

March 10, 1925.

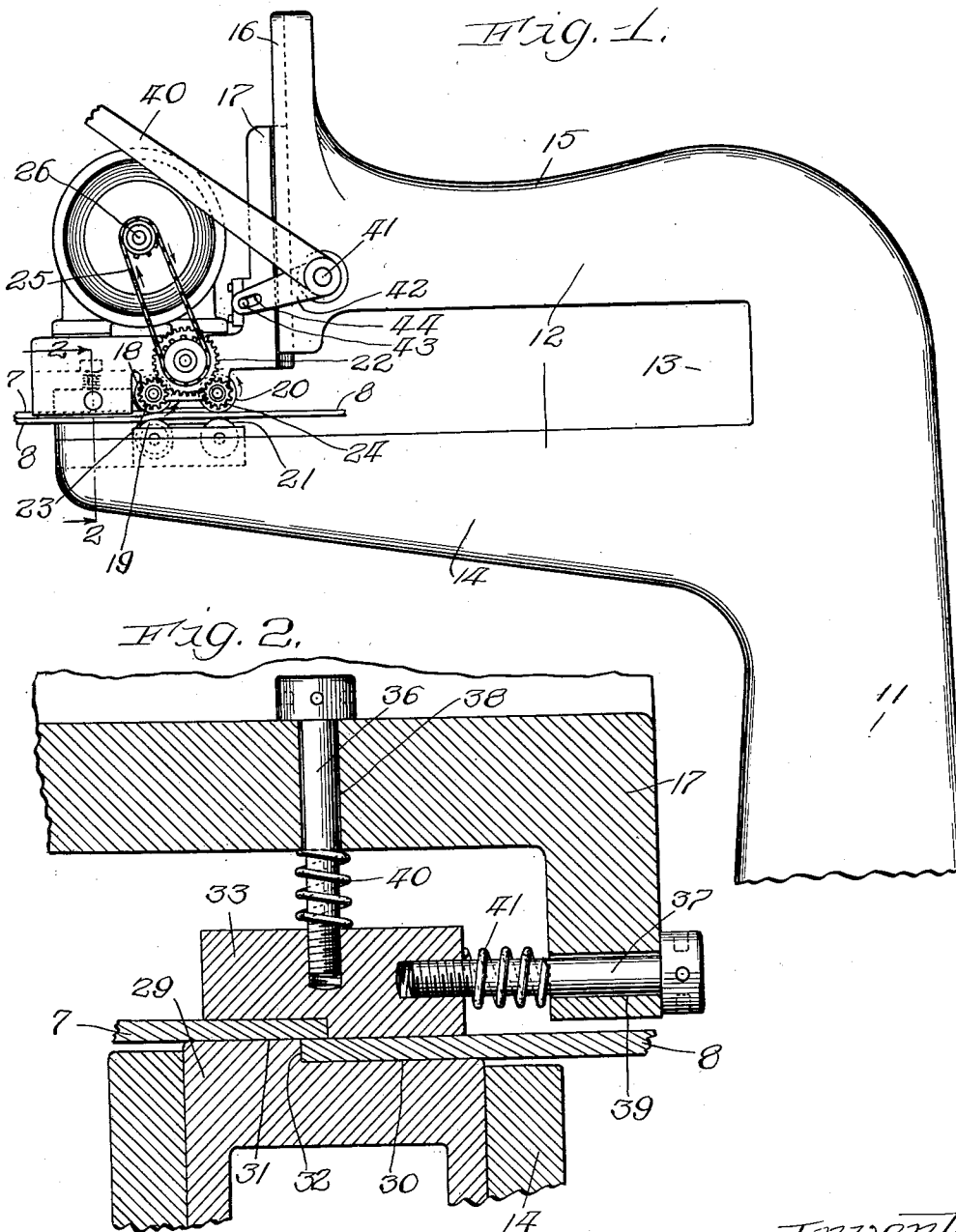
1,529,445

A. MILLER

ART OF UNITING METAL MEMBERS

Filed June 28, 1922

2 Sheets-Sheet 1



Inventor:
Arthur Miller,
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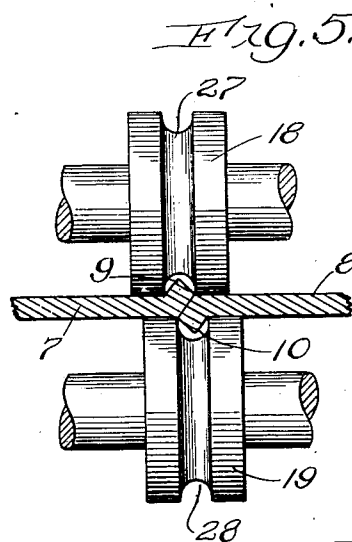
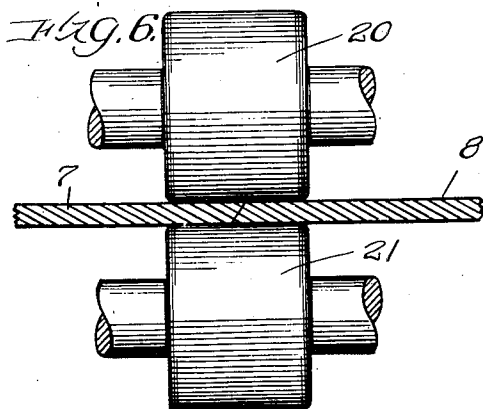
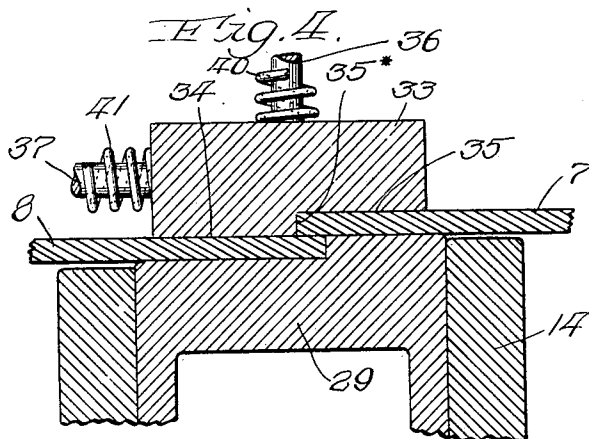
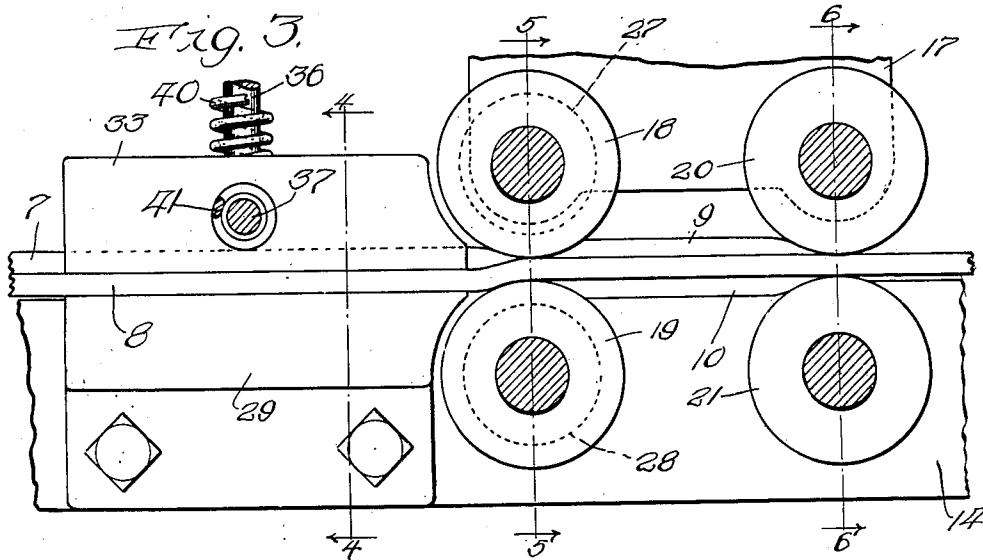
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ART OF UNITING METAL MEMBERS

Filed June 28, 1922

2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE.

ARTHUR MILLER, OF OAK PARK, ILLINOIS.

ART OF UNITING METAL MEMBERS.

Application filed June 28, 1922. Serial No. 571,424.

To all whom it may concern:

Be it known that I, ARTHUR MILLER, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in the Art of Uniting Metal Members, of which the following is a specification.

My invention relates, more particularly, to the uniting of sheet metal members at the edges thereof to form, preferably, a fluid-tight joint, as for example in the case of metal containers, such as milk cans.

One of my objects is to provide a novel and simple method of producing such a joint the metal of which at one or both faces of the sheets, as desired, shall be of the desired hardness, and be sufficiently smooth to render the surfaces of the finished structure readily cleansable, this feature being of special value where the container is to be used for receiving liquid food, such as milk; another object is to provide a welded joint which while smooth and of substantially the same thickness as the sheets joined together shall be durable and strong; and another object is to provide a novel and highly desirable character of joint.

Referring to the accompanying drawing:

Figure 1 is a view in side elevation, with certain parts broken away, of a machine suitable for use in performing certain of the operations, in accordance with the preferred way of practicing my invention, for producing the finished joint. Figure 2 is an enlarged section taken at the line 2—2 on Fig. 1 and viewed in the direction of the arrows. Figure 3 is a view in side elevation of a portion of the machine of Figs. 1 and 2. Figure 4 is a section taken at the line 4—4 on Fig. 3 and viewed in the direction of the arrows. Figure 5 is a section taken at the line 5—5 on Fig. 3 and viewed in the direction of the arrows; and Figure 6, a section taken at the line 5—5 on Fig. 3 and viewed in the direction of the arrows.

In practicing my invention in the preferred way, I lap the adjacent edges of the sheet metal members to be united, and represented at 7 and 8, and as shown in Fig. 4, and in such position unite them flatwise together at their overlapped portions, this being accomplished in any desirable way, preferably by the well known Gefeï step-welding method involving the spot-welding

of the sheets at close intervals at their overlapped edges, each of the adjacent welds overlapping, whereby a weld is produced which extends lengthwise of, and continuously along, without interruption, the overlapped portions of the sheets. The sheets united, as stated, are then operated on at their overlapped edges to deflect these edges in opposite directions and throughout their length, into the positions shown in Fig. 5, wherein the edge of the plate 7 is deflected upwardly and the underlying edge portion of the plate 8 is deflected downwardly, and the body portions of the sheets 7 and 8 are caused to extend in alignment with each other. The lapped edges referred to are deflected, as stated, preferably to extend at such an angle to the body portions of the sheets carrying them that a line drawn through the apex portions 9 and 10 of these sheets will extend obliquely upward to the left in Fig. 5 from its lower end to its upper end. Following the deflection of the lapped edges of the sheets 7 and 8, to the positions stated, these sheets are subjected at these lapped portions to a rolling action, preferably a cold-rolling action, for the purpose of flattening those portions of the sheets which extend beyond the faces thereof, smoothing the metal, causing the structure formed of the plates to be of substantially uniform thickness, and hardening the metal which by the welding operation referred to, became annealed, this smoothing and hardening operation being performed either at both surfaces of the united sheet structure or at one side only thereof, as desired.

The mechanism shown for conditioning the sheets 7 and 8 as shown in Fig. 5 and subjecting them to a rolling action at both sides of the welded joint, for the purpose stated, and which, as to its general features of construction is of well-known construction, comprises a supporting structure of any desirable form, represented at 11 and having an extension 12 at its upper end bifurcated at 13 to afford the lower, horn portion 14 and the upper, arm portion 15, the portion 15 being equipped with a vertically-disposed guide 16 engaged by a vertically-movable head 17 the position of which is controlled by the mechanism hereinafter described. The mechanism also comprises two pairs of rolls 18, 19, 20 and 21, the rolls 18 and 19 being swaging rolls to deflect the united sheets 7 and 8 into the condition

shown in Fig. 5, and the rolls 20 and 21 being provided for rolling out the metal at the joint into the condition shown in Fig. 6. The lower rolls 19 and 21 of the two sets are journaled in the horn 14 and the upper rolls 20 and 22 in the arm 15 to extend directly above the rolls 19 and 21, respectively, the upper rolls being driven as by means of the gear 22 journaled on the head 17 and meshing with pinions 23 and 24 on the rolls 18 and 20, respectively, the gear 22 being shown as driven by a belt 25 from a motor 26 supported on the head 17. The rolls 18 and 19 are peripherally grooved, as represented at 27 and 28, respectively, these rolls being spaced apart at their peripheries a distance substantially equal to the thickness of the sheets and offset in a horizontal plane a distance not less than the width of the lapped portions of the sheets and to an extent sufficient to cause the peripheral portions of each roll at opposite sides of the groove therein to engage both sheets at one face of the latter and at points beyond the overlap of the sheets, as shown in Fig. 5, whereby the sheet structure is deformed into the cross-sectional shape shown in this figure wherein the sheets 7 and 8 extend in the same plane.

The machine also comprises guide means for guiding into the swaging rolls the sheets 7 and 8 in overlapped united condition, the particular means illustrated comprising a block 29 rigid on the horn 14 and presenting the stepped surfaces 30 and 31 with the riser portion 32 extending lengthwise of the horn, and a cooperating presser block 33 presenting the stepped surfaces 34 and 35 and riser portion 35*, likewise extending lengthwise of the horn, the block 33 being so located, as shown in Fig. 4, that a general Z-shaped space is provided between the blocks 29 and 33. The block 33 is carried by the head 17 through the medium of screws 36 and 37 which extend loosely and slidingly at their threaded ends through vertical and horizontal openings 38 and 39, respectively, in the head 17 and screw into the block 33, coil springs 40 and 41 which surround the inner ends of the screws 36 and 37 being confined between the block 33 and the head 17 and operating to yieldingly force the block 33 downward and toward the left in Fig. 2, thereby firmly forcing the structure, formed of the sheets 7 and 8, downwardly against the stepped surfaces 30 and 31 and against the riser 32 as shown in Figs. 2 and 4, whereby the sheet structure in its movement through the machine is held to a definite path in its travel. In the use of the machine the sheet structure is fed into the guide means 29-32 to the position shown and in between the swaging rolls which draw the sheet structure therethrough swaging it to the condition shown in Fig. 4

and feeding it to the rolls 20 and 21 which latter also exert a pulling action on the sheet structure and roll its opposite faces at the joint thereof into hardened condition substantially as shown in Fig. 6.

The mechanism shown is adapted for the making of hollow cylindrical articles, such as the body-portions of containers and to this end is adapted to be manipulated, after the joint is swaged and rolled, for permitting the ready removal of the article from the machine, by movement opposite to that in swaging and rolling the sheet. This is provided for by the vertically movable head 17 carrying the block 33 and rolls 18 and 20, with which cooperate means whereby the block 33 and rolls 18 and 20 may be moved into and out of position of cooperation with the block 29 and rolls 19 and 21 to perform their respective functions as above stated, these means being shown as comprising a lever 40 secured to a rock-shaft 41 journaled on the arm 15 and carrying a crank-arm 42 having pin and slot connection 43-44 with the head 17, and through the medium of which lever, operated in any suitable way, the head may be raised and lowered.

By deflecting the sheet structure at its joint to the condition shown in Fig. 5 before passing it through the rolls 20 and 21, the metal at opposite faces of the sheet structure in the rolling operation, is not rolled out to a position in which it passes beyond the line of juncture of the sheets and is pressed into the opposite sheet, and thus the sheets are not weakened by the thinning of the metal at the portions adjacent the joint, as would be the case were the metal of the sheets at the joint rolled into overlapping position against the opposite sheets.

The cold-rolling of the sheets, as stated, operates not only to smoothen the metal at opposite surfaces of the sheet metal structure, but also serves to harden the metal at the joint which, by the welding action, became softened. The result therefore is a smooth hardened joint which is highly resistant to stresses tending to disrupt it and which may be maintained in sanitary condition.

Under some conditions it may be desirable to harden and smoothen the joint at one surface only of the sheet structure, and this may be accomplished in any suitable way.

It may be stated that in practicing my improved method it is not necessary that the edges of the parts of the sheets to be overlapped in forming the joint, be specially prepared, as for example bevelled or chamfered, and thus an operation involving expense, is eliminated with resultant economy.

While I have illustrated and described particular ways in which my improved method may be practiced, I do not wish to be understood as intending to limit it there-

to as the same may be practiced in other ways without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. The method of uniting the edges of metal members which consists in lapping adjacent edges of the members, uniting the lapped edges, deflecting the members to cause the lapped edges to expand in opposite directions and thereafter rolling the members at the joint.

2. The method of uniting the edges of metal members which consists in lapping adjacent edges of the members, uniting the lapped edges, deflecting the members to cause the lapped edges to extend in opposite directions and thereafter rolling the members at the joint at opposite faces thereof.

3. The method of uniting the edges of metal members which consists in lapping

adjacent edges of the members, welding the lapped edges, deflecting the members to cause the lapped edges to extend in opposite directions and thereafter rolling the members at the joint.

4. The method of uniting the edges of metal members which consists in lapping adjacent edges of the members, step-welding the lapped edges, deflecting the members to cause the lapped edges to extend in opposite directions and thereafter rolling the members at the joint.

5. The method of uniting the edges of sheet metal members, which consists in producing a joint wherein the members are lapped at their adjacent edges, with their opposing surfaces united and with the members deflected to cause the lapped edges to extend in opposite directions, and thereafter flattening the metal at said joint.

ARTHUR MILLER.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,529,445, granted March 10, 1925, upon the application of Arthur Miller, of Oak Park, Illinois, for an improvement in "The Art of Uniting Metal Members," an error appears in the printed specification requiring correction as follows: Page 3, line 10, claim 1, for the word "expand" read *extend*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of March, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.