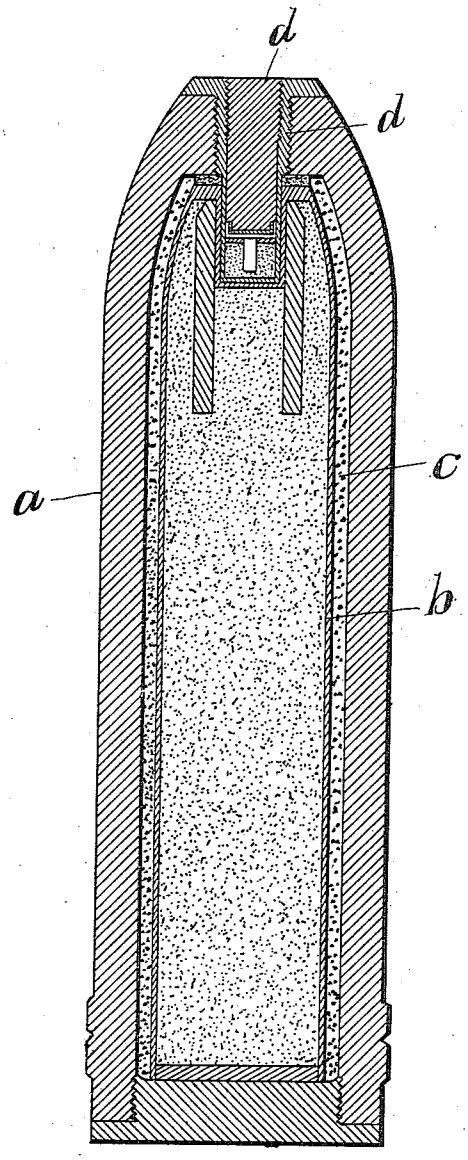
E. SOKOLOWSKI.

PLACING CONTAINERS IN PROJECTILES.

APPLICATION FILED NOV. 16, 1911.

1,039,459. Patented Sept. 24, 1912.




WITNESSES

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## PLACING CONTAINERS IN PROJECTILES.

1,039,459. Specification of Letters Patent. Patented Sept. 24, 1912.

Original application filed August 3, 1911, Serial No. 642,294. Divided and this application filed November 16, 1911. Serial No. 660,691.

*To all whom it may concern:*

Be it known that I, ERNST SOKOLOWSKI, a subject of the Emperor of Germany, residing at Hamburg, Germany, have invented a new and useful Improvement in Placing Containers in Projectiles, of which the following is a full, clear, and exact description.

Heretofore explosive charge containers for guns were prepared in such manner that it was possible to place them with a small free space into any desired projectile of their type. This small space between the outer wall of the explosive charge containers and the inner wall of the projectile was filled in different ways. A known method for the elimination of this free space consists in pouring into the projectile suitable molten filling materials, for instance paraffin, and in pressing the explosive charge container into the projectile and the paraffin contained therein. The molten material in this manner was forced to rise in the space between the explosive charge container and the inner wall of the projectile. When this filling material which on one hand adheres to the explosive charge container and on the other hand to the inner wall of the projectile is chilled, a fixed position of the explosive charge container in the projectile is insured. This method however, offers the following disadvantage: It frequently occurs that the molten paraffin fills the empty space in an irregular manner, being chilled in some places and preventing there the rising of the molten material, while in other places the paraffin rises more quickly, thus bringing about the presence of places which are not filled with the paraffin. These empty spaces are liable to cause irregularities during the firing, occurring in the following manner. With a violent initial impact in the barrel the explosive charge column strongly presses in the explosive charge container against the latter in a backward and in a backward and sidewise direction, and the explosive charge attempts to expand to the outside of the container on those places where the latter does not find a strong resistance, for instance on those places where there are empty spaces between the explosive charge container and the inner wall of the projectile. Whenever this pressure is very strong during the first moment of the shot, it is liable to occur that the entire rear end of the container is expanded, the plastic paraffin yielding to the front and escaping the pressure, being under the pressure strongly pressed against the container yielding at this place. A yielding of the container at the head, against the pressure from the outside to the inside, appears possible, when at the same time a contraction of the explosive charge to a certain extent is effected. With every phenomenon brought about in this or in a similar manner, movements with strong friction within the explosive charge and possible displacements of the explosive material are effected. In this manner, whenever the force is sufficiently strong, the conditions are favorable for a spontaneous ignition, for instance of the trinitrotoluol, by means of shock, friction and pressure. Even when in some instances a spontaneous ignition of the charge does not take place, it is possible that the center of gravity of the explosive charge is changed owing to the contraction of large explosive charges, thus affecting the uniformity of the line of flight of the projectile. Still less favorable are the conditions, when the filling material, for instance, molten paraffin, is poured from above into the empty space after the explosive charge container has been put in place. When using this method the filling out of the empty space is still more uncertain. The paraffin is chilled so quickly that a filling of the empty space at the most endangered part, the lower part of the explosive charge container, is not insured. It is not advisable to purposely enlarge the empty space in order to insure a satisfactory pouring of the paraffin without the formation of empty spaces, due to the fact, as has been stated, that the yielding material in the case of an especially strong impact is capable of escaping from the back toward the front, a phenomenon which is bound to take place the sooner, the larger the empty space between the explosive charge container and inner wall of the projectile. In this manner, furthermore, the size of the explosive charge container, and as a consequence thereof the size of the explosive charge itself, are decreased in an undesirable manner, and a thick elastic material is present between the explosive charge container and the inner

wall of the projectile which does not participate in the detonation, thus impeding in a very undesirable manner an effective breaking up of the projectile. In the place of paraffin the empty space between the explosive charge container and the inner wall of the projectile is in some instances filled out by means of wrapping paper in sufficient thickness around the explosive charge container. This paper wrapper, however, does not fill the space present at the rear end of the explosive charge container behind the cylindrical part of same. The paper wrapper, furthermore, represents in the same manner as has been described above an unsatisfactory dead cushion between the explosive charge container and the wall of the projectile. These difficulties are overcome by means of my improvement.

In my invention the explosive charge container is made of somewhat smaller diameter than heretofore, so that the distance between the jacket of the projectile and the explosive charge container measured on one side is increased to at least 4 mm. and whenever this is possible, more. Into the projectile heated in accordance with the requirements, a small quantity of a fused explosive, for instance, trinitrotoluol, is poured. Into this fused material, the loaded explosive charge container is pressed, centered, for instance, by means of thin wedges or by other means, and the remaining interstices between the container and the wall of the projectile are filled out with the fused explosive, for instance, trinitrotoluol. This pouring is carried out under the application of a so-called dead-head, using a fusing funnel which brings about that, by maintaining the jacketed pouring funnel heated during the process of chilling, during the chilling of the lower zone of the poured material in the projectile the upper portion of the material is maintained in liquid state. Other known pouring methods can, however, also be used. This method can also be carried out in such manner that the explosive charge container is introduced into the empty projectile heated in accordance with requirements and that the fused explosive, for instance, trinitrotoluol, is then poured in.

The advantages of this method are the following: The formation of empty spaces between the explosive charge container and the inner wall of the projectile are prevented with great certainty. After chilling the fused explosive is considerably more solid and less yielding than the ductile paraffin which escapes more readily. By means of this manner of placing the explosive charge container in a fixed position in the projectile a greater certainty against premature spontaneous ignitions of the explosive charge during the shot is obtained. The interstices between the explosive charge container and the inner wall of the projectile are in an advantageous manner filled with an explosive which actively participates in the explosion. The danger of a premature detonation of the explosive poured into the interstices does not have to be considered in view of the fixed position of same and its high degree of insensitiveness. By means of the present method it is at the same time possible to place a larger explosive charge into the same projectile, as compared with the methods used heretofore for the placing of the explosive charge containers. The efficiency is increased by means of the increase of the explosive charge and by means of their direct scattering action upon the jacket of the projectile.

In the accompanying drawing, which represents a longitudinal sectional view of the arrangement of a projectile and container and fused explosive embodying my invention, *a* is the projectile, *b* is the container, and *c* is the fused explosive (trinitrotoluol) in which the container is embedded and centered, and which fills the space between the container and the inner wall of the projectile.

*d* are the centering wedges.

I do not herein claim the method of carrying out the placing of containers in projectiles, as the same forms the subject matter of an application filed by me August 3, 1911, Serial No. 642,294, of which this application is a division.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In combination, a projectile, a container therein, and a fused explosive contained in the projectile and in which the container is embedded and centered.

2. In combination, a projectile, a container and a fused explosive between said container and the wall of the projectile.

3. In combination, a projectile, a container and a fused explosive filling the space between said container and the wall of the projectile.

4. In combination, a projectile, a container therein, and fused trinitrotoluol contained in the projectile and in which the container is embedded and centered.

In testimony of which invention, I have hereunto set my hand, at Hamburg, on this 2nd day of Nov., 1911.

ERNST SOKOLOWSKI.

Witnesses:
ERNEST H. L. MUMMENHOFF,
IDA CHRIST. HAFERMANN.

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