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METHOD OF FORGING BY EXPLOSION

By

B. N. Zyablov, V. A. Maslyanikov, et. al.

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METHOD OF FORGING BY EXPLOSION

BY: E. N. Zyablov, V. A. Maslyanikov, et. al.

English Pages: 4

SOURCE: Patent 141472, Application Nr 666020/25/7c,
14, 49h. 11, November 21, 1960, pp. 1-3

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Method of Forging by Explosion

By

B. N. Zyablov, V. A. Maslyanikov, Yu. S. Navagin and G. D. Ponomarev

We know that the power of an explosion is used for manufacturing large parts and designs from highly-durable steels and alloys.

For explosive sheet forging, the blank is placed on a matrice, and thereupon an explosion is produced from the exterior side of the blank. Under the action of the pressure of the explosive wave, the blank attains the shape of the matrice.

Such a method of explosive forging is sufficiently effective, but its application requires the manufacture of extremely cumbersome and expensive matrices, which is actually a deficiency of the known method.

Explosive forging of items from metal, done according to the proposed method, does not require the use of matrices. It is achieved by the fact that, between the charge and the blank, a layer composed of a porous material (foam-rubber, plastic, sponge rubber and others) is placed or a hollow chamber, according to the shape, corresponding to the shape of the stamp-out, and conversely, according to the relation to the charge, the sides of the blank are placed according to the shape of the stamp-out in a hollow chamber or a body composed of a porous material.

A diagram for accomplishing the proposed method is illustrated in fig. 1, 2, and 3.

Near the part to be processed 1 we place a charge of an explosive substance, 2 which we then explode by means of a detonator 3, arranged in the charge on the side opposite the part being processed.

Between the charge and the part we place a layer 4 composed of porous material (foam rubber, plastic, sponge rubber and others), or simply an air (hollow) chamber. This layer or chamber, on the basis of its outline, corresponds to the outline of the stamp-out, that is, the outside outline of the opening to be punched or the hollow to be pressed out.

On the outside of the charge and the layer is located a dense, liquid (aqueous) medium 5 with a density, exceeding the density of the layer, playing the role of a transmitter of the power of the explosion on the part, since the explosion, basically distributed along the zone of least resistance, and namely: the layer--the part, the stamping takes place in the spot where the layer is placed.

The part, subjected to processing, in separate cases, can be loaded into a working liquid to any depth. In this case, in order to facilitate the stamping and decrease the weight of the charge, a porous layer 6, similar to layer 4, is placed on the opposite side of the part.

In a case, when it is impossible or difficult to load the part being processed into a liquid, the explosion of the charge is produced in a slight capacity 7, adjacent to the part being processed.

Upon conducting separate experimental works, the capacity 3 can be manufactured from a weak inexpensive material and be destroyed on explosion.

The tests conducted on the determination of the effectiveness of the action of the proposed stamping method indicated, that the effectiveness of the explosion of the charge in water on a steel design in the presence of a foam rubber layer between the charge and the design is 3--5 times greater than without the layer; the presence of a foam rubber layer enables condensation and consolidation of the metal of the design.

Object of Invention

A method of stamping by explosion, by means of the reaction of an explosive wave in a liquid medium on a sheet metal blank, is distinguished by the fact, that for the purpose of carrying out stamping without the use of matrices, between the charge and the blank is placed a layer composed of a porous material (foam rubber, plastic, sponge rubber and others) or a hollow chamber according to the shape, corresponding to the shape in the stamp-out, and conversely, in respect to the charge, the sides of the blank are placed according to the shape, of the stamp-out, a hollow chamber or a body composed of a porous material.

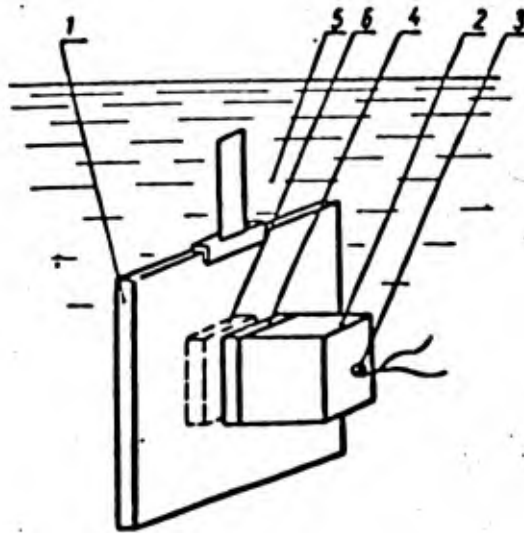


Fig. 1

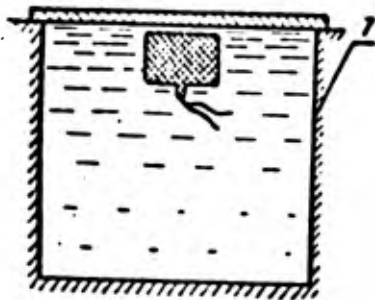


Fig. 2

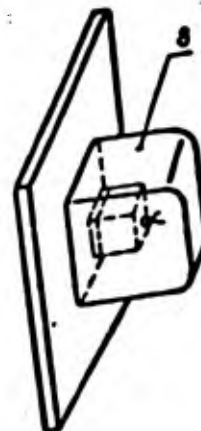


Fig. 3

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