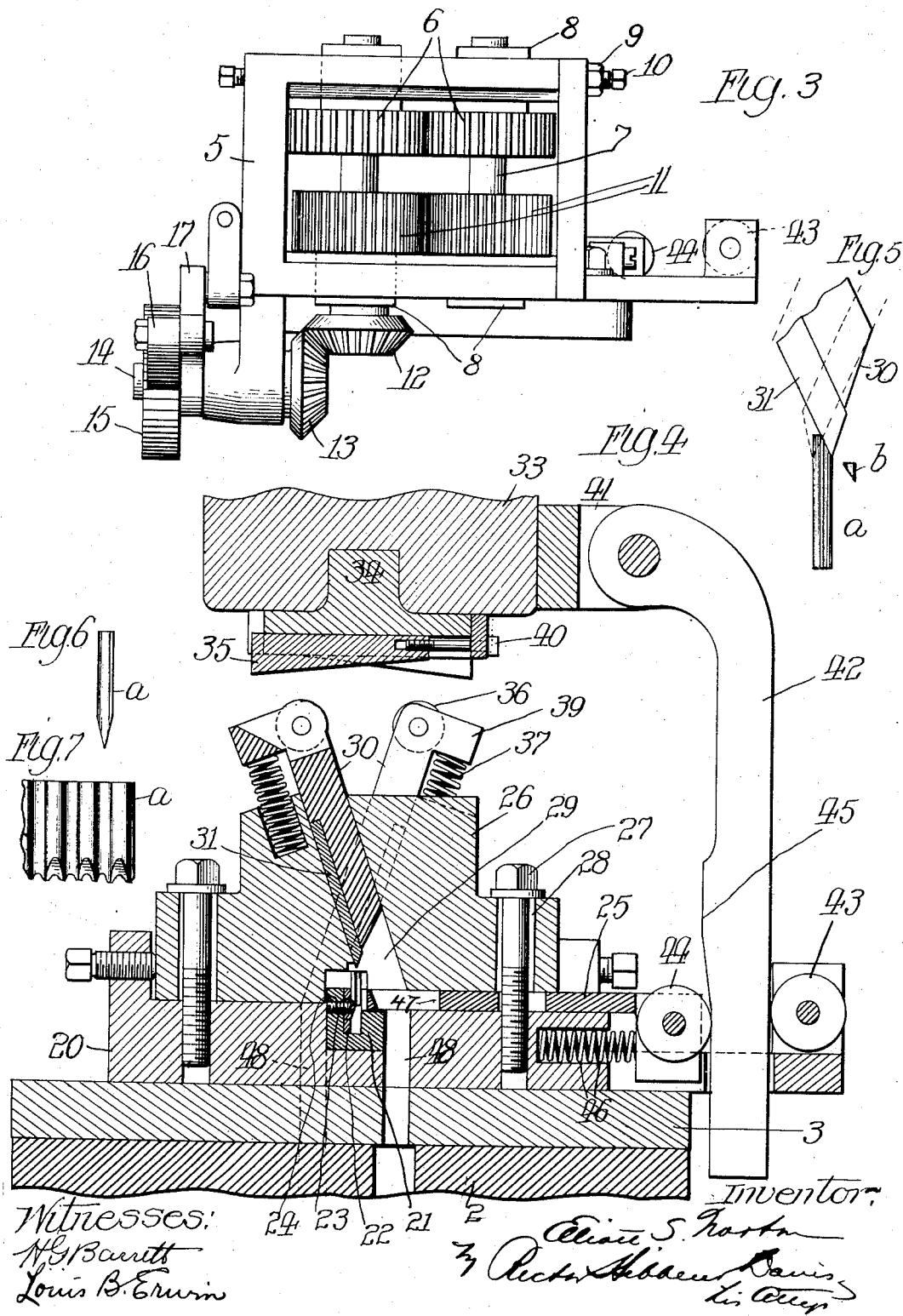
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METHOD OF MAKING CORRUGATED METAL FASTENERS.

APPLICATION FILED AUG. 14, 1906.

2 SHEETS—SHEET 2.



# UNITED STATES PATENT OFFICE.

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## METHOD OF MAKING CORRUGATED METAL FASTENERS.

No. 859,686.

Specification of Letters Patent.

Patented July 9, 1907.

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*To all whom it may concern:*

Be it known that I, ELLIOTT S. NORTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of Making Corrugated Metal Fasteners, of which the following is a specification.

The present invention relates to the manufacture of corrugated metal fasteners with edges beveled after corrugation so as to produce a series of short entering edges or points sharpened by bevels on both sides of the strip and intervening reentrant U-shaped edges sharpened alternately by a single bevel on one side or the other of the strip. The prior art discloses a metal fastener of this general character, but the article has not gone into general use notwithstanding the advantages theoretically possessed over the previous form of corrugated metal fastener having a continuous sharpened edge produced prior to corrugation. It is obvious that a corrugated metal fastener whose sharpened edge is subdivided into short sections with intervening U or V-shaped portions can be successfully employed in many connections where said previous form of corrugated metal fastener is impracticable, as for example where two pieces of soft wood are to be united making a draw cut necessary to avoid breaking down of fibers. This is one of many instances which will suggest themselves where it would be entirely impracticable to attempt to drive a metal fastener having an extended continuous acting edge. On the other hand, it is obviously entirely practicable in all such instances to drive a fastener whose acting edge presents a series of short sections adapted to enter the wood or other material as readily as the points of staples and whose intervening U or V-shaped portions supply draw-cutting edges.

The object of the present invention is to overcome certain practical difficulties in the commercial production of this desirable form of corrugated metal fastener. It is obvious that the beveling of a corrugated strip on opposite sides along the acting edge will produce the staple-like formation desired, but a problem has heretofore existed as to a method of beveling which will turn out the product in a satisfactory condition at a non prohibitive cost. The usual methods of sharpening, such as grinding and the like, when applied to a corrugated metal strip are productive of burs in the U-shaped portions and wire edges which must be removed before the fastener is fit for use. The successful removal of these objectionable burs and wire edges requires a rather nice operation necessarily pursued by hand. This would obviously be prohibitive of successful marketing when it is considered that an article such as this, used in such low-grade work *e. g.* as the making of pack-

ing boxes, must be turned out in large quantities by automatic machinery, requiring little if any further treatment, in order to be profitable.

The present invention accomplishes the desideratum by providing a method whereby a single cutting operation on each side of the corrugated strip of metal serves to produce the desired contour and character of acting edge on said strip. The invention further provides means whereby such a method can be successfully carried out, the strip being first corrugated and then suitably clamped while cutting tools operate first on one side and then on the other removing at a single stroke the metal of the strip between the ridges of the corrugations and the median longitudinal line thereof at the acting edge, the cut being of course taken diagonally of the strip with reference to the thickness thereof.

The accompanying drawings illustrate an apparatus for carrying out the invention, Figure 1 representing the same in top plan view with the press head removed; Fig. 2 being a somewhat similar view with the tool heads and cutting tools removed; Fig. 3 representing part of the apparatus in end elevation; Fig. 4 representing the apparatus in cross section and Figs. 5, 6 and 7 being views of the product turned out by this apparatus.

In these drawings similar reference symbols denote corresponding parts in the different views and the numeral 2 designates the upper part of a standard supporting a bed plate 3, above which are mounted the working parts with which the present invention is more especially concerned. At one end of this bed plate there is secured by suitable flanges and adjustment slots and bolts 4, a frame 5, within which a pair of corrugating rolls 6 are journaled. These rolls are horizontal and secured to spindles 7 supported in bearing blocks 8 which occupy slideways in the top and bottom of the frame 5 and are adjustable therein through the medium of screws 9 and lock-nuts 10. Spur gears 11 secured to said spindles and meshing with each other serve to transmit motion between the two corrugating rollers and one of the spindles carries at its extended lower end a bevel gear 12 meshing with a similar gear 13 on a short shaft 14 journaled in a bearing depending from the frame 5, as shown in Fig. 3. A ratchet wheel 15 secured on the outer end of this shaft and a pawl 16 on an arm 17 turning loosely on the shaft serve to intermittently turn the shaft and the gears for the purpose of feeding and corrugating the metal strip *a* which passes between the rolls 6. The pawl may be swung back and forth at regular intervals through any suitable driving connections applied to the arm 17, the operation being of course timed so that the strip will be fed between cuts. After issuing from the corrugat-

ing rollers the strip passes between guides 18 secured to the bed plate 4 by suitable base flanges 19 and conducting the corrugated strip to the cutting tools.

At about the middle of the bed plate a block 20 is secured across its top and this block is channeled in the line of the strip feed to accommodate a bar 21 which is itself channeled longitudinally from end to end in the line of the guideway leading from the corrugating rolls, which guideway delivers the corrugated strip into the channel of the bar, as clearly illustrated in Fig. 2. To one side of the said channel there is detachably secured an elongated plate 22 of hardened metal shouldered longitudinally to provide a horizontal ledge or shelf 23, preferably beveled on its under side as shown in Fig. 4. The corrugated strip is conducted over this ledge or shelf which forms a back-stop for the same during the cutting operations. The said plate of hardened metal is held in place by screws 24 and may be removed and replaced by a similar plate whenever necessary in order to accommodate a different width of corrugated strip, the ledge or shelf of the substituted plate being at a different elevation from that of the removed plate. That portion of the bar 21 at the side of this channel opposite that to which the said hardened plate is secured does not rise to the height of the latter but terminates on a plane below the ledge or shelf and over this part of said bar a horizontally disposed clamp 25 slides. Said clamp is in the form of a rectangular plate occupying a guideway in the block 20 and is designed to be forced against the corrugated strip where the latter rests upon the shelf or ledge 23, said corrugated strip being thereby held securely in position during the cutting operation, with its upper portion projecting above the clamp and the shouldered plate as clearly shown in Fig. 4.

The block 20 is flanged at opposite sides and between the flanges are mounted a pair of tool heads 26 side by side, the same being held down by bolts 27 passing loosely through openings 28 in the flanges of the block 20. Each of the tool heads has extending through it from top to bottom an inclined tool guideway 29, that in one tool head extending reversely to that in the other so that they occupy intersecting planes as illustrated in Fig. 4. Both tool heads are recessed in the lower side to accommodate the portion of the bar 21 projecting above the block 20 and also the portion of the corrugating strip projecting above said bar and the disposition of the tool guideways 29 is such that the intersecting line of the planes in which their inner sides lie runs directly over a median line of the upper edge of the corrugated strip. Tool holders 30 occupy the guideways 29 respectively and are adapted to reciprocate therein, each holder carrying a tool in the form of a cutting blade 31 whose edge is normally coincident with the before mentioned line of intersection of planes of the guideways. Thus the cutting tools stand ready to enter the edge of the corrugated strip practically at the median line thereof to cut angularly through the strip to the ridges of the corrugations thereof, thereby removing from each corrugation a slug b such as illustrated in Fig. 5. The cutting tools are preferably arranged in tandem as above explained, so that they do not act upon the same length of the strip while the latter is clamped in one position but one tool

acts upon such length of the strip while the other tool is acting upon the following length of the strip, of course at the opposite side thereof from that upon which the front tool is acting. Upon the next advance of the strip the length of the same already acted upon by the rear tool is presented for the action of the front tool and thereafter the strip will of course be acted upon on both sides so that the product turned out will be a corrugated metal fastener strip double beveled, as illustrated in Fig. 6.

The above described mode of beveling the strip entirely obviates the difficulty encountered in grinding operations, viz., that of producing burs and wire edges, for it will be seen that each cutting tool makes a clean slice through the edge and sides of the corrugated strip, removing from each corrugation thereof simply a single slug as distinguished from grinding away of the metal with the waste product in comminuted condition. Thus the desired form of metal fastener can be produced by a single cutting operation on each side and a product turned out requiring no further operations upon it to make it fit for use. When the strip leaves such a machine as that above described it only needs to be cut into the desired lengths. So far as the penetrating edge is concerned that is complete.

The means here shown for reciprocating the cutting tools and advancing the clamp in proper time comprises a press-head 33 carrying a holder 34 for a pair of adjustable bearing blocks 35, with inclined lower faces for contact with rollers 36 in the upper ends of the tool holders 30. The latter are normally elevated by spiral springs 37 occupying recesses in the heads 26 and bearing against lateral lugs or flanges 39 of said holders. The bearing blocks 35 are arranged to slide cross-wise of the holder 34 under the action of adjusting screws 40 in a flange of the latter and these bearing blocks are arranged with their inclined lower sides reversibly disposed for proper cooperation with the rollers 36. It will be seen that the adjustment of these blocks may be availed of to compensate for any wear. The downward pressure of their inclined under faces against the rollers 36 of course operates to force the holders 30 and their cutting plates 31 downward through the guideways 29 and thus effect the beveling of the corrugated strip in the manner already described.

The press-head 33 carries a bracket 41 in which is pivoted the upper end of a bar 42 extending at its lower end between rollers 43 and 44, one in a projecting bracket of the block 20 and the other in the outer end of the clamp plate 25. The inner side of this depending bar 42 is formed with a cam-rise 45, so that when the bar moves downwardly with the press-head the clamp plate will be thrust inwardly by the action of the cam-rise against the roller 44. A spiral spring 46 occupying a recess in the block 20 and bearing against the depending portion of the clamp plate tends to thrust the latter outwardly.

The block 20 and the clamp plate are formed with suitable openings 47, 48, for the escape of the slugs cut from the corrugated strips and the inner side of the opening in the clamp plate is preferably beveled as shown in Fig. 4 to facilitate the escape of the slugs and prevent their lodging between the clamp and the

strip. The bevel on the under side of the shoulder of the plate 22, heretofore mentioned, prevents such slugs remaining so lodged upon this plate as to obstruct the clamp in its movement toward the corrugated strip. It will be remembered in this connection that the ledge 23 does not extend the full thickness of the corrugated strip. Slugs which may lodge between the clamp and the uncut portion of the strip will pass under the latter and into the channel of the bar 21, said channel being wide enough to provide considerable space between one side and the shoulder plate 22, as clearly shown in Fig. 4.

Of course, it is to be understood that the apparatus here shown is simply an example of one form of means whereby the method or process of the present invention can be carried out. It will be obvious that other forms of apparatus may be employed to accomplish the same purpose.

What is claimed is:

1. The improved process of producing sharpened corrugated metal fasteners, the same consisting in bringing one longitudinal edge of a cross-corrugated metal strip to a series of short sharpened edges or points with intervening U-edges by a single operation on each side of the strip removing at one diagonal cut the metal of the strip between the ridge of each corrugation and a median line of the same and the neighboring reverse corrugation.

2. The improved process of producing sharpened corrugated metal fasteners, the same consisting in bringing one longitudinal edge of a cross-corrugated metal strip to a series of short sharpened edges or points with intervening U-edges by cutting through said longitudinal edge from a median line of the corrugations diagonally to the ridges of the latter at one operation removing a single slug from each corrugation.

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