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1,543,851

G. B. HOLDERER

EXPLOSIVE CARTRIDGE

Filed Aug. 8, 1924

Fig. 1.

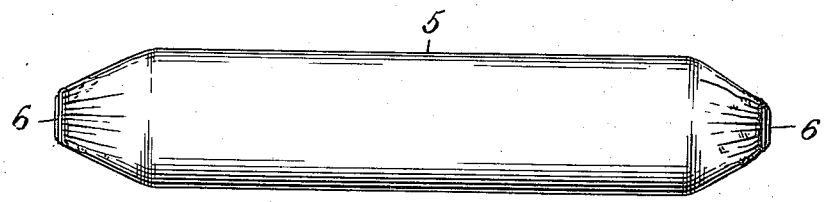


Fig. 2.

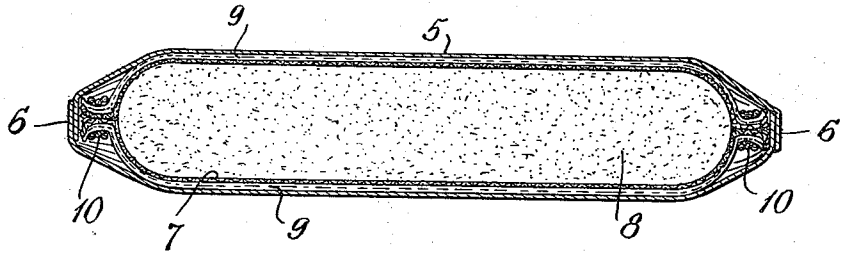
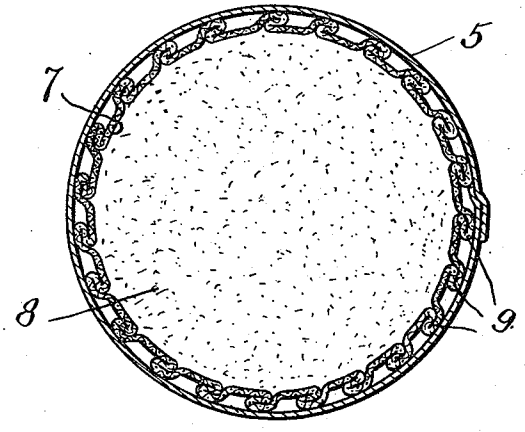


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE B. HOLDERER, OF NEW ROCHELLE, NEW YORK, ASSIGNOR TO AIR REDUCTION COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

EXPLOSIVE CARTRIDGE.

Application filed August 8, 1924. Serial No. 730,858.

To all whom it may concern:

Be it known that I, GEORGE B. HOLDERER, a citizen of the United States, residing at New Rochelle, in the county of Westchester, State of New York, have invented certain new and useful Improvements in Explosive Cartridges; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to explosive cartridges, and particularly to a type of cartridge containing a non-explosive material of a carbonaceous nature which is adapted to be saturated with liquid oxygen before insertion in the cavity in which it is to be exploded. Cartridges of this type have been suggested heretofore but they have been unsatisfactory because of the impossibility of properly loading the cavities, primarily because of the use of paper wrappers which become brittle at the low temperatures accompanying the use of liquid oxygen. When such a cartridge is tamped in the cavity the wrapper bursts and the explosive is scattered in the numerous crevices existing in the rock or other material to be shattered. Portions of the carbonaceous material may even be thrown from the cavity in an unburned condition forming dangerous powder trains which may cause premature explosions. If an attempt is made to avoid this difficulty by charging the cavities without tamping it will not be completely filled and the air spaces surrounding the cartridge will materially reduce the effectiveness of the explosion. This is particularly true where the required drilling must be done in stages and the cavity is reduced in diameter in its lower portions. Since the cartridges are of uniform diameter it is apparent that such a cavity cannot be filled properly. In either case the effectiveness of the explosion is not sufficient to warrant the substitution of liquid oxygen cartridges for other explosives in commercial operations on a large scale.

It is the object of the present invention to provide a cartridge of the character described having numerous advantages and capable of satisfactory and efficient use in competition with other explosives.

Further objects and advantages of the invention will be apparent as it is better understood by reference to the following specification and accompanying drawing; in which

Fig. 1 is a side elevation of a cartridge constructed in accordance with the invention.

Fig. 2 is a longitudinal section through the cartridge; and

Fig. 3 is an enlarged transverse section showing the peculiar construction of a cartridge casing.

In carrying out the invention I may use any suitable carbonaceous or other combustible material preferably in a finely divided form to facilitate the absorption of an adequate amount of liquid oxygen. Lamp black and carbon black are satisfactory materials for this purpose but others may be substituted. In addition to the carbonaceous material other substances may be added as fillers to improve or increase the explosive effect of the cartridge or to reduce the cost thereof. The particular materials employed in the body of the cartridge are not a part of the present invention which relates more especially to the wrapper therefor.

This wrapper comprises two parts, one of which is adapted to firmly hold the carbonaceous material during shipment of the cartridge and until it is placed in the cavity where it is to be exploded. The other part is designed particularly to permit expansion of the cartridge in the cavity without loss of any of the material therein contained. The inner wrapper is made of a closely woven textile material which will prevent escape of the carbonaceous material and is formed with longitudinal plates permitting the cartridge to be collapsed lengthwise and thus to expand so that it will conform to the shape of the cavity. The outer wrapper is made preferably of paper which is frangible, particularly at low temperatures. A cheap quality of paper may be used for this purpose so long as it is sufficiently strong to withstand handling. The outer or inner wrappers or both wrappers may be water-proofed by a coating or impregnation of any suitable material which will permit liquid oxygen to pass therethrough but which will exclude water. In this way the cartridge can be

rendered impervious to water in the cavity. Linseed oil is a suitable water-proofing agent but other substances may be used.

The cartridge is manufactured preferably by forming a tube of paper and drawing the inner wrapper of textile material, which has previously been made in tubular form, through the outer paper tube. The textile wrapper is of somewhat larger diameter than the paper wrapper so that when the cartridge is filled the textile material becomes folded or pleated longitudinally. After the carbonaceous material has been inserted the ends of the inner container can be tied or otherwise secured and the ends of the outer paper wrapper can be folded to seal the cartridge.

In this form the cartridge is harmless and can be shipped without special precautions. At the point where it is to be used it is dipped in liquid oxygen and allowed to remain for a sufficient time to permit absorption of sufficient oxygen to form an explosive composition. The cartridge thus soaked with liquid oxygen is placed in the cavity and tamped. The outer paper wrapper becomes frangible at low temperatures and the tamping causes it to break so that the inner wrapper of textile material is permitted to expand and thus to fill the cavity completely. Where the cavity is large a number of cartridges can be inserted and tamped in place.

The cartridge is fired by the insertion of a detonator of the usual kind in the head thereof. The detonator can be exploded by means of a fuse or electrically as desired.

Referring to the drawing, 5 indicates the outer wrapper of paper or equivalent material which encloses the cartridge and holds it firmly in shape. The paper wrapper is folded at 6 to close the ends thereof. The inner wrapper 7 of textile material encloses the carbonaceous material 8 and is formed with a plurality of longitudinal pleats 9. The ends of the inner textile wrapper are closed by tying or otherwise at 10. Either or both of the wrappers may be coated or impregnated with a water-repellent substance. In this form the cartridge is complete and ready for shipment to the point where it is to be used. At that point it is soaked in liquid oxygen and placed in the cavity before the oxygen has an opportunity to evaporate.

Among the particular advantages of the invention are the elimination of air space in the cavity and the increased amount of explosive material which can be inserted in a cavity of given dimensions owing to the possibility of expanding the cartridge with a consequent increase in the break of from 60 to 100 per cent, an increased quantity of liquid oxygen absorbed because of the absorptive character of the textile wrapper and lengthened life of the cartridge after soaking in the liquid oxygen because of the tendency of the textile wrapper to retard evaporation.

Various changes may be made in the details of construction and arrangement of the cartridge without departing from the invention or sacrificing any of the advantages thereof.

I claim:

1. In an explosive cartridge a filling of carbonaceous material, an inner wrapper of textile material, an outer wrapper of frangible material, the inner wrapper being adapted to expand and to hold the filling when the outer wrapper is broken.

2. In an explosive cartridge a filling of carbonaceous material, an inner wrapper of textile material having longitudinal pleats therein permitting the cartridge to expand and an outer wrapper of frangible material which is adapted to be broken and thus to permit the inner wrapper to conform to the shape of the cavity in which the cartridge is placed.

3. In an explosive cartridge a filling of carbonaceous material, an inner expansible wrapper of textile material and an outer wrapper of paper.

4. In an explosive cartridge a filling of carbonaceous material, an inner wrapper of textile material having longitudinal pleats therein and an outer wrapper of paper.

In testimony whereof I affix my signature.

GEORGE B. HOLDERER.