UNITED STATES PATENT OFFICE.

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EXPLOSIVE COMPOUND.

1,054,515. Specification of Letters Patent. Patented Feb. 25, 1913.

No Drawing. Application filed May 27, 1912. Serial No. 699,872.

To all whom it may concern:

Be it known that I, CHARLES F. DIPPEL, a citizen of the United States, residing at Brenham, in the county of Washington and State of Texas, have invented certain new and useful Improvements in Explosive Compounds, of which the following is a specification.

This invention relates to explosive compounds of that character employing as a base potassium chlorate or its equivalent, the object of the invention being to provide an explosive compound of this particular type which is free from the defects of prior explosives of its class and which embodies substantial advantages resulting from its particular combination of ingredients and their specific coaction, as hereinafter fully described.

In carrying my invention into practice I provide an explosive compound consisting, essentially, of potassium chlorate, two parts, white granulated sugar, one part, and alcohol sufficient to slightly moisten the mass, although more or less alcohol may be used according to the rapidity of ignition desired or period for which the compound is to be kept before use. In practice, denatured alcohol (such as grain alcohol containing a denaturing substance consisting of or including petroleum benzin or other volatile hydrocarbon) is preferably employed.

The compound is prepared in suitable quantities by simply mixing the ingredients in the proportions named. This can be done by putting the potassium chlorate and granulated sugar in a tube or receptacle, sprinkling the alcohol thereon, and then stirring and mixing the mass by means of a wooden paddle. The compound is then sealed for use or sale in air-tight receptacles, whereby evaporation of the alcohol is eliminated or reduced to the minimum.

The compound thus manufactured is ready for immediate use, but does not deteriorate or become dangerous with age, and hence possesses desirable keeping qualities. Experiments have shown that quantities of this compound manufactured sixteen months ignite as rapidly and explode with the same force as quantities recently made. It has also been demonstrated that the compound may be safely mixed and handled, as it does not explode by attrition or concussion, in which respect it differs from all prior chlorate of potash explosives with which I am familiar, and does not require the dangerous use of caps to explode it, as it may be set off by means of a fuse as in the use of ordinary explosive powders. However, it may be exploded by the use of caps, if desired. Unless this compound is confined, it will not explode upon ignition, but will simply burn up.

The explosive can be made into sticks of suitable size, which can be used for blasting under water or for overhead blasting. These sticks are made by pressing the compound into molds, of such size as desired, immediately after mixing. After being thus pressed into molds and dried therein, the sticks are hard and when subjected to a spark will explode with the same degree of force as the powder. For use under water, the sticks must be wrapped in oil paper, or coated with paraffin. These sticks, unlike dynamite, do not become dangerous with age, are not dangerous in handling, and do not explode by concussion, and are therefore a more useful exposive than dynamite. The coating of these sticks with paraffin will serve to prevent evaporation of the alcohol. Sodium chlorate may under some conditions be used with advantage instead of and as a substitute for potassium chlorate, and such modification is held to fall within the scope of the invention.

This improved explosive compound has considerably greater strength than gunpowder or blasting powder, and approximately the same explosive force as forty per cent. dynamite, but has greater blasting power than dynamite of this strength, as, unlike dynamite, it gives a high degree of breaking power in all directions. It is highly desirable for use in blasting in mines, tunnels, quarries and other inclosed spaces, as it does not generate any inconvenient or annoying amount of noxious gases and involve the loss of time and expenses incurred in ridding a mine of gases after a blasting operation. Moreover, the explosive is cheap, and by its use a greater amount of material may be blasted out with a given amount of explosive than by the use of any of the ordinary blasting powders. The compound may also be used as a smokeless powder for firearms, as it will not foul or otherwise injure the gun.

It is well known that many attempts have

been unsuccessfully made to utilize chlorate of potash as a powder base, on account of the instability of such substance and its liability to easily explode by attrition or percussion when mixed with other substances either during or after admixture. I have found by extensive experimentation that these defects are overcome by a combination of the ingredients employed by me in the proportions named, and a safe and reliable explosive produced. The sugar may be used in less proportion to that named to reduce the explosive force of the compound, but in the proportion of one part to two parts of the chlorate of potash furnishes maximum explosive power, any greater amount being both objectionable and excessive. The alcohol serves several purposes. Its addition, without other substances, to the chlorate and sugar, in some manner reduces to a material degree or prevents explosion of the mixture by attrition or percussion, and renders innocuous the small proportion of slightly obnoxious harmless gases generated, thus making the compound capable of being safely manufactured, stored and handled. Moreover, the alcohol increases the rapidity of ignition of the particles, and accordingly enhances the explosive force of the powder. This action is further promoted by the action of the denatured alcohol, through the increased inflammability due to the presence of the benzin or denaturing substance. By storing the compound in sealed containers evaporation of the alcohol to any appreciable degree may be prevented, but any loss of alcohol may be compensated for at any time in an obvious manner.

I am aware of the fact that it has heretofore been proposed to combine sugar and potassium chlorate with water, the mixture being dried, granulated and ground into a powder. Such a combination, however, cannot be safely made or preserved, and the necessary step of grinding increases the cost of production and cannot under any ordinary conditions be carried out without an explosion.

I am also aware of the fact that it has heretofore been proposed to combine chlorate of potash and sugar in equal parts, but for reasons stated this compound would be ineffective and could not be safely made or kept.

I am also aware of the fact that it has heretofore been proposed to combine sugar and chlorate of potash in other proportions than those employed by me, and also to use with such mixtures alcohol as a solvent for other substances, but not in the manner or for the purpose employed by me, and that it has also been proposed to combine with such mixtures alum, sulfur and other substances, which cannot be employed without causing attrition or chemical changes rendering it difficult to make or keep the mixture without producing an explosion, and which objections I am enabled to avoid through the combination herein disclosed.

The term "anhydrous," as used in the claims is intended to indicate that the material is substantially free from water; such small traces of water as are liable to be present in the materials, chlorate and sugar, being included, and such amounts of water as are usually found in denatured alcohol also being included. I, therefore, do not claim any of such combinations, but

What I do claim as new and desire to secure by Letters-Patent is:—

1. An explosive compound consisting, essentially, of an anhydrous admixture of potassium chlorate, two parts, white granulated sugar, one part, and denatured alcohol.

2. An explosive compound consisting, essentially, of an anhydrous admixture of potassium chlorate, two parts, white granulated sugar, one part, alcohol, and a volatile hydrocarbon.

3. An explosive consisting of potassium chlorate, two parts; sugar, one part; and a small amount of alcohol and a volatile hydrocarbon.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES F. DIPPEL.

Witnesses:
B. F. TEAGUE,
A. J. WENDT.