S. B. FIELD.

METHOD OF FORMING A LAP JOINTED TUBE.

APPLICATION FILED JULY 22, 1915.

1,228,766. Patented June 5, 1917.

2 SHEETS—SHEET 1.

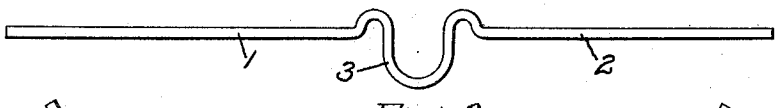


FIG. 3

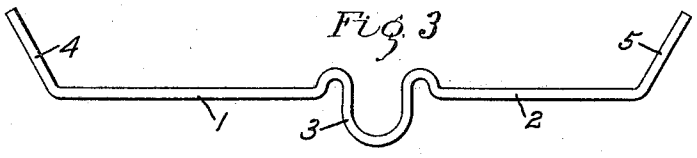


FIG. 4

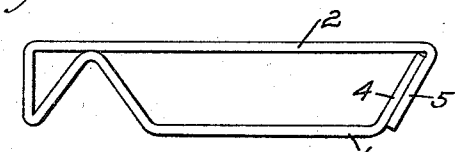


FIG. 2

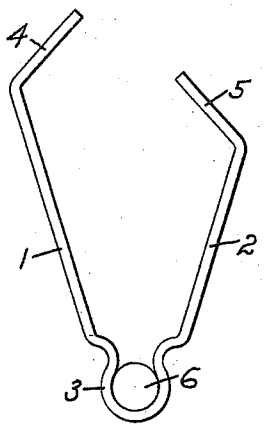


FIG. 5

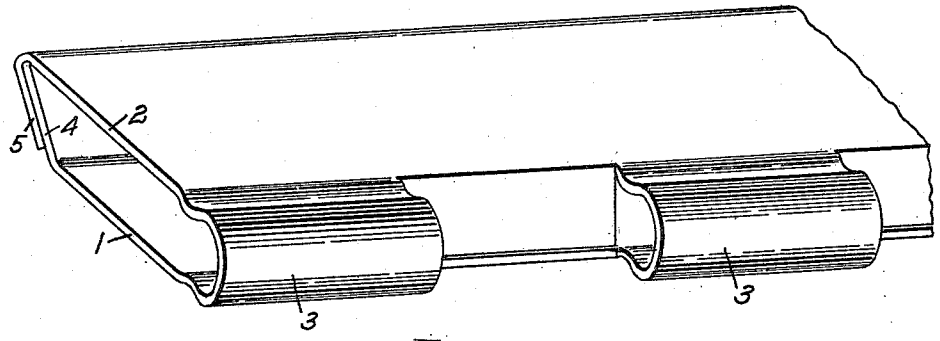


FIG. 1

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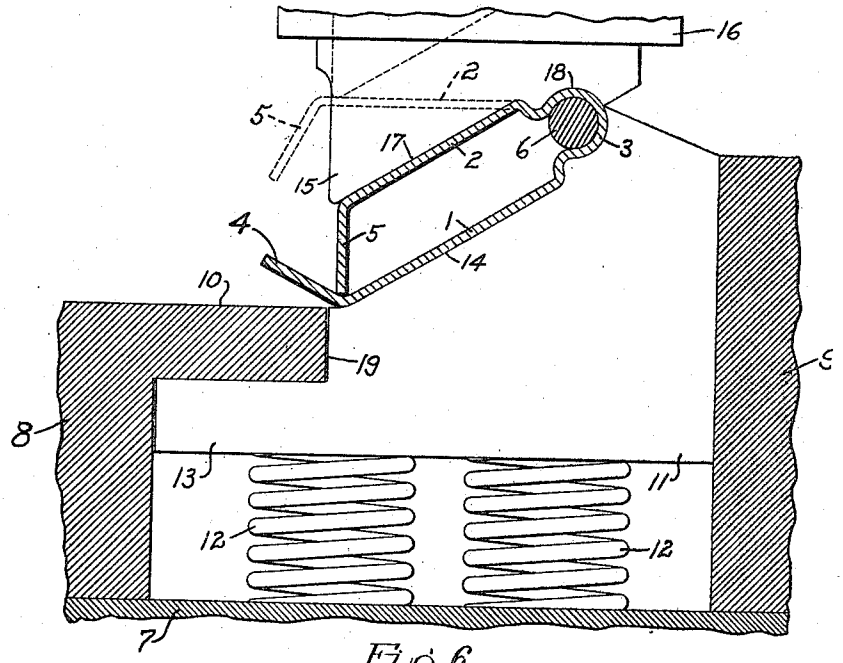


Fig. 6

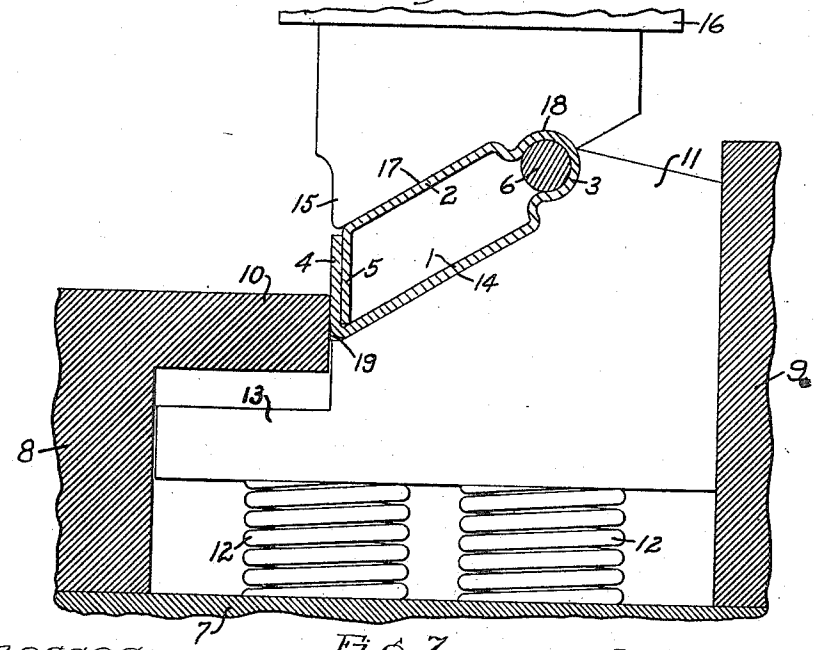


Fig. 7

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UNITED STATES PATENT OFFICE.

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METHOD OF FORMING A LAP-JOINTED TUBE.

1,228,766. Specification of Letters Patent. Patented June 5, 1917.

Application filed July 22, 1915. Serial No. 41,418.

To all whom it may concern:

Be it known that I, SAMUEL B. FIELD, a citizen of the United States, residing at Holbrook, county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Methods of Forming a Lap-Jointed Tube, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to an improved method of forming a lap jointed tube.

It is especially applicable to a plate folded to form what I term a channel plate. In the manufacture of sheet metal shipping cases, in which the walls or panels are formed of an inner and outer plate spaced apart from each other, such for instance as shown in Patent No. 1,093,548 dated April 14, 1914, it is sometimes the practice to form closure members for the open space at the edges between the two plates of each panel. These closure members are each composed of a plate folded to form what is termed a channel member, that is, a plate folded intermediate two edges to form two parallel side portions which will be spaced by the fold just far enough apart so that the channel member will fit snugly between the two plates of the panel, and so that the fold will bridge the space at the edges between the two plates of the panel. It is also desirable that the channel member shall serve as a stiffener for or brace between the panel plates along the space in which it is inserted. If the inner edges of the channel member are left free, like the ends of the legs of a U-shaped plate, then these legs will yield to inward pressure on the outer face of the panel, and it is the purpose of the channel member constructed according to this invention to have the ends of the legs bent in so that they will lap past each other, one of said bent end portions being long enough to extend across and engage the opposite branch of the channel member, and thus prevent the two branches from collapsing toward each other or yielding under the pressure on the outside of the panel plate. When the two legs are thus bent it is important that they should be retained in this position so that not only will they not spring in but will be locked in interengagement. If the bend is made square, that is at a right angle to the parallel faces of the channel member, then the said overlapping end portions will not interlock, but I have discovered that if they are bent at an angle one leg being bent past a right angle into an acute angle, and the other leg being bent to an obtuse angle complementary to the acute angle of the first leg, so that the bent-over portion which is innermost extends across into the angle formed by the other bend they will be securely self-locked together.

It is necessary that there should be an edge of something firm over which to bend the plates. If a mandrel is employed, there is great difficulty in removing the mandrel after the channel piece has been fully bent into the required form and the bent parts are locked together, because they can not be spread apart to loosen their grip on the mandrel. I have discovered a means of bending them whereby one of the bent portions may be utilized to serve as the bending edge over which the other member may be bent, thereby dispensing entirely with the use of another member for an interior mandrel.

The invention will be fully understood by reference to the following description taken in connection with the accompanying drawings, and the novel features are clearly pointed out and defined in the claims at the close of this specification.

In the drawings,—Figure 1 is a perspective view of one form of channel piece constructed according to the invention, the channel member shown therein being intended to serve also as a hinge member with knuckles to interengage with knuckles in an adjacent panel, and a hinge pin to be inserted through the barrel formed by the interengaging knuckles, the knuckle portions being intended to extend out beyond the edge of the panel plates.

Fig. 2 is an end elevation of a channel plate which is not intended to be used as a hinge member, its outer portion being shaped differently from that shown in Fig. 1, but the overlapping and interlocking edge portions are formed as in Fig. 1.

Fig. 3 is an end view of a blank such as is intended to be made into a channel member of the form shown in Fig. 7, the loop being already formed.

Fig. 4 is an end view of the blank shown

in Fig. 3 after the side edges have had the outer portions which are to form the overlapping elements bent at an obtuse angle.

Fig. 5 is a view of the blank shown in Fig. 4 after the sides have been bent up in flaring relation to each other and a stiffening rod inserted in the loop.

Fig. 6 is an elevation, partly in section and broken away showing the blank in the punch press after it has been shaped as in Fig. 5, the punch having partially descended and bent the upper side branch of the blank down into parallel relation to the lower side branch so that the bent lap element of the upper branch is brought into position where its end will form an anvil over which the lap element of the other branch will be bent by the continued descent of the punch.

Fig. 7 is a view of the parts shown in Fig. 6 after the punch has made a still further descent far enough for the lap element of the lower branch to be bent up into flat engagement with the face of the lap element of the upper branch.

Referring now to the drawings, in the form of finished channel member shown in Fig. 1, there are two parallel side panel or leaf portions 1, 2, a loop or fold which unites the two parallel panels to form a third side, and two overlapping portions 4, 5, to form the fourth side. The fold has been cut out to form knuckle portions 3. The lower leaf portion 1 terminates in a portion 4 bent at an obtuse angle to the leaf 1, and the upper leaf portion 2 terminates in a portion 5 which is bent down over the edge of the portion 4 into an acute angle to the leaf 2, and lies flat against the outside face of the portion 4. The edge of the portion 4 extends up into the corner formed by the portion 5 and the leaf 2 and is pinched therein.

Before the blank is put into the punch press shown in Figs. 6 and 7 it is formed into the shape shown in Fig. 5. This may be done in any manner desired and by as many steps as desired. In the drawings, the blank is shown in Fig. 3 as already stamped or died out to form the loop 3, the leaf portions 1, 2, being still flat and in the same plane. It is to be noted that the leaf 1 is longer than the leaf 2. The next step is performed by suitable mechanism to bend up the side edges of the leaf members 1, 2 to form the portions 4, 5 which are to subsequently serve as lap members, only at this stage both portions 4, 5 are at an obtuse angle to their respective leaves 1, 2.

The blank is then bent into the form shown in Fig. 5, a core or rod 6 preferably being inserted in the loop to keep the loop in proper shape. This rod will afterward be withdrawn if the panel is to be used with a hinge. If it is not used as a hinge, but merely as a closure member, the rod may be allowed to remain as a stiffener and in such case the loop portion 3 will be continuous instead of being cut out to form a series of knuckle portions.

After the blank is bent into the form shown in Fig. 5 it is put into the punch press shown in Figs. 6 and 7.

The punch press has a stationary die having a base portion 7, and sides 8, 9, and one of the sides, as 8, has a flange 10 which extends inwardly at some distance above the bottom 7. A block or pad 11 is seated upon heavy springs 12, which rest on base 7 and the block constitutes what is termed a "spring pad." The lower portion of the pad has a flange portion 13 on one side so that the lower portion of the pad, including the flange is of the full width of the space between the inner faces of the walls 8, 9 of the die, and has a sliding fit between the walls, and the flange 13 is normally held up against the overreaching portion 10 of the die by the pressure of the springs 12, thus limiting the upward movement of the spring seated pad.

The pad 11 is formed on its upper side with a matrix or recess shaped to receive the head of the fold or loop 3 and the lower leaf of the blank after it has been bent into the form shown in Fig. 5. The recess is so located that when the blank is seated in the pad, the bent end portion 4 will rest on the upper side of the flange 10 of the stationary die. When thus seated, the portion 4 and the leaf 1 are both at an acute angle to the portion 5.

A plunger 15, or punch, as it is usually termed, is vertically slidable in guides in the head 16 and is formed with its lower side shaped to conform to the upper half of the finished channel plate, that is, it has an inclined face 17 parallel with the inclined face 14 of the pad 11, and a portion 18 to conform to the shape of the head, whatever shape that may be, whether of the form shown in Fig. 1 or Fig. 2 or whatever other form is desired.

The blank as shown in Fig. 5 is placed on the pad 11 while the punch is in its elevated position shown in dotted lines in Fig. 6. The punch is then moved down and the inclined face 17 will turn the leaf 2 down into the full line position shown in Fig. 6, until the lower end of the bent end portion 5 strikes the lower leaf 1, the portion 5 then being at an acute angle to the portion 4, which is important. The bend thus far during the descent of the punch is entirely at the fold or loop end.

When in this position, the bent end portion 5 should be in a plane substantially parallel with the inner end of the flange 10, but the two planes should be spaced apart from each other far enough to allow for the doubling up of the end portion 4 when the pad descends with the punch. By reason

of the leaf 1 being longer than the leaf 2, the portion 5 is enabled to engage the lower branch at about the line of the bend between the leaf 1 and the end portion 4.

As soon as the edge of the portion 5 strikes the leaf 1, the continued descent of the punch will force down the pad 11 and compress the springs 12 and cause the end portion 4 to bend up around the edge of the portion 5, the space between the portion 5 and the end 19 of the flange 10 being, as already mentioned, equal to the thickness of the end portion 4 so that the part 4 will be bent flat against the part 5. On account of the acute angle made by the part 5 with the leaf 1, the lower end of part 5 cannot be sprung inward or outward, that is, to the right or left as viewed in Fig. 7, and it therefore serves as a rigid former or anvil around which the part 4 will be bent up. When the punch 15 rises again the spring 12 will expand and carry the pad up into normal position shown in Fig. 6, and the now fully formed channel member may be removed. Thus no former block is employed inside of the channel plate in the entire operation. The parts 4 and 5 will retain their form into which they have been bent. They may then be soldered together if desired.

What I claim is:

1. In the process of making a lap jointed tube formed of a single sheet of metal, bending the blank so that the edge of one of the lap elements engages in an angle formed by the other lap element and its adjacent panel portion, then utilizing said first lap element as an anvil and applying pressure to said anvil element in a direct line with its plane toward the junction of said other lap element and its adjacent panel, and also applying pressure to the other lap element to bend it over the edge of said anvil element and bring it up into a plane parallel with the plane of said first lap element.

2. In the process of making a lap jointed tube formed of a single sheet of metal, bending the blank to bring two panel portions into parallel relation to each other and to bring two end portions which are to form the lap elements into position so that the edge of one of the lap elements engages in the angle formed by the other lap element and its adjacent panel, then applying pressure in opposite directions to the outer faces of said two parallel panel elements and applying a wiping pressure over the outer face of the outer lap element to bend it over the edge of said first lap element and bring it into contact with the outer face of said first lap element.

3. In the process of making a lap joint for a polygonal sided tube to be formed of a single sheet of metal, bending the blank so that the edge of one of the lap elements engages in an angle formed by the other lap element and its adjacent panel, then holding the partially folded blank rigidly between two surfaces and while so held utilizing the said first lap element as an anvil and applying pressure to the said other lap element to bend it over the edge of said anvil element into a plane parallel with the face of said anvil element.

4. In the process of making a lap jointed tube formed of a single sheet of metal, bending the blank to bring two panel portions into parallel relation to each other and to bring two end portions which are to form the overlap elements into position so that the edge of one of the lap elements engages in an angle formed by the other lap element and its adjacent panel, then holding the partially folded blank between two surfaces which respectively engage said two parallel panels and moving said partially folded blank while rigidly held in such manner as to cause the outer lap element to wipe over a surface which bends said outer lap element into overlapping contact with said inner lap element.

5. In the process of making a lap jointed tube formed of a single sheet of metal, bending the blank to bring two panel portions into parallel relation to each other and to bring two end portions which are to form the overlap elements into position so that each is at an obtuse angle to the respective panel with which it is directly connected and so that the edge of one overlap element engages in the angle formed by the other overlap element with its adjacent panel, then holding the partially folded blank between two surfaces which respectively engage said two parallel panels and hold them rigidly while the said first overlap element is engaged in the angle between the second element and its adjacent panel, then moving said partially folded blank and its holding members in a direction to cause the unfolded lap element to engage with a surface which is parallel with the plane of said first lap element and thereby to bend said second lap element over the edge of said first lap element into a plane parallel with said first lap element.

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

SAMUEL B. FIELD.

Witnesses:

WILLIAM A. COPELAND,

ALICE H. MORRISON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."