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DYNAMITE CARTRIDGE.

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To all whom it may concern:

Be it known that I, ERLING A. HEDIN, a citizen of the United States, and a resident of Chester, in the county of Delaware and State of Pennsylvania, have invented a certain new and useful Dynamite Cartridge, of which the following is a specification.

This invention relates to dynamite cartridges, and particularly to the combination, with the body of dynamite, of a paper shell or wrapper of a special composition adapted to yield, upon explosion of the dynamite, a substantially smaller amount of carbon monoxide than results from the paper shells heretofore used.

The object of my invention is to provide a paper of such properties that fumes resulting from the explosion of the dynamite may be practically free from noxious gases, as compared with dynamites having the previously used composition of paper in the cartridges.

Commercial dynamites are as a rule put up in paraffined paper cartridges of dimensions varying from $\frac{7}{8}''$ diameter by 4″ length to 4″ diameter by 8″ length, and in the use of such dynamites they are as a rule loaded into the bore hole without removal of the wrapper. In consequence, the wrapper being composed of carbonaceous material, takes part in the explosion of the dynamite as one of the ingredients thereof, and should be considered an essential part of the dynamite composition. Since most dynamite compositions have little more than enough oxygen in their make up to provide complete combustion to CO_2 of all the carbonaceous matter in the dynamite mixture exclusive of paper, the presence of the paper greatly increases the proportion of carbon monoxide in the gases resulting from the explosion. This is particularly objectionable in underground work, such as the driving of tunnels through hard rock, where ventilation is necessarily insufficient.

In the past, therefore, efforts have been made to reduce the amount of CO by two different methods. The first depended upon so adjusting the composition of the dynamite as to give the lowest possible CO content in the resultant gases. This method is limited by the fact that too great an excess of oxygen in the dynamite composition exclusive of paper, tends to produce a lower strength in the dynamite.

The second method has depended on reducing the weight of paper used in the cartridge so as to reduce the excess of carbonaceous matter. This method, while successful so far as fumes are concerned, has been open to the objection that light weight papers, while they can be made strong, are too thin and flimsy to stand up in the loading machines. The large amount of waste powder and waste paper resulting from the use of this method, greatly increases the cost of the finished product.

According to my invention, the objections to both of the previous methods have been satisfactorily overcome by the use in the cartridges of a paper in which a substantial portion of the carbonaceous matter has been replaced by inorganic matter such as china clay, talc, calcium or barium sulphates or similar filling materials. Additional advantage may be given by careful regulation of the amount of paraffin applied to the paper. The use of these materials reduces the amount of carbonaceous matter contributed to the dynamite by the paper and at the same time does away with any appreciable diminution of thickness or stiffness of the paper so that it works satisfactorily on the shell making machines and in the loading machines.

For example, a previously used paper has a weight before paraffining of .0243 lbs. per sq. ft. and a thickness of .0050 inch. The paper I prefer to use in my improved composition contains before paraffining 20% of loading, for example clay; 80% carbonaceous matter, for example, unbleached sulphite pulp, and has a thickness of .0050 inch and a weight before paraffining of .0243 lbs. per sq. ft.

By the use of dynamite with cartridge paper such as described, I have found that fumes produced by 60% gelatin dynamite in underground work are so low in CO content, that it has been possible to enter a working immediately after a blast without detriment, in comparison with the former necessity of waiting for a considerable length of time before entering a working, with the chance even then of trouble from fumes.

As examples of dynamite compositions in

which my invention may be used, I may cite the following, though it is to be understood that the invention is not limited to these compositions, but includes broadly the use of a paper of the type described in combination with commercial dynamites and gelatin dynamites:

(1) 3.5% paper of the following composition:

Wood pulp	72%
Inert material	16%
Paraffin	12%

and 96.5% gelatin dynamite of the following composition:

Nitroglycerin	50%
Nitrocellulose	1%
Nitrate of soda	40%
Carbonaceous matter	8%
Chalk	1%

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

Nitroglycerin	10%
Nitrate of ammonia	77%
Nitrate of soda	3%
Carbonaceous matter	10%

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

Nitroglycerin	17%
Nitrate of ammonia	30%
Nitrate of soda	40%
Carbonaceous matter	12%
Chalk	1%

As will be evident from the above description, my invention is not limited to dynamite cartridges in which the paper before coating contains 18 to 20% of inert loading material, but includes the use of paper containing a substantial proportion, and preferably more than 10%, of loading material, but not so much thereof as to unduly lower the strength of the paper. The above-mentioned percentages of loading material correspond to about 16 or 18%, and to more than about 9%, respectively, based upon the coated paper containing 12% of paraffin. The paper shell will ordinarily amount to from about 3 to 7% of the weight of the dynamite cartridge.

I claim:

1. A dynamite cartridge comprising dynamite enclosed in coated carbonaceous paper containing more than 9% of inert loading material.

2. A dynamite cartridge comprising dynamite enclosed in coated carbonaceous paper containing from about 16 to 18% of inert loading material.

3. A dynamite cartridge comprising dynamite enclosed in loaded carbonaceous paper in which the ratio of carbonaceous material to inert loading material is less than ten to one.

4. A dynamite cartridge containing a dynamite of such composition that an increase amounting to about 5% (based upon the weight of the dynamite) of its carbonaceous ingredient would cause a substantial increase in the carbon monoxide content of the gases resulting from the explosion of said dynamite, and having a paper shell in which the ratio of carbonaceous material to inert loading material is less than ten to one.

5. A dynamite cartridge containing a dynamite of such composition that an increase amounting to about 5% (based upon the weight of the dynamite) of its carbonaceous ingredient would cause a substantial increase in the carbon monoxide content of the gases resulting from the explosion of said dynamite, and having a paper shell whose weight is from about 3 to 7% of the total weight of the cartridge, and in which the ratio of carbonaceous material to inert loading material is less than ten to one.

6. A dynamite cartridge containing a dynamite of such composition that an increase amounting to about 5% (based upon the weight of the dynamite) of its carbonaceous ingredient would cause a substantial increase in the carbon monoxide content of the gases resulting from the explosion of said dynamite, and having a paper shell whose weight is from about 3 to 7% of the total weight of the cartridge, and which contains from about 16 to 18% of inert loading material.

In testimony whereof I affix my signature.

ERLING A. HEDIN