Sept. 20, 1932. W. T. DEACON ET AL 1,878,622

MACHINE FOR LOCK SEAMING SHEETS AND STRIPS

Filed May 31, 1930 2 Sheets-Sheet 1

Fig. 1.

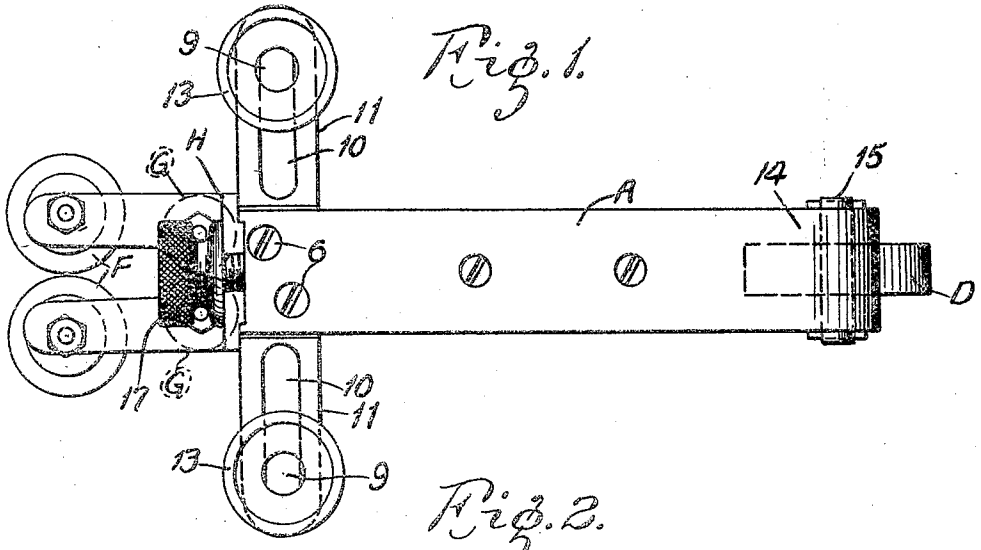


Fig. 2.

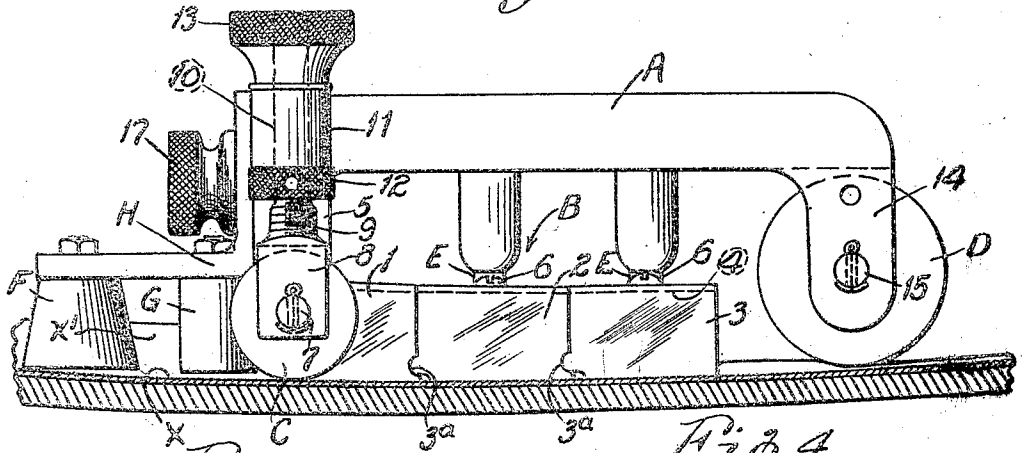


Fig. 3.

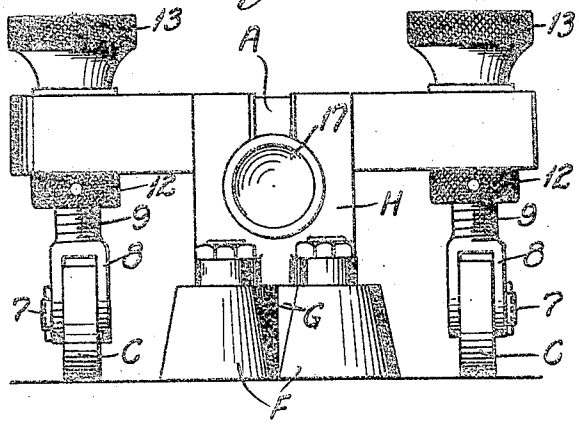
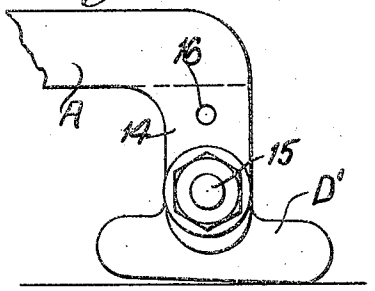


Fig. 4.



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MACHINE FOR LOCK SEAMING SHEETS AND STRIPS

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Fig. 5.

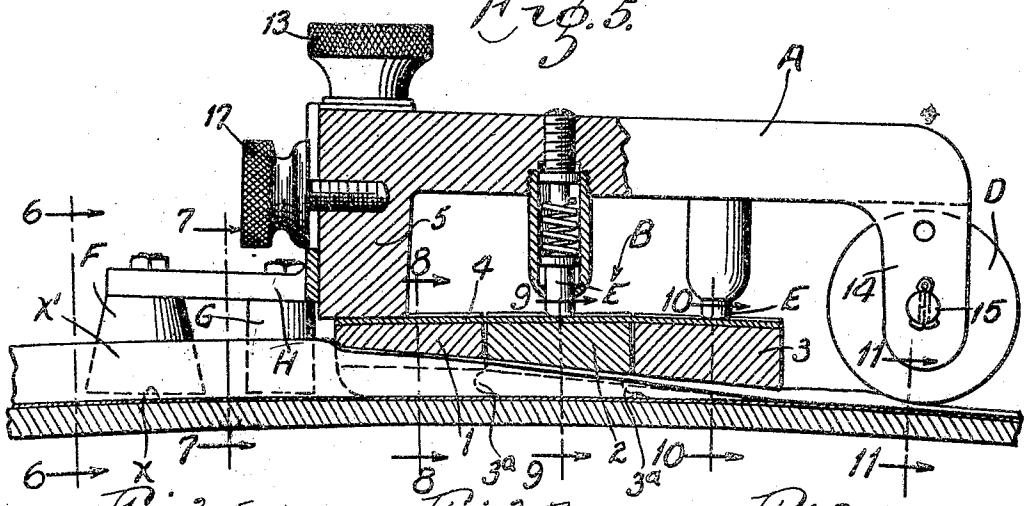


Fig. 6.

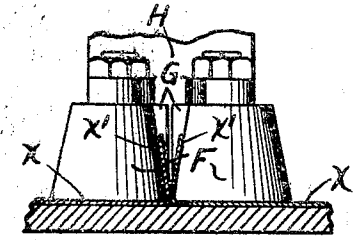


Fig. 7.

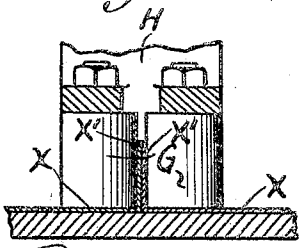


Fig. 8.

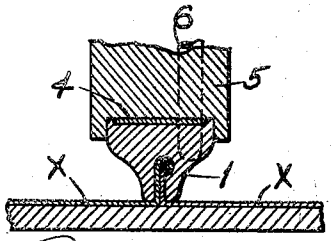


Fig. 9.

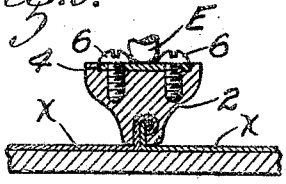


Fig. 10.

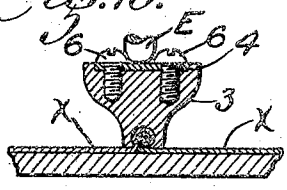


Fig. 11.

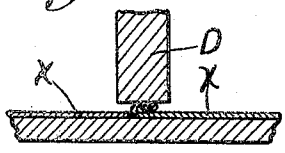
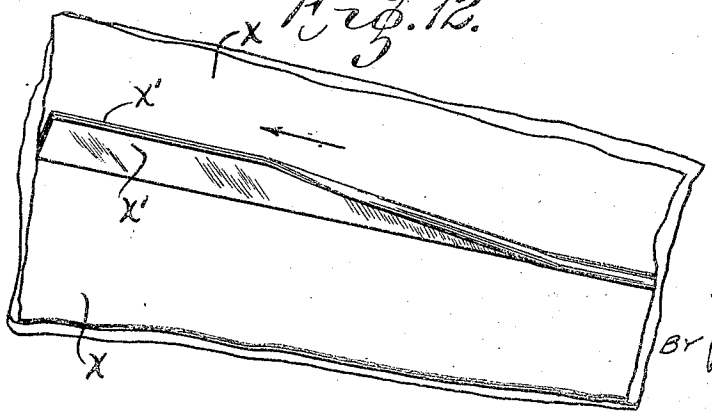


Fig. 12.



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UNITED STATES PATENT OFFICE

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MACHINE FOR LOCK-SEAMING SHEETS AND STRIPS

Application filed May 31, 1930. Serial No. 457,886.

This invention relates to a machine that is adapted to be used for producing gas and liquid tight seams between thin sheets or strips, or sheets or strips of foil thickness, that are used as a sheathing, or as a covering, protecting or insulating medium for a surface.

The main object of our invention is to provide a machine for the purpose mentioned, that is capable of moving or being moved over sheets or strips of material which it is desired to join together, which machine has provision for progressively bending, folding or rolling portions of said sheets or strips into interlocking relationship so as to produce a gas and liquid tight seam between the strips.

Another object is to provide a machine of the kind described, that is capable of being used on a flat surface, on a convex surface, or on a concave surface, and which is of such construction that it can be used for lock-seaming two or more flanges or similar parts that are straight or of arcuate form.

And still another object of our invention is to provide a portable machine for the purpose described, that is of rugged construction, and which is small and compact enough to be operated manually.

Figure 1 of the drawings is a top plan view of a machine constructed in accordance with our invention.

Figure 2 is a side elevational view of said machine.

Figure 3 is a front elevational view of said machine.

Figure 4 is a fragmentary side elevational view, illustrating a shoe that may be used in place of a roller to flatten down the interlocked portions of the strips.

Figure 5 is a side elevational view, partly in vertical longitudinal section, illustrating the manner of using the machine.

Figures 6, 7, 8, 9, 10 and 11 are sectional views, taken on the section lines of corresponding numbers in Figure 5; and

Figure 12 is a perspective view of two sheets or strips of material provided on their adjacent longitudinal edges with upstanding portions or flanges that are adapted to be bent, folded or rolled into interlocking relationship by our improved machine.

The pending application for patent of William T. Deacon, Serial No. 432,414, filed March 1, 1930, discloses a method of protecting a surface which contemplates securing sheets or strips of foil thickness to the surface, and thereafter, bending, folding or rolling the adjacent edge portions of said strips into interlocking relationship so as to produce gas and liquid tight seams or joints between the strips. The machine herein illustrated and described is intended to be used primarily for practising or carrying out the method disclosed in said Deacon application, but it is not limited to this particular use, but, on the contrary, is capable of general use for lock-seaming thin sheets or strips, or sheets or strips of foil thickness, formed of metal or other material of such a nature that two or more thicknesses of same can be joined together by a lock-seaming operation. Briefly described, said machine consists of a frame or body portion A provided with dies, rollers or any suitable means for progressively interlocking two or more thicknesses of material together, so as to produce a locked seam, when said frame is moved relatively to the sheets or strips joined together by said seam.

In the form of our invention herein illustrated the machine is provided with a die structure, designated as an entirety by the reference character B in Figures 2 and 5, designed so that when the machine travels longitudinally of two metal strips x provided with flanges or upstanding portions x', as indicated in Figure 12, said die structure B will cause the flanges or upstanding portions x' on the strips to be deformed in such a way as to produce a locked seam that is gas-tight and liquid-tight. In order that the machine may be used for interlocking flanges or similar parts that are of arc shape in outline and also used for producing gas and liquid tight seams between sheets or strips of convex or concave shape, the die structure B is articulated, jointed, or made up of a number of relatively short die elements pivotally connected together. In the machine herein shown said die structure is composed of a plurality of dies 1, 2 and 3 connected to or mounted on a flexible support 4, shown in

Figure 5, and having their adjacent or abutting end portions connected together by pivots or joints 3^a that maintain said dies in alignment but still permit them to move angularly relatively to each other sufficiently to conform to a concave surface, as shown in Figure 2, or to conform to a convex surface, as shown in Figure 5. A convenient way of constructing the machine is to form the flexible support 4 from a strip of spring steel arranged longitudinally of the frame A of the machine on the underside of same and rigidly attached at one end to a depending portion 5 at the front end of said frame. The top faces of the dies 1, 2 and 3 are grooved so as to receive the support 4, and said dies are rigidly connected to said support in any suitable way, as, for example, by fastening devices 6 projecting downwardly through the support 4 and threaded into holes in the dies.

The frame A of the machine is provided with supporting rollers C, shown in Figure 3, that travel on the strips x at opposite sides of the seam produced by interlocking the adjacent edge portions of said strips, and while the particular method of mounting the rollers C is immaterial, so far as our idea is concerned, we prefer to construct the machine so that the supporting rollers C may be adjusted vertically, and may be adjusted towards or away from each other or arranged at various distances from the longitudinal axis of the machine. As shown in the drawings, each of the supporting rollers C is rotatably mounted on a horizontally-disposed shaft 7, sustained by a bifurcated part 8 at the lower end of a spindle 9 that projects upwardly through an elongated slot 10 in a laterally-projecting arm 11 at the front end of the frame A. The spindles 9 are externally screw-threaded and provided with adjusting nuts 12 that bear against the underside of the laterally-projecting arms 11 on the frame of the machine, and clamping nuts 13 are mounted on the upper end portions of said spindles so as to co-act with the adjusting nuts 12 to clamp the spindles in adjusted position in the elongated slots 10 of the arms 11. If it is desired to adjust the supporting rollers C laterally it is only necessary to loosen the nuts 13, after which the spindles 9 may be moved lengthwise of the slots 10 in which they are positioned, so as to set the rollers C in proper position with relation to each other or with relation to the longitudinal axis of the machine. If it is desired to raise or lower the rollers C, this can be easily effected simply by screwing the nuts 12 upwardly or downwardly on the spindles 9 and manipulating the clamping nuts 13 to provide for such adjustment of the nuts 12. The rollers C can be adjusted independently of each other, and therefore it is possible for the rollers C to be set at different levels. The die structure B can be provided with an internal space or cavity of various shapes, so long as it is designed in such a way that when the machine is in motion the flanges or similar parts which are to be joined will be progressively interlocked so as to produce a locked seam.

In the machine herein shown the front die 1 is provided with an internal space or cavity shaped so as to turn over the top edges of the upstanding flanges x' on the strips, as shown in Figure 8. The intermediate die or second die 2 is provided with an internal space or cavity shaped so as to curl the flanges x' a trifle farther, as shown in Figure 9, and the third die or rear end die 3 is provided with an internal space or cavity shaped so as to continue the curling operation, as shown in Figure 10, thereby causing the flanges x' on the strips to be progressively curled or bent into interlocking engagement when the machine is moved to the left, looking at Figure 5. The final step in the operation of deforming the flanges or upstanding portions of the strips x consists in flattening down the curled or interlocked portions of the strips. This operation may be effected either by means of a pressure roller D rotatably mounted in a bifurcated portion 14 depending from the rear end of the frame A, as shown in Figure 5, or a pressure shoe D′ rigidly mounted in said bifurcated portion 14, as shown in Figure 4. The bifurcated portion 14 of the frame is provided with a removable supporting device 15 for the pressure roller D or for the pressure shoe D′, and when a pressure shoe D′ is used to flatten down the interlocked portions of the strips, a pin 16 is arranged transversely through aligned holes in the side pieces of the bifurcated portion 14 on the frame and in the shank of the pressure shoe D′, so as to hold said shoe rigid, and thus cause it to flatten down the interlocked portions of the strips when the user of the machine exerts downward pressure on the rear end of the frame A, during the operation of moving said frame over the sheets or strips that are being joined together. Due to the fact that the articulated die structure B is carried by a flexible support 4, it is desirable to provide the machine with a means for exerting downward pressure on the dies 2 and 3, so as to hold them in engagement with the work, and cause the die structure as an entirety to conform to the shape or outline of the surface over which it is moved. In the machine shown herein the frame A of the machine is provided with spring-pressed plungers E that act on the dies 2 and 3 and hold them in engagement with the strips x, during the operation of deforming the upstanding flanges or portions x' on said strips.

In practising the method described in the said Deacon application it is preferable to use protecting strips or sheets whose longitudinal edge portions are doubled or folded over in

overlapping relation with the body of the strips at the time the strips are secured to the surface to be protected. Subsequently said folded or doubled edge portions are bent upwardly into a position at substantially right angles to the strips, and the edge portions of adjacent strips are then bent, folded or rolled into interlocking relation, as previously described, so as to produce gas and liquid tight seams between the strips. Our machine may have provision for bending the overlapped edge portions of the strips upwardly into parallel relationship during the operation of moving the machine over the strips to join them together, or the preliminary bending operation of the strips, i.e., turning the folded portions upwardly, may be performed by a separate tool or instrument prior to the operation of deforming the edge portions of the strips, so as to produce locked seams between the strips. The machine herein illustrated is intended to be used for joining strips whose longitudinal edge portions have been turned upwardly, as shown in Figure 12, so as to produce parallel flanges x', but the machine is equipped with a set of rollers F for drawing said flanges together, and a separate set of rollers G for straightening out said flanges or removing wrinkles from same. As shown in the drawings, the two pairs of rollers F and G are mounted on vertically-disposed spindles carried by a bracket H that projects horizontally from the front end of the frame A of the machine, the rollers F being substantially frusto-conical-shaped, as shown in Figure 6, so that when the machine is moved longitudinally of the strips x, the base ends of the rollers F will engage the upstanding flanges x' on the strips and draw said flanges together, as shown in Figure 6, and the rollers G, which are of cylindrical shape, will straighten out said flanges and remove any wrinkles which may be in same thereby causing the upstanding flanges on the strips to be pressed snugly together at the time they start to enter the cavity of the deforming die 1. Preferably, the bracket H, which carries the rollers F and G, is attached to the front end of the frame A of the machine in such a way that said bracket may be raised or lowered, the bracket H being herein illustrated as being retained in adjusted position by means of a clamping screw 17 mounted in the front end portion of the frame A.

In using our improved machine for producing locked seams between thin sheets or strips, or sheets or strips of foil thickness, portions at the longitudinal edges of said strips are bent upwardly into parallel relationship, as shown in Figure 12, and thereafter, the upstanding portions of adjacent strips are interlocked with each other so as to produce gas and liquid tight seams by moving our machine longitudinally of the strips, as previously described. The machine may, of course, be used for producing a locked seam between two strips arranged in abutting or endwise relation, and while we have herein illustrated a seam composed of two thicknesses of material, it is obvious that the seam produced by our machine may comprise more than two thicknesses of material. The machine herein illustrated is light enough and small enough to enable it to be manually operated, but, it is, of course, immaterial, so far as our broad idea is concerned, whether the machine is moved manually over the work, or is moved over the work by a propelling mechanism. The machine may be used on flat surfaces, on concave surfaces, on convex surfaces, or to lock-seam flanges or similar parts that are of arcuate form, and the machine may be easily adjusted to adapt it to material of different thicknesses, or to enable it to be used for lock-seaming strips located at different levels.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A machine for the purpose described, adapted to be moved over sheets or strips that are to be joined together, an articulated die structure on said machine for progressively deforming portions on said sheets or strips to form a locked seam, and means for flattening said seam.

2. A machine for the purpose described, consisting of a frame provided with supporting rollers, said frame being adapted to be moved over sheets or strips that are to be joined together, and an articulated die structure carried by said frame and provided with means for causing co-acting portions on said strips that are disposed at an angle to said strips, to be progressively bent into interlocking relationship as the machine travels over the strips.

3. A machine for the purpose described, consisting of a frame provided with supporting rollers, said frame being adapted to be moved over sheets or strips that are to be joined together, a flexible support on said frame, and an articulated die structure carried by said support and provided with a cavity shaped so as to receive upstanding portions on said strips and cause said portions to be deformed progressively to produce a locked seam as the machine travels over the strips.

4. A machine for the purpose described, consisting of a frame provided with supporting rollers, said frame being adapted to be moved over sheets or strips that are to be joined together, a flexible support on said frame, an articulated die structure carried by said support and provided with a cavity shaped so as to receive upstanding portions on said strips and cause said portions to be deformed progressively to produce a locked seam as the machine travels over the strips, means for flattening said seam, and means on

said frame arranged in advance of said die structure for drawing together and straightening the portions of said strips to be deformed by said die structure.

5. A machine for the purpose described, consisting of a frame provided with supporting rollers, said frame being adapted to be moved over sheets or strips that are to be joined together, an articulated die structure attached at one end to said frame and provided with a space or cavity shaped so as to cause upstanding portions on said strips to be curled one within the other so as to join said strips together, and means for exerting pressure on said die structure in a direction tending to hold it down on the work.

6. A machine for the purpose described, consisting of a frame provided with supporting rollers, said frame being adapted to be moved over sheets or strips that are to be joined together, means carried by said frame for causing co-acting portions on said strips to be curled one within the other so as to produce a locked seam, means carried by said frame for flattening said seam, means for enabling said supporting rollers to be set at different levels, and means for enabling said rollers to be adjusted laterally with respect to the longitudinal axis of the machine.

7. A machine for the purpose described, consisting of a frame that is adapted to be moved over sheets or strips that are to be joined together, supporting rollers for said frame, an adjustable means at the front end of said frame for preliminarily positioning co-acting portions at the edges of said strips, an articulated die structure on said frame for progressively bending said co-acting portions into interlocking relationship so as to produce a seam, and a pressing device on said frame arranged at the rear end of said die structure for flattening said seam.

8. In a machine for lock-seaming sheets or strips, the combination of a die structure adapted to be moved longitudinally of two adjacent strips and provided with means for causing co-acting flanges on said strips to be progressively bent or curled into interlocking engagement so as to produce a locked seam, and a means arranged in advance of said die structure and movable with the same for drawing said flanges into contact with each other prior to the engagement of said flanges by the die structure.

9. In a machine for lock-seaming sheets or strips, the combination of a die structure adapted to be moved longitudinally of two adjacent strips and provided with means for causing co-acting flanges on said strips to be progressively bent or curled into interlocking engagement so as to produce a locked seam, a means arranged in advance of said die structure and movable with the same for drawing said flanges into contact with each other prior to the engagement of said flanges by the die structure, and means separate and distinct from said die structure and arranged at the rear of same for flattening down the seam produced by said die structure.

10. A machine for lock-seaming sheets or strips provided with a die structure adapted to be moved longitudinally of two parallel strips and provided with a cavity constructed to receive upstanding flanges on adjacent edges of said strips, and progressively curl or bend said flanges into interlocking engagement during the travel of the die structure longitudinally of the strips, said die structure being articulated so as to adapt the same to strips that are flat, convexed or concaved.

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