

# UNITED STATES PATENT OFFICE.

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## DYNAMITE CARTRIDGE.

No Drawing.

Application filed June 9, 1923. Serial No. 644,497.

*To all whom it may concern:*

Be it known that I, ERLING A. HEDIN, a citizen of the United States, residing at Upper Darby, in the county of Delaware and State of Pennsylvania, have invented a new and useful Improvement in Dynamite Cartridges, of which the following is a specification.

The principal object of the present invention is to provide a dynamite cartridge enclosed in carbonaceous coated or impregnated paper and which upon explosion gives off fumes practically free from noxious gases, which permits of the use of the composition of dynamite most appropriate for strength, which can be manufactured with a minimum waste of paper and of paper strong enough to stand up in shell making machinery, which can be sprayed with paraffine upon its completion, and which therefore avoids the use of paper which is slippery in the machines and provides for the use of paper that can be readily and satisfactorily printed upon.

To these and other ends hereinafter set forth the invention comprises a cartridge consisting of dynamite that need not have more oxygen in its make-up than is desired for combustion of the ingredients in the dynamite itself exclusive of the wrapper, and of paraffined or like paper containing an oxidation agent for the complete combustion of the paper and of the paraffine.

According to my invention use is made in the cartridges of paper to which has been added or which incorporates an oxidation agent such as potassium chlorate, sodium or potassium nitrate, barium peroxide or other like agent capable of giving off oxygen upon combustion of the paper.

By the present invention the shells or cartridges can be manufactured from paper in the unparaffined state, and this reduces the waste of paper to a minimum because such paper is not slippery and works well in the machines, and any waste made can be readily disposed of to paper mills. By the present invention the shells or cartridges can be sprayed with paraffine which is advantageous because a comparatively large quantity of paraffine can be applied, and this makes the shells impervious to moisture and obviates leakage of nitro-glycerine. Again by the present invention the paper

can be strong enough or heavy enough to stand up in the shell-making machines, and since the paper need not be paraffined until after the completion of the shells or cartridges, the unparaffined paper can be satisfactorily printed upon.

Good results can be obtained by the use of paper containing, before paraffining, 20% of an oxidation agent such as sodium nitrate and 80% of carbonaceous material, for example, unbleached sulphite pulp and having a thickness of .0050 of an inch and a weight of 0.022 pound per square foot. In the finished cartridge or shell there is about 20% of paraffine.

In the use of the described cartridge or shell of my invention, I have found that fumes produced by 60% gelatine dynamite in underground workings are practically free from carbon monoxide and it is possible to enter the workings immediately after the blast without detriment, in contrast with waiting for a considerable length of time before entering the workings which was necessary in the use of all dynamite cartridges of which I have knowledge and which were put up in regular spray paraffined wrappers, with the chance even then of trouble from fumes. Among examples of dynamite compositions in connection with which my invention may be used I may cite the following, although I desire it to be understood that the invention is by no means limited to the following compositions but includes broadly the use of paper of the type described as an ingredient with commercial dynamites and gelatine dynamites of cartridges and shells.

(1) 3.5% paper of the following composition,

|                                     | Per cent. |
|-------------------------------------|-----------|
| Wood pulp-----                      | 60        |
| Oxidizing agent sodium nitrate----- | 15        |
| Paraffine-----                      | 25        |

96.5% gelatine dynamite of the following composition,

|                            | Per cent. |
|----------------------------|-----------|
| Nitro-glycerin-----        | 50        |
| Nitro-cellulose-----       | 1         |
| Nitrate of soda-----       | 40        |
| Carbonaceous material----- | 8         |
| Chalk-----                 | 1         |

(2) 6.2% paper of the formerly mentioned composition and 93.8% ammonia dynamite of the following composition:

|                            | Per cent. |
|----------------------------|-----------|
| 5 Nitro-glycerin.....      | 10        |
| Nitrate of ammonia.....    | 77        |
| Nitrate of soda.....       | 3         |
| Carbonaceous material..... | 10        |

10 (3) 3.9% paper as above and 96.1% dynamite of the following composition:

|                          | Per cent. |
|--------------------------|-----------|
| 15 Nitro-glycerin.....   | 17        |
| Nitrate of ammonia.....  | 30        |
| Nitrate of soda.....     | 40        |
| Carbonaceous matter..... | 12        |
| Chalk.....               | 1         |

For the sake of further description it may be said that in a shell or cartridge embodying my invention dynamite of the required composition for producing the most advantageous results is employed without reference being had to the effect of the paper and paraffine in the explosion because complete combustion of the paper and paraffine substantially to carbon dioxide is insured by the incorporation of an agent in the wrapper adapted when the explosion occurs to provide the necessary supply of oxygen. While I have referred to the incorporation of the oxidizing agent in the paper the real point is to get it into the wrapper and hence the introduction of the oxidizing agent into the coating or impregnating substance is regarded by me as an equivalent.

It will be obvious to those skilled in the

art to which the invention relates that modifications may be made in details and in the use of chemical equivalents and in matters of form, hence the invention is not limited in those respects or otherwise than as the prior art and the appended claims may require and since the invention is of a chemical nature, I reserve to myself the comparatively broad doctrine of equivalents established in such cases.

I claim:

1. A dynamite cartridge comprising dynamite enclosed in carbonaceous coated paper containing an oxidation agent adapted to furnish oxygen for the complete combustion of the paper and coating without interfering with the appropriate combustion of the dynamite.

2. A dynamite cartridge comprising dynamite which upon explosion of the cartridge provides oxygen appropriate for combustion of the dynamite, and impregnated paper which upon explosion of the cartridge provides oxygen appropriate for substantially complete combustion of the paper and impregnating material.

3. A dynamite cartridge having in its make-up an ingredient which upon explosion of the cartridge provides oxygen appropriate for combustion of the dynamite, and paraffined paper having in its make-up an ingredient which upon explosion of the cartridge provides oxygen appropriate for substantially complete combustion of the paper and paraffine.

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