

UNITED STATES PATENT OFFICE.

R. O. DOREMUS AND B. L. BUDD, OF NEW YORK, N. Y.

IMPROVEMENT IN TREATING GUNPOWDER TO FORM CARTRIDGES.

Specification forming part of Letters Patent No. **34,724**, dated March 18, 1862.

To all whom it may concern:

Be it known that we, R. OGDEN DOREMUS and BERN L. BUDD, of the city, county, and State of New York, have invented or discovered a new Mode of Treating Gunpowder to Form it into Cartridges and for other Purposes; and we do hereby declare that the following is a full, clear, and exact description of the same.

Our invention has for its object the formation of ordinary gunpowder into the various shapes it is found advantageous to employ it in the loading of fire-arms—that is to say, as cartridges, &c.—in which shaping we have been enabled to dispense with the use of paper, pasteboard, woolen, or cases of any kind.

The nature of our invention consists therefore in certain means which have been discovered by us, for molding the loose grains of powder into certain fixed or solid forms or shapes, which it will retain under the usual handling and transportation of cartridges made in the old way, and this formation we effect without any deterioration of its qualities for discharging projectiles from any of the known kinds of fire-arms, but, on the contrary, with greatly-improved effect over loose powder. There result certain great advantages from our process, among the most important of which is the ability to govern the rapidity of combustion, either of the whole charge or of portions of it, whereby the principle of acceleration can be employed; second, reduction in bulk, so that a larger quantity may be transported in a given space than in the case of granular powder; third, the granular form of the powder not destroyed, although compacted into masses, so that if occasion require said powder can be easily reduced to its original condition without detriment; fourth, it does not deteriorate by age or require the continuous shifting and turning that loose powder does to prevent its caking; fifth, does not readily absorb moisture, and may be made wholly water-proof; sixth, is not liable to accidental explosions on account of the absence of loose grains; seventh, the powder is formed by our process into cylinders, balls, or any other desired form to fit the bores of guns and of the weight suitable for each charge.

Our process is as follows: We procure suitable molds to receive the powder to be formed into cartridges, with pistons fitted to them.

The molds being of the size and shape to give the correct form to the cartridge for the different-sized guns, loose powder is then poured into such a mold as has been selected, sufficient for a charge. The piston is then fitted in and pressure applied until the powder is sufficiently condensed to cause the grains to adhere to each other.

We have discovered that the rate of combustion of the intended cartridge can be regulated by the different degrees of pressure applied to the piston. Accordingly, having ascertained by experiments the best for the purpose, it is only necessary to continue the application of the same force to all other charges to produce any quantity of cartridges of the same quality.

In order to prepare cartridges upon the principle above described, various degrees of pressure will be employed, according to the nature of the fire-arm in which they are to be used, as well as the projectile to be thrown. To prepare a cartridge—as, for example, for a six-pounder cannon, in which one and a quarter pound of powder constitutes a charge—a cylindrical mold is to be formed of some suitable metal, as brass, whose bore is such that the cartridge to be formed therein will enter the gun. One and a quarter pound of powder is then to be introduced and the piston fitted in. Pressure is applied by means of any suitable machine, as a hydraulic press, until the powder has been condensed by a power equivalent to fifteen tons weight. The piston is then to be taken out of the mold and the powder discharged. It will now be found to have become completely compacted into a solid mass, which may be handled without risk of breaking, and in which form the granular formation of the powder still exists. In making charges which shall have different rates of combustibility in the same cartridge, the powder must be introduced into the mold in successive portions. Those for obtaining three rates of combustibility the powder must be divided into three parts or portions. One portion is then submitted to pressure, say, of twenty-five tons, then the piston removed, and the next portion poured upon the first, and pressure again applied up to twenty tons, and, finally, the last portion is submitted to a pressure of fifteen tons. The whole of the powder will then have been compacted into one mass having three distinct

strata, in each of which the combustion will be different, that portion having received the greatest pressure consuming more slowly than the other portions. It will only be necessary, therefore, to calculate the area of the bore of any other sized cannon and the quantity of powder for a charge to be able to apply the proper pressure to produce cartridges having the same rate of combustion as in the case of those above described. Inasmuch, however, as the uses to which cartridges of compacted powder can be put and the results to be accomplished by them are so various, so must the shapes of the molds and the pressures vary, and those variations in quality and rates of combustion which will be found best for the several purposes can only be ascertained by experiment. After the powder has received sufficient pressure it is discharged from the mold, and is then ready for use. It will then be capable of being handled without any danger of breaking, and its application to use is the same as any ordinary cartridge.

Cartridges formed by solidifying the powder into masses of suitable shape on the principle herein described will resist the action of moisture for a much longer period than when in loose grains. It can also be wholly protected by inclosing each cartridge within a separate case or box of thin copper, zinc, papier-maché, &c.; or we can make it water-proof in itself by varnishing the outside with shellac, collodion, or other material of similar nature which is not soluble in water.

The operation is as follows: The loose powder having been molded into form, as described, it is only necessary to insert one of the cylinders into the gun, and on this the ball, properly "patched" for the prevention of windage when the charge is fired by percussion-caps or any other known primer, as usual. In the case of cannons the molds are also of a size to form the powder into cylinders of the size of

their bore, and are ready for use without any cases or other covering, from which it will be seen that great advantages necessarily result from the ability to dispense with flannel, mo-reen, &c., from the use of which arises the chief source of fouling the gun, and the necessity for such frequent spongings is thus avoided.

The powder may also be prepared in various forms by our process for use in loading shells and other explosive missiles.

The principle of acceleration is obtained as follows: The powder is to be compacted to a greater or less degree of density for different degrees of combustibility—that is to say, the more dense it is the slower it will be consumed. We therefore form cartridges which shall have different degrees of combustibility at different portions or strata, and this we accomplish by putting the powder into the mold in successive portions and compacting them to a greater or less degree of density. Thus the first portion introduced may be submitted to very heavy pressure, the next portions to less pressure, and so on.

What we claim is—

1. Forming the ordinary granulated gun-powder of commerce into solid shape suitable for use as cartridges or for other purposes by compacting the same in dry condition within molds by pressure so applied as to condense said powder into the shapes substantially as described.

2. The cartridge formed of powder in strata of different degrees of combustibility, and compacted as described, and for the purposes set forth herein.

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Witnesses:

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