Nov. 12, 1968 W. J. BURNS 3,410,127

PLATE WITH INTEGRAL RIVET AND METHOD AND APPARATUS FOR MAKING SAME

Filed April 25, 1966

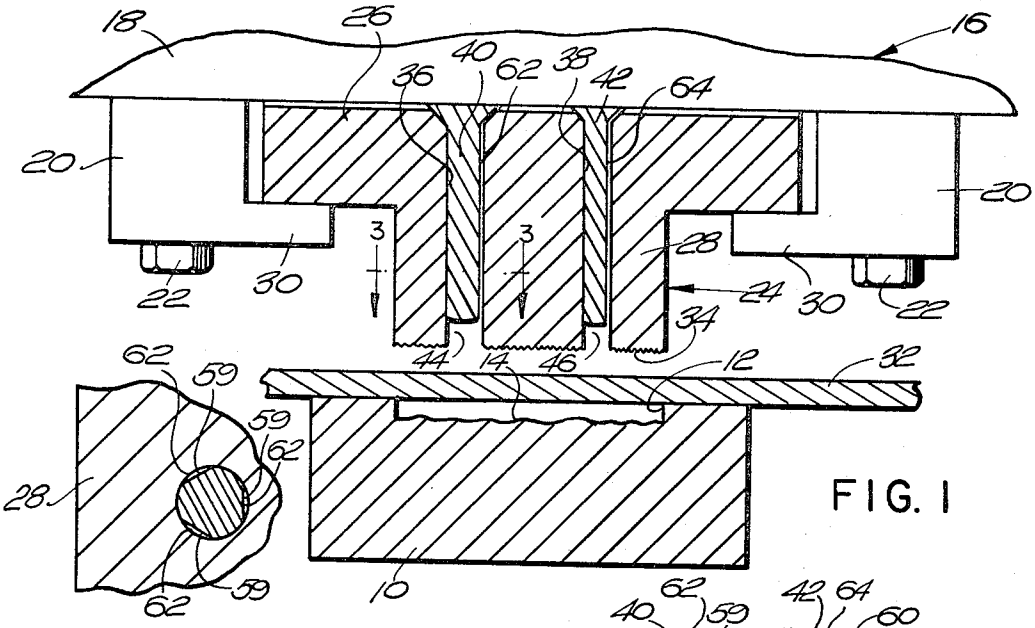


FIG. 1

FIG. 3

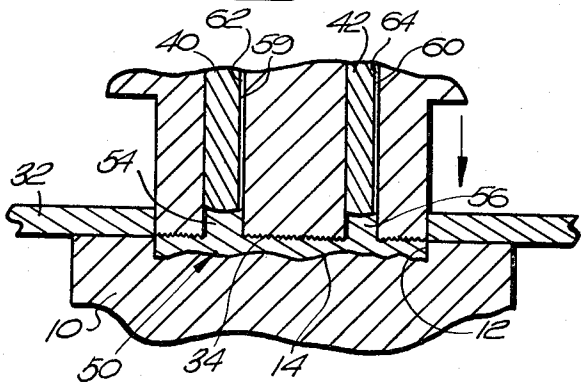


FIG. 2

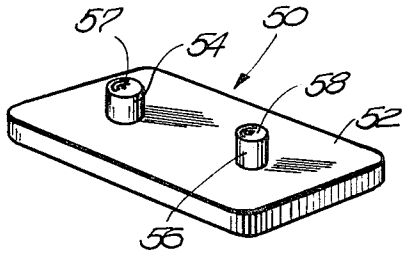


FIG. 5

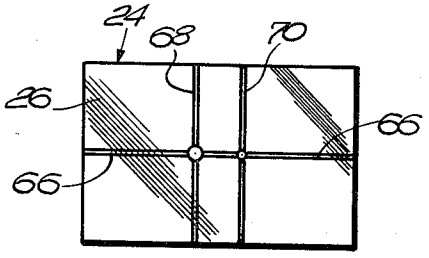


FIG. 4

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ABSTRACT OF THE DISCLOSURE

The method and apparatus for forming a metallic decal with integral rivets thereon wherein a metallic strip is placed over a cavity in a die and a striking member is moved downwardly into engagement with the metallic strip for forcing it into the die, the configuration on the bottom surface of the die being impressed on the surface of the strip that is forced into engagement therewith, a striking member that forces the metallic strip into the die, including openings therein that provide for the simultaneous formation of rivets on the metallic strip as it is forced into the die.

The present invention relates to a plate having integral rivets formed thereon and to the method and apparatus for forming the plate with the rivets integrally joined thereto.

One of the principal features of the present invention is the fabrication of a metallic decal having a predetermined external design formed thereon and being further provided with integral rivets on the rear surface thereof that enable the decal to be conveniently secured to a metal strip or the like. Prior to the instant invention it was difficult to produce a metal decal with integral rivets without having to actually work the metal in a series of operations that reduced the thickness of the metal until the rivets were formed in the manner required. These prior known techniques in forming metal decals with integral rivets required considerable labor and time and therefore such metal decals were not economical to produce. The present invention avoids the difficulties experienced in the fabricating of the prior known decals with integral rivets by employing a unique method and apparatus, wherein the decal and the integral rivets thereon are formed in a single striking operation. In order to accomplish this purpose, a lower female die having a cavity with the design formed therein is provided over which a strip of metal is positioned, the metal strip being struck so as to form the decal in a single striking operation, although a subsequent operation is performed to actually sever the formed decal from the strip. Located above the female die is a striking member that has a configuration that conforms to that of the cavity in the die and that is received in the cavity in the striking operation to force the metal therein, thereby forming the required design on the surface of the plate that engages the design. Formed in the striking member and extending therethrough for communication with the end thereof that engages the plate are openings in which pins are located. The pins are positioned such that the ends thereof are spaced from the ends of the striking member to define recesses, the recesses cooperating to receive metal therein during the striking operation. As the metal flows in the recesses in the striking member, the integral rivets are formed on the plate to define the complete decal therewith. In order to prevent a vacuum from forming in the recesses in the striking member during the striking operation, thereby providing for release of the decal from the striking member, vent passages are provided in the openings in which the pins are located. The vent passages are defined by forming the pins with flattened sides that are spaced from the adjacent

surfaces of the openings, the vent passages providing for communication of the recesses with atmosphere. As will be described, the striking operation causes the metal that is struck by the striking member to flow into the recesses in the striking member, the metal as received in the recesses defining rivets that are integrally formed on the rear surface of the metal decal.

Accordingly, it is an object of the present invention to provide a metal decal having a design formed on one side thereof and metal rivets formed integrally on the opposite side thereof.

Another object of the invention is to provide apparatus for forming a metal plate having integral rivets formed on the rear surface thereof.

Still another object is to teach a method of forming a thin metal plate with integral rivets on the rear surface thereof, said rivets being formed by a single striking operation.

Other objects, features and advantages of the invention will become apparent as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

In the drawings which illustrate the best mode presently contemplated for carrying out the present invention:

FIG. 1 is a sectional view of the apparatus embodied in the present invention showing the location of a metal plate on a female die prior to the striking of the plate for forming the metal decal of the present invention therefrom;

FIG. 2 is a fragmentary sectional view similar to FIG. 1, illustrating the location of the striking member after it has been moved downwardly to form the metal plate that is located on the female die;

FIG. 3 is a sectional view taken along lines 3—3 in FIG. 1;

FIG. 4 is a top plan view of the striking member illustrated in FIG. 1; and

FIG. 5 is a perspective view of the rear surface of the metal decal of the present invention showing the integral rivets formed thereon.

Referring now to the drawing and particularly to FIG. 1, the apparatus by which the metal decal embodied herein is formed is illustrated and includes a lower die block **10** that is adapted to be mounted in any suitable manner, the representation as shown of the die block **10** being for purposes of illustration only. Disposed in the upper surface of the die block **10** is a cavity **12**, on the bottom wall of which a predetermined design **14** is etched in relief. It is understood that the design **14** may be varied as required by replacing the entire block **10** or forming die inserts for placement within the cavity **12**.

Located above the die block **10** and mounted for vertical movement with respect thereto is a power press generally indicated at **16**. The press **16** may be of any conventional design and operates in the usual fashion in that it is provided with a vertically movable member **18** that is adapted to be moved downwardly with respect to the die block **10** for carrying out a striking operation, thereby producing the article to be described hereinafter. As shown in FIG. 1, the press **16**, which is operated by any conventional drive, includes the member **18** to the lowermost ends of which brackets **20** are secured by bolts **22**. Fixed to the underside of the housing **18** by the brackets **20** is a striking block generally indicated at **24** that is formed in a generally T configuration that includes an upper portion **26** and a lower portion **28**. The junction of the upper portion **26** and lower portion **28** defines a flange under which extensions **30** formed on the brackets **20** are received for retaining the striking block **24** in secure relation on the underside of the member **18**. It is seen that the striking block **24** may be removed from the mounted position on the underside of the press **16** by simply re-

moving the bolts 22 and the brackets 20 from engagement therewith.

In order to form the metal decal or article in the configuration as defined by the design 14 located within the cavity 12, the lowermost end of the striking block lower portion 28 is formed with a configuration that corresponds to that of the cavity 12. Thus when the striking block 24 is brought into engagement with a metal strip indicated at 32 that overlies the cavity 12, the metal engaged by the underside of the lower portion 28 will force the engaged portion of the metal strip 32 downwardly into the cavity 12 and into intimate contact with the design 14 as formed on the bottom wall of the cavity. As again illustrated in FIG. 1, the underside of the lower portion 28 is provided with a roughened area 34, which as will be described, prevents the metal engaged by the striking block 24 from flowing beyond a desired area and thus provides for an even distribution of the metal that is engaged by the striking block 24.

One of the novel features of the invention is the formation of integral rivets on the rear side of the metal decal 32 during the fabrication thereof. In order to accomplish this purpose, the striking block 24 is provided with spaced openings 36 and 38 that extend through the upper and lower portions 26 and 28 to define through-passages in the striking block. The uppermost ends of the openings 36 and 38 are countersunk, the passages receiving pins 40 and 42 respectively therein that are formed with correspondingly shaped heads that are received in the countersunk portions of the passages. Since it is desirable to form the rivets on the metal decal to be described of different sizes for the purpose of facilitating mounting thereof in use, the openings 36 and 38 and the pins 40 and 42 located therein are formed with different dimensions with respect to the cross-sectional configuration thereof. Thus the diameter of the opening 36 is somewhat larger than the diameter of the opening 38 and the pin 40 has a corresponding dimension with respect to the pin 42, the pins 40 and 42 being generally cylindrical for being received within the openings 36 and 38 respectively. In order to form the rivets on the metal decal, to be described, the lowermost ends of the pins 40 and 42 are spaced from the end of the lower portion 28 of the striking member 24 to define holes or recesses 44 and 46. It is seen that the recesses 44 and 46 as defined in the lower portion 28 are adapted to receive metal therein during the striking operation that forms the metal decal. As shown in FIG. 1, the lowermost ends of the pins 40 and 42 have a somewhat convex configuration that provides for forming the ends of the rivets of the metal decal in a concave configuration, as will also be described.

In the formation of the metal decal herein which is illustrated in FIG. 5 and is generally indicated at 50, the metal strip 32 is placed on the die block 10 and over the cavity 12. The striking block 24 is then brought into engagement with the metal strip 32 with sufficient force to cause the metal to be formed as the striking member 24 is moved to the position illustrated in FIG. 2. The metal engaged by the lower end of the striking member 24 is forced into the cavity 12 to define a body portion 52 of the decal 50, the lowermost surface of the body portion 52 being forced into intimate contact with the design 14 with sufficient pressure to cause the design to be formed on the body portion 52. In the striking operation, the pressure of the striking block 24 against the body portion 52 that is forced into the cavity 12 is sufficient to cause the metal on the rear surface of the body portion 52 to flow upwardly into the recesses 44 and 46 thereby forming rivets 54 and 56 as illustrated in FIG. 5. Because the lower ends of the pins 40 and 42 have a convex configuration, the ends of the rivets 54, 56 formed with concave depressions 57 and 58 respectively that provide for receiving a peening tool for peening of the rivets when the metal decal 50 is mounted in place on a metal strip or the like. Further, because of the difference in diameter of the holes 44 and 46, the rivets 54 and 56 have a corresponding cross-sectional dimension, the difference in size of the rivets insuring the proper placement of the decal 50 when it is secured to a metal strip or the like.

Since a vacuum would normally be created within the recesses 44 and 46 upon movement of the striking block 24 into engagement with the strip 32 during formation of the decal 50, the vacuum, unless relieved, would prevent the decal 50 from being extracted from the striking member 24 after the striking operation. In order to prevent the vacuum from being formed as indicated, the pins 40 and 42 are provided with flat sides 59 and 60 respectively as indicated in FIG. 3. With the placement of the pins 40 and 42 within their respective openings, vent passages 62 and 64 are defined with the adjacent walls of the openings, the vent passages 62, 64 also communicating with the recesses 44 and 46 in the striking block 24. As further illustrated in FIG. 4, spaced grooves 66, 68 and 70 are formed in the upper surface of the striking block 24, these grooves communicating with the vent passages defined by the pins 40 and 42 and thereby venting the recesses 44 and 46 to atmosphere. It is seen that the vent passages as defined in the striking block 24 are not sufficiently large enough to allow metal to flow therein, but will allow communication with atmosphere so as to prevent the formation of a vacuum in the recesses 44 and 46 during the striking operation that forms the metal decal 50. As described hereinabove, the roughened area 34 prevents the metal that is struck by the striking block 24 from flowing outwardly thus insuring that the metal will flow upwardly into the recesses 44 and 46 to form the desired rivets 54 and 56 as illustrated.

It is seen that by locating the pins 40 and 42 within the striking block 24 as described, the rivets 54 and 56 may be formed in the desired configuration and dimension. Further by providing the vented passages within the striking block 24, the metal decal 50 as formed may be easily extracted from the striking member 24 after the lifting of the block 24 from engagement with the die block 10.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the underlying inventive concept and that the same is not limited to the particular forms herein shown and described except insofar as indicated by the scope of the appended claims.

What is claimed is:

1. In a method of forming a metallic decal having an integral rivet in a single striking operation, comprising the steps of locating a metal strip over a female die in which a predetermined design is formed, striking the exposed surface of said metal strip with a striking member to form the decal by forcing the metal into said female die for the formation of the predetermined design thereon, said striking step simultaneously forming rivets on the surface of said decal with which said striking member engages, venting to atmosphere the area in which said rivets are formed by the way of through openings located in said striking member to provide for release of said decal from said striking member after said striking member is separated from said die.

2. In a method as set forth in claim 1, comprising the further step of venting the area in which said rivets are formed to atmosphere to provide for release of said decal from said striking member after said striking member is separated from said die.

3. In a method as set forth in claim 1, comprising the further step of controlling the length of said rivets by positioning removable pins in said through openings in said striking member such that the innermost ends of said pins are located in said openings that distance from the engaging surface of said striking member that defines the length of the rivets required.

4. In apparatus for forming a metallic decal from a

metallic strip, a female die having a cavity formed therein in which a predetermined design is formed and over which said strip is adapted to be positioned, a striking member located above said cavity and being movable downwardly for engaging said strip; said striking member having a configuration corresponding to that of said cavity for being received therein when said striking member is moved downwardly into striking contact with said strip, wherein said strip is forced into said cavity and the lowermost surface thereof is forced into engagement with said design in said cavity so that the design is impressed into the engaging surface of said strip, said striking member having through openings formed therein that communicate with said strip during the striking operation and into which metal from said strip is forced to form outwardly projecting rivets that are formed integral with said strip on the surface opposite to the surface in which the design is impressed when said strip is removed from the female die as a finished metallic decal.

5. In apparatus as set forth in claim 4, a pin located in each of said openings in said striking member and being spaced from the striking end thereof that distance that defines the length of the rivets formed on said strip.

6. In apparatus as set forth in claim 5, each of said pins having at least one flat side that cooperates with the opening in which the pin is located to define a vent passage, said vent passages communicating with the striking end of said striking member to prevent a vacuum from forming in said openings during the striking operation.

7. In apparatus as set forth in claim 6, the surface of said striking member that engages said strip being roughened for restricting the flow of metal within a confined area during the striking operation.

8. In apparatus as set forth in claim 6, the uppermost surface of said striking member having elongated grooves formed therein that communicate with the openings therein, said openings being countersunk, wherein the vent passages defined by the flat sides of said pins have access to atmosphere through said countersunk openings and elongated grooves.

9. In apparatus as set forth in claim 6, one of said openings having a larger diameter than the other so that the rivets as formed in said openings conform to the diameters thereof.

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