

March 30, 1937.

S. F. JACKES

2,075,286

SHEET METAL PRODUCT

Filed Nov. 3, 1934

2 Sheets-Sheet 1

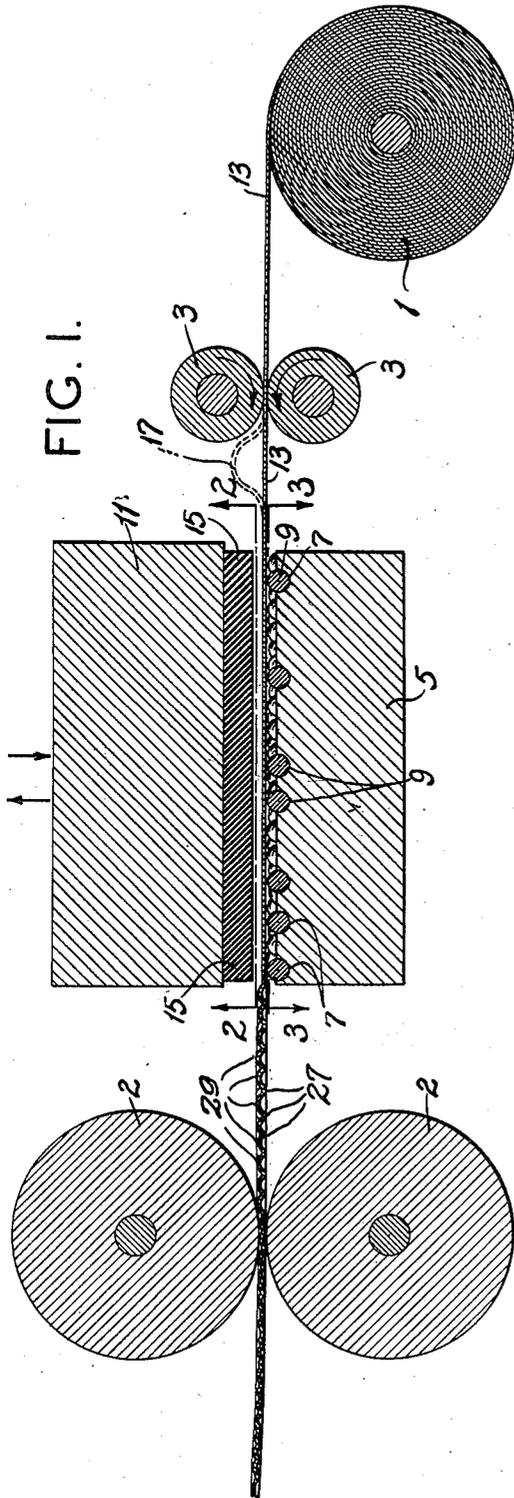


FIG. 1.

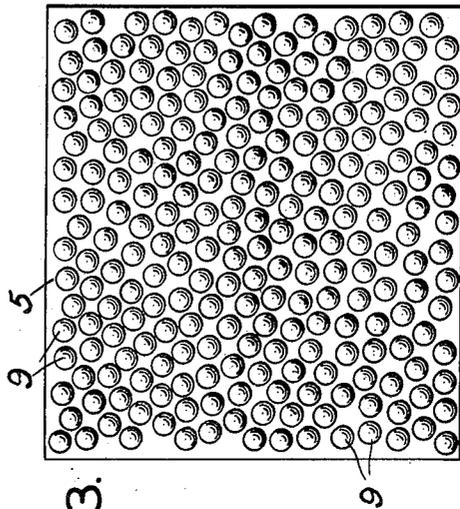


FIG. 3.

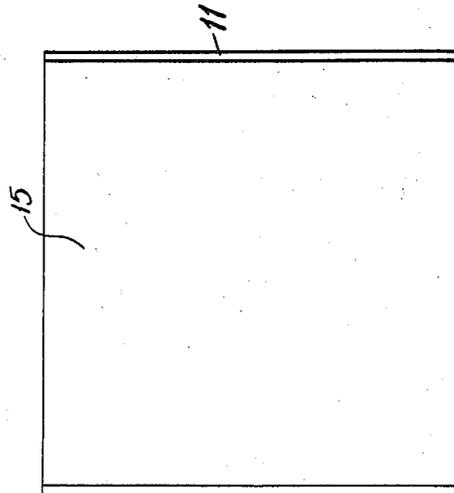


FIG. 2.

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2 Sheets-Sheet 2

FIG. 4.

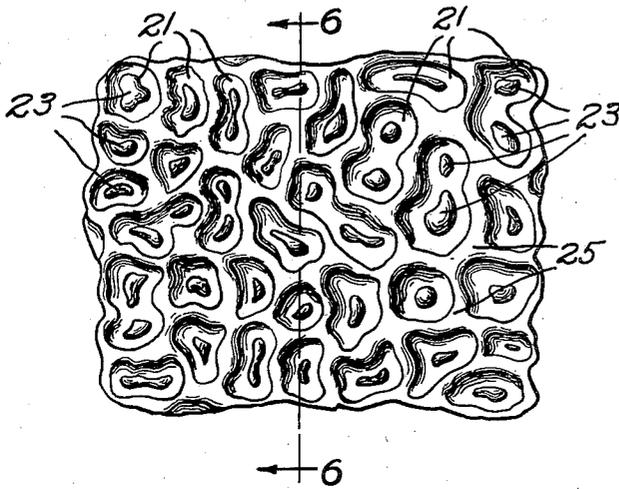


FIG. 6.

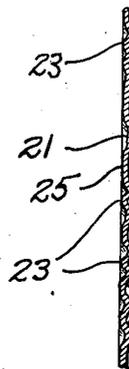


FIG. 5.

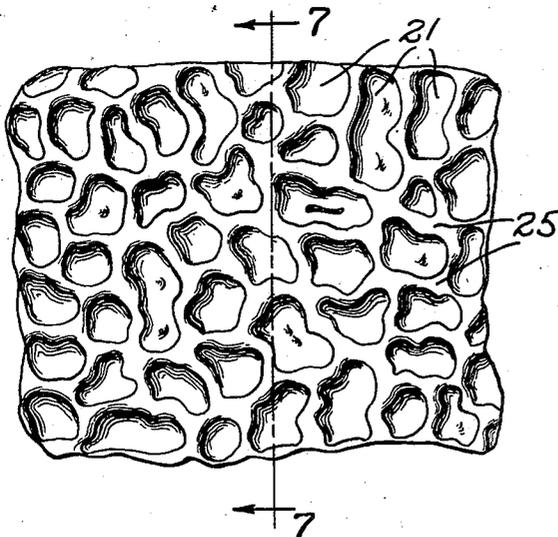
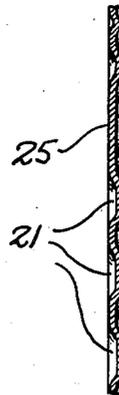


FIG. 7.



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UNITED STATES PATENT OFFICE

2,075,286

SHEET METAL PRODUCT

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Application November 3, 1934, Serial No. 751,326

8 Claims. (Cl. 41—24)

This invention relates to the method of, and apparatus for forming sheet metal, including the product thereof, and with regard to certain more specific features, to the provision of an improved finish on such metal.

Among the several objects of the invention may be noted the provision of a new and improved sheet metal product having a decoratively deformed surface which gives the appearance of having a crinkled coated finish, without the disadvantages of a coated finish in applying the product to hot locations such as in stove pipe, stoves, etc.; the provision of a product of this class in which the deformations on the sheet metal surface have the improved form and appearance of a non-repeating, irregular pattern; the provision of a method whereby the general form of the result may be readily changed; the provision of a surface which will not show irregularities or imperfections in color or form of the sheet on which the surface exists; and the provision of a novel method and apparatus for effecting said result. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a diagrammatic side elevation illustrating the steps in the process;

Fig. 2 is a bottom plan view taken on line 2—2 of Fig. 1, showing a reciprocating die;

Fig. 3 is a top plan view taken on line 3—3 of Fig. 1, showing a stationary die;

Fig. 4 is an enlarged detail plan view of a representative portion of one form of the product;

Fig. 5 is an enlarged detail plan view of another form of the product;

Fig. 6 is a cross section taken on line 6—6 of Fig. 4; and,

Fig. 7 is a cross section taken on line 7—7 of Fig. 5.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is shown at numeral 1 a reel of strip steel, said strip steel being representative of any sheet metal of suitable gauge. At numeral 3 is indicated a pair of draw rolls for drawing the strip steel from

the reel 1 and delivering it to the apparatus to be described. Continuous motion of the draw rolls is proper, as will appear, but intermittent motion may be effected, if desired.

At numeral 5 is shown a relatively stationary die block having recesses 7 formed therein adapted to receive balls 9 or the like. The configuration of the congerie of recesses 7 and the corresponding recessed balls is shown in Fig. 3, wherein it will be noted that an irregular relationship is effected between balls. For best results, the balls should not be regularly patterned.

At numeral 11 is shown a reciprocating die block which is adapted to be fastened to the cross-head of an ordinary press, it being understood that the relatively stationary block 5 is located on a lower relatively stationary part of the press. The block 11, being fastened to said cross-head of the press, is adapted to be reciprocated back and forth, to and from the block 5.

On the bottom face of the block 11 is cemented a resilient layer of material, preferably a rubber pad 15. It will be understood that the resiliency of this material 15 should be enough to permit it to assume the general form of the tops of the balls, behind the strip of steel 13, as the latter is pressed against the balls, the strip 13 also assuming the general partially spherical shapes of the upper parts of the balls.

From the die blocks 5 and 11, the material 13 passes to pressure rolls 2 which tend to flatten out the impressions left upon the strip by the action of the die blocks 5 and 11.

The method of operation of the apparatus is as follows:

As the draw rolls 3 deliver the strip steel between the die blocks 5 and 11, said block 11 reciprocates and causes a given area of the strip to be forced against the ball 9 by means of the resilient rubber pad 15. The rubber is hard enough that the strip is forced to assume an indented form in which each indentation has roughly the partial spherical shape of a ball. On the other hand, the resiliency of the rubber is such that the effect hereinafter described may be accomplished. For thicker gauges of material the hardness of the rubber is increased but substantial resiliency is always provided.

While the block 11 is in downward position, the strip of course cannot creep forwardly. However, the feed rolls 3, if operating continuously, continue to feed the strip and there is therefore formed an arch at 11 which takes up the slack strip until the block 11 again draws off, permitting the arch to spring out into straight form and

thus feed the strip forwardly. If the rolls 3 operate intermittently they are timed with the reciprocating action of die 11. They stop when the die 11 has descended and move when it draws 5^o off.

After advance of the strip, the block 11 again descends, and the material is provided with a second set of impressions. The advance of the strip 13 is not equal to the width across the 10 blocks 5 and 11 each time that the block 11 reciprocates, but is only a small fraction thereof. Thus, the balls are pressed a second time into and partially adjacent to an already indented area. Thus various shapes of indentations are effected.

15 The provision of the resilient rubber facing on the die block 11, in view of a certain looseness of the balls 9 in their sockets, provides an element of indeterminacy in the manner in which the balls will be pressed into the material upon successive impressions. They will not provide a 20 definitely repeating pattern which is what is desired herein. It will be clear that if the block 11 does not have the resilient pad but is provided with recesses corresponding to the balls 9, that 25 an undesirable repeating pattern may be formed.

After the strip leaves the blocks 5 and 11, it advances to the pressure rolls 2 which tend to flatten out the indentations but do not do so entirely. This step in the process provides the 30 indentations with relatively flat bottoms, with or without interior raised cones or elevations, the latter feature depending upon the initial depth of indentation provided by the dies, as will appear.

35 Thus the effect of the treatment is to provide a sheet having more or less irregular indentations 21 of crater-like form, each with or without a small conical raised portion of irregular form or forms 23 in each crater. The crater effect with 40 the raised cones 23 therein is emphasized as the blow delivered by the block 11 is increased in force, that is, as the initial indentations are increased in depth. In Fig. 4 is illustrated the final appearance of the material after the block 11 has 45 struck relatively hard blows and the pressure rolls have flattened the areas 25 between final impressions as well as reversed the interiors of the indentations 21 to become raised as at 23.

If it is desired to reduce the effect of the conical shapes 23 within the craters 21, this is done by 50 lightening the blow delivered by the block 11 (by adjusting the stroke of the press). The result is a surface such as illustrated in Fig. 5 wherein few or no interior raised portions within the recesses 55 result from rerolling although the flat portions 25 surrounding the craters 21 remain.

It will be seen that the sheet is initially provided with partially spherical indentures 29 between which are cusped portions 27 (Fig. 1). The 60 cusped portions 27 when rolled, form flats between the indentures and rolling causes the indentures to become the more or less flat bottomed craters 21 (see Fig. 5). If the formation of the indentures is made initially deep, as by a strong 65 die blow, then subsequent rolling effects a reversal of curvature at the deepest parts of the indentures 21 to form raised portions or mounts 23 within the indentures (see Fig. 4).

It will be understood that by adjusting of depth 70 of the original indentations, between the depth required for the form of the invention shown in Fig. 4, and that shown in Fig. 5, finishes will be obtained with raised portions in some of the indentations and others may not have raised 75 portions, depending upon the indeterminate ac-

tion of the apparatus. It is considered that such a finish is also new and novel.

It will be understood that other forms may be substituted for the balls 9 and that resilient material other than rubber may be used for the pad 5 15. It is also to be understood that the balls are relatively free in their sockets so that the indeterminacy principle is fully taken advantage of. That is to say, as each ball is capable of moving somewhat, its actions, under successive reciproca- 10 tions of the upper die, therefore will not be the same with respect to the other balls. The other balls also in the meantime have moved.

It will be seen that the invention provides a convenient method for providing a non-repeating 15 finish or pattern on sheet metal, the same being adapted to be changed in general characteristics, as desired. Opposite faces of the sheet correspond in shape but are of obverse form. At the same time, the apparatus is relatively simple to make 20 and operate. The resulting surface does not show imperfections which may exist in the sheet, as does the ordinary sheet iron surface.

In view of the above, it will be seen that the 25 several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all 30 matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. The product comprising a metal sheet, irregularly spaced recesses therein, relatively flat 35 portions between said recesses, and conical raised portions within the recesses.

2. The product comprising a metal sheet, irregularly spaced and partially spherical recesses 40 therein, relatively flat portions between said recesses, and conical raised portions within the recesses.

3. The product comprising a metal sheet, irregularly spaced recesses therein having relatively 45 flat bottoms, relatively flat portions between said recesses, and conical raised portions within the recesses and extending from said bottoms.

4. The product comprising a metal sheet, irregularly spaced partially spherical recesses 50 therein having relatively flat bottoms, relatively flat portions between said recesses, and conical raised portions within the recesses and extending from said bottoms.

5. The product comprising a sheet, spaced recesses therein, connecting portions between said 55 recesses, and raised portions within at least some of the recesses.

6. The product comprising a sheet, irregularly spaced recesses therein, relatively flat portions 60 between said recesses, and raised portions within at least some of the recesses.

7. The product comprising a sheet, spaced recesses therein of irregular form, connecting 65 portions between said recesses, and raised portions within at least some of the recesses, opposite faces of the sheet being similar but obverse in form.

8. The product comprising a metal sheet, 70 spaced recesses therein of irregular form, relatively flat portions between said recesses, and conical raised portions within at least some of the recesses.

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