S. C. CARY.

METHOD OF MAKING BANDS FROM SHEET METAL.

APPLICATION FILED DEC. 26, 1913.

1,131,037. Patented Mar. 9, 1915.

Fig. 1.

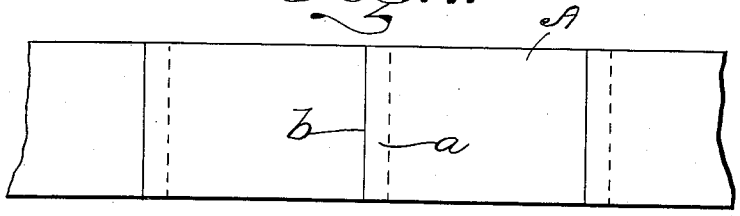


Fig. 2.

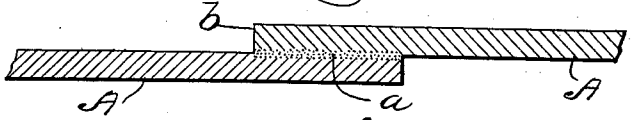


Fig. 3.

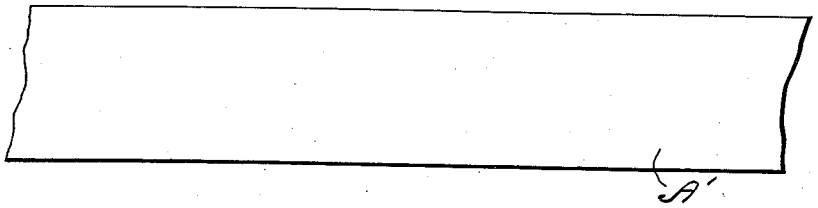


Fig. 4.

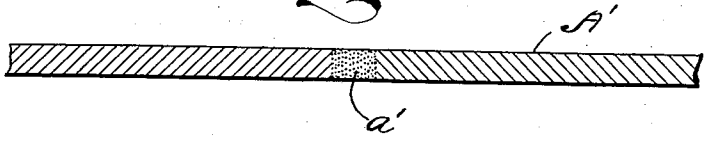


Fig. 5.

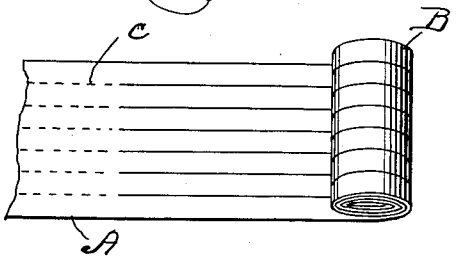
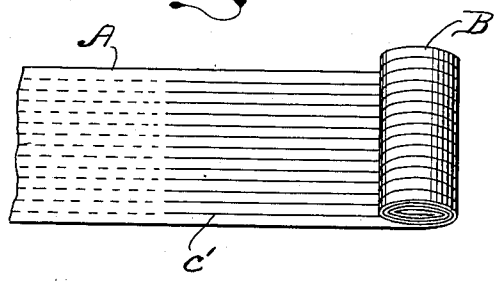


Fig. 6.



WITNESSES

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METHOD OF MAKING BANDS FROM SHEET METAL.

1,131,037. Specification of Letters Patent. Patented Mar. 9, 1915.

Application filed December 26, 1913. Serial No. 808,708.

To all whom it may concern:

Be it known that I, SPENCER C. CARY, a citizen of the United States, residing at the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Method of Making Bands from Sheet Metal, of which the following is a specification.

This invention is a method of making bands from sheet metal, the same being adapted for use in packaging or bundling merchandise, such, for example, as strapping for boxes, crates, shooks, and other inclosures, and adapted, also, as ties for bales of cotton, cloths and fabrics, and other material in bulk.

In the arts of making bale ties and box strapping, two methods are in vogue chiefly, one involving the operation of rolling metal in desired lengths and to the required gage or thickness and width, whereas the other method consists in cutting metal sheets into strips and uniting, by one means or another, as disclosed in previous patents granted to me, said cut strips in end to end order so as to result in a band possessing the necessary length, thickness and width. As frequently happens, the bands are used only once and thereafter thrown away, so that they must be produced and sold economically for commercial reasons. Bands produced by the first method, *i. e.* rolling the metal, are characterized by excessive gage or thickness for the reason that rolling appliances have not heretofore, and are not now, constructed and operated to roll the metal down to the thin gage or thickness suitable for strapping boxes, etc., such operations involving large expense. Furthermore, the rolled metal has been so thick, bulky and tough that, practically speaking, it is unsuitable for use as box strapping. It cannot be handled easily and nails can be driven through it only with difficulty. By reason of its comparative stiffness and toughness, the rolled metal is incapable of being coiled into a compact bundle, hence it has been and is now the practice to fold the metal into bundles of undue length, which renders the material difficult to handle. Furthermore, it cannot be bent with facility, and it cannot be nailed into position on a box or a crate only with difficulty because the rolled metal is so tough the nails will not penetrate it easily.

The second method, *i. e.* cutting metal sheets into strips and uniting the strips in end to end order, is now extensively practised, and for numerous commercial reasons, chief among which are that sheet metal of the required gage and ductility can readily be purchased in the open market, that the sheet metal is economical, and that it possesses the strength necessary to withstand the tensile strain and the ductility requisite for the nails to be driven easily through the same when used as box strapping. One method now used is disclosed in certain prior patents heretofore granted to me, involving the use of sheet metal wherein holes are punched adjacent to the edges of the sheets, rivets are inserted through the holes and headed, and the sheets cut into strips, the lines of the cut being intermediate the rows of rivets. While such a method is marked by numerous practical advantages over rolled metal bands, there are certain defects which it is the purpose of this invention to overcome. Chief among such objections is that the cut strips are not united by the rivets so strongly as to preclude the band or strap from pulling apart as when under excessive strain, practical experience having shown that the sectional band will, at certain times, pull apart at the riveted joint, thus in effect destroying, or at least impairing, the whole coil of strapping, it being customary at the present time to package the metal strapping by coiling three hundred feet or more, of such strapping into a compactly coiled bundle. Another objection is that the steps of punching the sheets, assembling the sheets so that the holes in one will register with the holes in another, inserting the rivets, and heading or upsetting the rivets to unite the sheets in end to end order, involve a series of operations requiring care, skill, time and labor, and require the use of special machinery, all of which tend to increase the cost of manufacture. Again, the holes must be punched and the rivets positioned at predetermined distances so that the united sheets can be cut only on certain lines to produce bands of a predetermined width, for it is manifestly impossible to cut through the rivets, whereas the requirements of the trade are for bands which vary in width, say one half ($\frac{1}{2}''$) of an inch, five-eighths ($\frac{5}{8}''$) of an inch, three-fourths ($\frac{3}{4}''$) of an inch, or any other fractional measurement. Obviously, the sheets united by rivets cannot be

cut lengthwise into strips the width of which may vary to suit a particular order or to meet certain trade requirements, but, on the contrary, the sheets under the old mode of procedure must be punched, riveted and cut into strips or bands the width of which must necessarily be determined in advance and which are suited to the capacity and adjustment of the special machinery employed.

The present invention simplifies the procedure and more economically produces bands or strapping from sheet metal, and results in a band or strap of superior quality. In this process, certain operations heretofore essential are omitted, thus saving time and labor; second, the joints between the sheets are as strong, if not stronger, than the metal in the sheets; and third, bands or straps of any desired width can be cut from the united sheets and without impairing the union between, or the attachment of, the individual sheets.

According to this invention, I employ metal sheets of suitable size and appropriate thickness, say about 27 gage, which sheets are united by electrically welding them so as to permanently join the sheets at or adjacent to their marginal edges. Subsequently the welded sheets are cut lengthwise and at predetermined intervals, the width between the cuts being made regardless of the union of the sheets, for the reason that the weld is continuous or unbroken, whereby bands of any desired width may be cut from the welded sheets in contradistinction to the prior operation of cutting the sheets into bands the width of which is determined by the spacing of the rivets. For handling the material to the best advantage subsequent to the operation of welding the sheets, it is preferred to coil the material into a compact bundle, it being practicable by this method to handle material the length of which may vary from 300 to 500 feet. When cutting the material produced by welding the sheets and coiling the same into the bundle, the coil is placed in a suitable machine and the latter is started so as to run the material through the machine, the material run off the coil being recoiled; but during the run of the material through the machine the sheets are cut lengthwise, the cuts being parallel and the cutters being positioned intermediate the original coil and the second coils. The material is cut on parallel lines and when the cut lengths are recoiled there results a series of coiled bands, each of a definite width, length and gage and composed of sections electrically welded so as to produce joints the strength of which is equal to or greater than the tensile strength of the metal itself.

In the art of producing narrow bands from metal sheets the margins of which are mechanically united by riveting them together, the operation of slitting the sheets lengthwise is performed by a series of cutters which operate on the sheets between the steps of unwinding and rewinding them, experience having shown that said cutters, particularly when they are more or less dull, have a tendency to draw on the metal, and thus result in more or less variation in the width of the narrow bands particularly at the riveted parts of the sheets, besides which the cutters tend to buckle or bend the narrow bands, all of which results not only in a variation in width but also in the production of rough edges upon the bands. My process involving the step of electrically welding the edge or marginal portions of the sheets prior to cutting and thereafter slitting or cutting the sheets lengthwise and across the welds not only secures the advantages hereinbefore set forth but results, also, in bands or straps which are uniform, for all practical purposes, in both gage and width, this result being due in a large measure to the fact that the united edge or marginal parts of the sheets are held or retained permanently and in fixed relation during the slitting or cutting operation. In addition to the specified advantages, it is apparent that no free edges are left at the welded joints between the pieces composing the band or strap, as has been the case heretofore, and thus when the welded part of the strap or band is bent around the corner of a packing case, shook, etc., the metal at the joint will not bend out of position so as to cut the hands of the workman. Furthermore, by reason of the uniformity in gage and width the band is useful in relations heretofore not available, *e. g.* in the buckles of bale ties and in automatic machinery where it is necessary that the band shall run freely through dies or other parts.

In the drawings: Figure 1 is a plan view showing a series of metal sheets welded electrically together. Fig. 2 is a longitudinal section on an enlarged scale illustrating graphically the electrically welded joint or seam between two overlapping sheets. Fig. 3 is a plan view on an enlarged scale showing one of the bands resulting from a butt weld between two sheets. Fig. 4 is a section taken longitudinally through the band of Fig. 3, the sheets from which band is cut having been butt-welded electrically. Figs. 5 and 6 are perspective views illustrating the operations of slitting the electrically welded sheets and recoiling the resulting narrow bands into a series of compact bundles or coils, the views illustrating the operations of slitting sheets of the same width into bands the width of which vary as desired.

In carrying the invention into practice I select sheets of metal possessing the required

flexibility or ductility consistent with tensile strength, it being preferred to employ sheet metal of about 27 gage. The size of the sheets, *i. e.* length and width, may vary. The first step is to assemble the metallic sheets A into such relation that the edge portions thereof are welded electrically, thus producing welds or joints *a* which are continuous. The character of the weld, *i. e.* whether lap weld or butt weld, is not essential. Thus, in Figs. 1 and 2, the sheets A are positioned in lapping relation at their adjacent edges, as at *b*, and the lapped edges are electrically welded by the flow of current so as to fuse or soften the metal and by the application of pressure to so unite the sheets by the weld *a* as to result in the adjacent sheets being joined in a manner to render them homogeneous. Again, the adjoining sheets may be positioned into close relation at their edges and by the application of electric heat and of pressure the sheets may be butt-welded at *a'* in Fig. 4, the sheets A being thus electrically welded so as to render them integral or substantially so for the reason that the metal along the adjacent edges of the sheets is fused and by applying pressure the fused metal is caused to flow and bridge the gap.

The welds uniting the sheets extend continuously across the sheets, and by the electrical welding process the welds are produced so perfectly that the sheets are united and can be cut through without perceptibly weakening the joint or weld.

A number of sheets having been electrically welded, they are wound into a compact coil, and the operation of welding other sheets in end to end order is continued until a bundle or coil of the desired length, say from 300 to 500 feet, is produced. The coiled bundle of sheets is now placed in a cutting machine, and the material is run through the machine, at which time the metal is cut into strips of any desired width, the metal is subjected to pressure in order to flatten it, the edges are trimmed, and the narrow strips are wound into compact coils B, see Figs. 5 and 6.

As the metal runs or is drawn through the cutting machine, the cutters operate to slit the metal along the dotted lines *c*, Figs. 5 and 6, the cutters being positioned for operation upon the metal sheets intermediate the wide original coil and the narrow coils B composed of the cut strips. During the slitting or cutting operation referred to, the metal sheets are held in rigid permanent relation to each other by the welded joints, and thus the tendency of the cutters to draw the metal when cutting across the welded joints between the sheets is effectually overcome, whereby bands or lengths are cut so as to be uniform in width. As shown in Fig. 5, the welded metal sheets are cut on parallel lines to produce comparatively wide strips and the cut strips are wound into coils B, but obviously the welded sheets may be cut into narrower strips, as shown in Fig. 6, which narrow strips are coiled as shown to produce compact bundles, it being apparent that the sheets may be cut into strips of any appropriate or suitable width and produce strips composed of welded lengths, for the reason that the welds permit the sheets to be cut at predetermined points intermediate the width, thus enabling the manufacturer after welding the sheets to cut the same into bands the width of which may vary to fill different orders or to suit different purposes.

The operation of slitting the sheets prior to rewinding the resulting strips deflects the metal along the lines of the cuts so as to buckle the metal, and produces, also, rough edges. Prior to rewinding the cut strip, the individual pieces of metal are subjected to pressure by passing the same through cooperating rolls whereby the buckling is eliminated and the strips are flattened, and, furthermore, the strips are trimmed along the side edges thereof by suitable rolls which remove the roughness from the edges, thus producing flattened strips with smooth edges which will not cut the hands of the operator when handling, nailing or bending the strip.

The procedure followed in the manufacture of straps or bands in accordance with my invention does not require subsequent operations upon the metal in order to produce bands or straps uniform in width, thus saving the time and labor necessary in some prior methods of milling or trimming the riveted strips to secure the desired uniformity in width. The metal is cut or slitted as herein described, thus producing more or less roughness along the edges and slight buckling of the metal, to remove which the cut metal is subjected to pressure by passing it between rolls, and the edges are trimmed; but it is to be distinctly understood that the specified rolling and trimming operations are not for the purpose of securing uniformity in width, nor are they necessary or requisite for such purpose.

As is well known by those skilled in the art, it is not unusual to emboss the metal strips used for strapping boxes, or other packages, nor to curl over the side edges of the metal, nor to incase wires in the curled over edges, such curling of the edges or incasing of the wires being for the twofold purpose of avoiding injury to the hands and for increasing the strength of the strapping. Obviously, my new band or strap may embody either or all of these common expedients, but as they are old in the art, I have not considered it necessary to illustrate the same.

In the manufacture of box strapping one

serious problem has been to unite the pieces so as to secure a strap which will not pull apart at the joint between the pieces, the same constituting what has been called the "weak point". Various prior devices have been devised to increase the strength of the connection between the pieces, such as by providing a tongue on one piece which overlaps and is riveted to the next piece, and this joint is strengthened by folding or curling the edges of the metal pieces into contact with the side edges of the tongues, the joint being further strengthened by extending the continuous wires across the line of division. My new strap is superior to these prior devices for the reason that the connection between the pieces is far stronger, besides which it is simpler in construction and more economical of manufacture in the particulars hereinbefore recited. It will be noted that the pieces of metal composing the strap are fused together by the electric welding of the sheets, and thus to all intents and purposes the band or strap is seamless or jointless, all the parts being integral. The union between the pieces composing the strap when made according to this invention is in fact stronger than the metal of the pieces themselves, particularly when the pieces are lap-welded as at *a* in Fig. 2

Another important advantage secured by my construction is that the transverse welds are continuous; thus leaving no free edges to catch and cut the hands of the operator in applying the strap or band, particularly when bending it around a packing case, shook, box or bale. Strapping heretofore made of separate pieces has always been riveted as has been explained, and when bent around a package, should the bend come at the riveted joint, the free transverse edges of the metal at the riveted joints will open or spread to a certain extent, thus exposing said free edges to such an extent as to cut and injure the operator's hands. All this is overcome in the new bands or straps produced by this invention.

It is to be understood that the bands or strips after cutting from the sheets are more or less irregular in two particulars, first, the edges are rough and the marginal portions are buckled or distorted. My invention eliminates these irregularities for the reason that the rough edges are smoothed down by passing the bands between the rolls, the latter operating to press or swage the rough edges, thus trimming them to produce smooth edges which will not cut the hands. By embossing the bands along the margins thereof the buckling or distortion is eliminated for the reason that the metal is taken up by the embossed or offset parts of the band. Accordingly, the bands are not only stronger, but they are subjected to such treatment as results in a superior article.

In addition to the advantages hereinbefore set forth, the bands or straps produced by my mode of procedure are characterized, for all practical purposes, by uniformity in the gage or thickness and in the width, for the reason that the welding operation eliminates the double thickness or two ply metal inherent in the old form of riveted joint and, further, the permanent relation to each other of the welded sheets during the slitting or cutting operation precludes any relative displacement of the sheets at the joints when the cutters act on the welded parts of the sheets. Manifestly, bands or straps uniform in gage and width are useful in many arts, more particularly as ties for bales and in machinery the part or parts of which require the free passage of the strap metal.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. The improvement in the art of making bands from metal sheets which consists in electrically welding the sheets at their adjacent edges, such weld extending continuously across the sheets, and cutting the sheets on parallel lines and across the welds between said sheets, the lines of cut being at predetermined intervals and irrespective of the condition of the union between said sheets.

2. The improvement in the art of making bands from sheet metal which consists in assembling sheets of predetermined size and gage in lapping contact at their contiguous edges, joining the sheets at the lapping edges by electrically heating the sheets and pressing them together, and cutting the sheets on predetermined lines and across the welds between the individual sheets.

3. The improvement in the art of making bands or straps from sheet metal which consists in assembling sheets of predetermined size and gage to bring the end edges thereof contiguous to each other, joining the sheets at said contiguous edges by electrically welding said edge portions and producing transverse joints or seams which extend continuously across the sheets and are free from outstanding rough edges, and cutting the sheets lengthwise and across the welded seams or joints between the connected sheets, said sheets being cut on a series of lines parallel to, and at predetermined intervals from, each other, thereby producing long narrow bands or straps characterized by an absence of free rough edges at the joints or welds.

4. The improvement in the art of making bands or straps from sheet metal which consists in electrically welding the metal sheets at their adjacent edge portions, thus producing a transverse and substantially flush seam between adjoining sheets, and subsequently

cutting the sheets lengthwise and across the welded seams to produce relatively narrow bands or straps substantially uniform in both width and gage, said sheets being retained by said transverse welds in predetermined fixed relation to each other during the operation of cutting through said welded portions of the sheets.

5. The improvement in the art of making narrow bands or straps from sheet metal which consists in uniting the edge portions of adjacent sheets by electrically welding the same to produce substantially flush seams which extend continuously and transversely with respect to the sheets, and subsequently cutting the sheets on predetermined lines, lengthwise thereof and across the welded seams, whereby the sheets are retained by the welded seams in predetermined fixed relation while cutting through the welded seams and the resulting bands or straps are substantially uniform in both gage and width.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SPENCER C. CARY.

Witnesses.

H. I. BERNHARD,

M. C. RODRIGUEZ.