C. A. WOODBURY.

BURSTING CHARGE FOR CONTAINERS INTENDED TO BE EXPLODED AND PROCESS OF FORMING SAID CHARGES.

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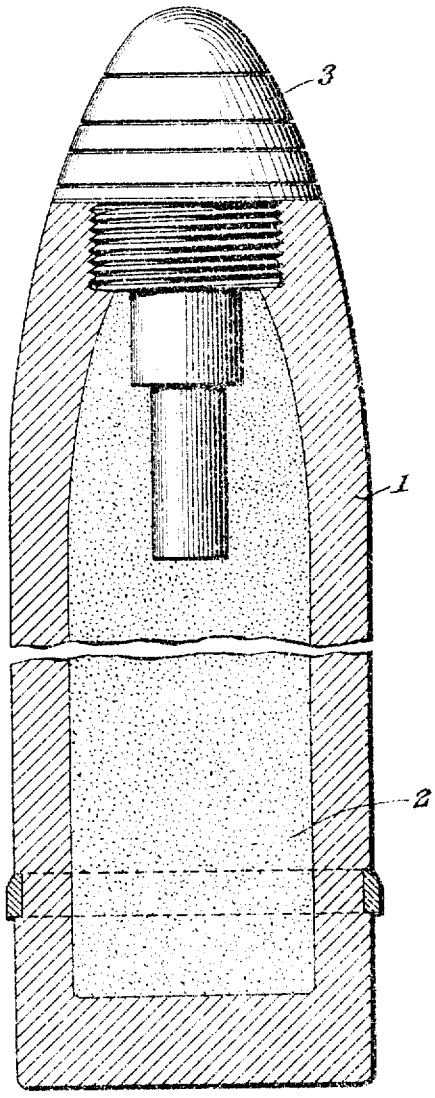

Inventor
Clifford A. Woodbury
By his Attorneys
Prindle, Wright & Small.

UNITED STATES PATENT OFFICE.

CLIFFORD A. WOODBURY, OF MIDDLETOWN TOWNSHIP, DELAWARE COUNTY, PENNSYLVANIA, ASSIGNOR TO E. I. DU PONT DE NEMOURS AND COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

BURSTING CHARGE FOR CONTAINERS INTENDED TO BE EXPLODED AND PROCESS OF FORMING SAID CHARGES.

1,312,464. Specification of Letters Patent. Patented Aug. 5, 1919.

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To all whom it may concern:

Be it known that I, CLIFFORD A. WOODBURY, of Middletown township, in the county of Delaware, and in the State of Pennsylvania, have invented a certain new and useful Improvement in Bursting Charges for Containers Intended to be Exploded and Processes of Forming Said Charges, and do hereby declare that the following is a full, clear, and exact description thereof.

This invention relates to a bursting charge for containers intended to be exploded, such as shells, grenades, torpedoes, mines, etc., and its object is to provide such a bursting charge which shall have, among others, the advantages of rendering available new sources of raw materials for bursting charges for high explosive containers and of providing a process by which said charge can be cast into said containers and there caused to solidify and completely fill the space provided for the charge, and to such ends the invention consists in a bursting charge for containers intended to be exploded, such as shells, grenades, torpedoes, mines, etc., and the process of forming said charge.

In the accompanying drawing the figure is an axial section of a shell containing a bursting charge embodying my invention.

The invention is capable of being carried out in different ways, but for the purpose of illustration only one form of the invention will be described herein. In filling containers intended to be exploded, such as shells, grenades, torpedoes, mines, etc, with bursting charges, it is desirable to introduce the largest possible charge into a given space, so as to produce the maximum bursting effect. Trinitrotoluol has heretofore been used to a very large extent, because, among other reasons, it has a relatively low melting point and is therefore easily melted and can be kept melted while being introduced into the shell or other body and does not freeze or solidify until it has reached the final condition in which it is to remain. The supply of trinitrotoluol, however, may not be adequate, and it is very desirable to render other materials available to replace the trinitrotoluol in whole or in part. I have discovered a new bursting charge for the said purpose, which is of high power; is safe for the purpose; and which bursting charge, though useful and available when introduced into the shell or other container in solid condition, has ingredients having melting points too high to permit such ingredients as a practical matter to be melted and cast into the shell. I have, therefore, invented a process by which the said ingredients can, in effect, become part of a molten mass of such low melting point as to be capable of being successfully cast into a shell and which charge has such qualities that it is solidified, is highly explosive, and is easily detonated; and yet is relatively safe under all ordinary conditions other than detonation.

The trinitrotoluol used in my bursting charge may be either a crude product, such as obtained by direct nitration of toluol, or a product obtained by refining the crude product.

My new bursting charge consists of a mixture of trinitrotoluol and picric acid, to which mixture may be added, if desired, trinitroxylene. The nitration of xylene is preferably so controlled as to produce a solid, finely divided product.

This bursting charge can be detonated by standard fuses or primers at present in use in shells and projectiles, and has an explosive force substantially equal to that of trinitrotoluol.

In charging a shell, the ingredients may be pressed into the shell in a dry condition making a compact charge which is readily detonated by the usual primer. It is desirable, however, as above stated, to cast the charge into the shell in order to get the maximum possible weight of explosive into the shell. The picric acid and the trinitroxylene, having melting points too high to permit them to be cast under commercial conditions, I have, as stated, invented a process by which the said ingredients can, in effect, become part of a molten mass of such low melting point as to be capable of being cast into a shell.

The trinitrotoluol is melted and the desired quantity of picric acid added, keeping the temperature well above the freezing point of the mixture. I believe the picric acid virtually goes into solution with the melted trinitrotoluol, producing a homo-

geneous liquid, although I do not wish to be bound by this expression of opinion. At temperatures of from 80° to 90° C. approximately 50 parts of picric acid can be added to 50 parts of trinitrotoluol before a point is reached where no further picric acid will dissolve in the melted trinitrotoluol.

To the mixture thus obtained may then be added either picric acid or trinitroxylene or both substances, keeping the temperature of the mixture well above its freezing point.

In case of adding further picric acid the amount that can be added can be varied within wide limits without seriously affecting the casting properties. This additional picric acid I believe to remain in suspension in the liquid mixture of picric acid and trinitrotoluol. I have found that a mixture of 25% trinitrotoluol and 75% picric acid can readily be cast into a shell or other container.

On adding the trinitroxylene to the mixture of trinitrotoluol and picric acid, I believe the explosive to be carried in suspension in the liquid mixture of trinitrotoluol and picric acid. The percentage of any one of the ingredients that may be added to the liquid mixture will necessarily vary, depending upon the fineness of the explosive and somewhat upon the temperature at which the mixing is carried on.

The following formulæ are typical of mixtures that can be used satisfactorily:

25% to 50% of trinitrotoluol.
75% to 50% of picric acid.

20% trinitrotoluol.
20% picric acid.
60% trinitroxylol.

33⅓% trinitrotoluol.
33⅓% picric acid.
33⅓% trinitroxylol.

25% trinitrotoluol.
50% picric acid.
25% trinitroxylol.

50% trinitrotoluol.
25% picric acid.
25% trinitroxylol.

In the figure of the accompanying drawing I have shown, more or less diagrammatically, a shell body 1 having within it a bursting charge 2, such as I have described, and having a detonating fuse 3 containing a detonator for detonating the bursting charge.

By the term "container" as used in the claims is meant a container intended to be exploded, such as a shell, grenade, torpedo, mine, etc.

I claim:

1. A bursting charge comprising trinitrotoluol, picric acid, and trinitroxylene.

2. A bursting charge comprising molten trinitrotoluol, picric acid, and trinitroxylene.

3. A bursting charge comprising the combination of not more than 50% molten trinitrotoluol with picric acid and trinitroxylene.

4. A bursting charge comprising a liquid containing trinitrotoluol having picric acid dissolved therein and trinitroxylene in suspension therein.

5. A bursting charge comprising a liquid containing trinitrotoluol having picric acid and trinitroxylene in suspension therein.

6. A bursting charge comprising a liquid containing trinitrotoluol having picric acid dissolved therein and picric acid and trinitroxylene in suspension therein.

7. A bursting charge comprising a liquid containing trinitrotoluol having picric acid and trinitroxylene dissolved therein and picric acid and trinitroxylene in suspension therein.

8. A bursting charge comprising 20% to 50% trinitrotoluol, 20% to 50% picric acid and 60% to 25% trinitroxylene.

9. A bursting charge comprising trinitrotoluene, picric acid and trinitroxylene, the amount of picric acid and trinitroxylene being in excess respectively of 50% and 10% of the amount of trinitrotoluene.

In testimony that I claim the foregoing I have hereunto set my hand.

CLIFFORD A. WOODBURY.