UNITED STATES PATENT OFFICE.

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PROCESS OF PRODUCING PROPELLENT POWDER.

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To all whom it may concern:

Be it known that I, OLIVER J. TEEPLE, JR., of Wilmington, in the county of New Castle, and in the State of Delaware, have invented a certain new and useful Improvement in Processes of Producing Propellent Powder, and do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to an improvement in processes of making propellent powders, but more particularly progressive powders, that is to say, powders provided with coatings designed to retard the combustion, so as to provide a lower initial pressure.

The object of my invention is to provide a process for producing, in an advantageous manner, propellent powders, and more particularly, powders of the progressive type, which latter are designed for the purpose of providing a lower initial pressure without decreasing the velocity of the projectile. More particularly, the object of my invention is to provide a process by means of which powder grains may have their surfaces impregnated with compounds designed to retard the combustion in a very simple manner and in such a way as to at the same time prevent the powder grains from adhering together. A further object of my invention is to avoid the use of dangerous and inflammable solvents in the coating process so as to thereby avoid loss and the danger due to the escape of the solvent vapors.

While my invention is capable of being carried out in many different ways, for the purpose of illustration, I shall describe only one way in which my invention may be carried out. By way of example my process may be carried out as follows:

A quantity of a nitrocellulose or gelatinized smokeless powder in the form of grains is introduced into the revolving drum provided with ports for the introduction and escape of steam. A quantity of a nitrohydrocarbon, as for example, dinitrotoluene, which can exert a solvent action upon the grain is now introduced into the drum in the form of a powder. The drum is now revolved for a short interval of time until the powder grains and the dinitrotoluene are thoroughly mixed. A hot aqueous vapor which may be steam alone or steam mixed with another suitable gas or vapor is then admitted to the apparatus while the drum is being revolved. As a result the dinitrotoluene is melted so that the nitrocellulose grains become coated and impregnated at the surface with the melted dinitrotoluene. When the coating and surface-impregnation has been completed the supply of steam is cut off and the coated powder grains are permitted to cool. It will be found that by this treatment the grains of nitrocellulose will have been uniformly impregnated at the surface with the melted dinitrotoluene, and that the powder grains do not adhere to one another during the process. This is an important difference over the treatment by means of hot air hitherto proposed, as by the latter method the action of the hot air causes the powder grains to adhere to one another, so that it becomes necessary to provide means for separating the grains for that reason. In my process there is no tendency for the grains to adhere to one another at any time. This may be due to the presence of water formed by the condensation of the steam in small amounts or to other causes.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit thereof.

I claim:—

1. The process which comprises tumbling a gelatinized powder grain with a powdered material which is a solvent for the grain, and then melting the solvent during the continued tumbling operation with a hot aqueous vapor to impregnate the surface of the grain with the solvent.

2. The process which comprises tumbling a gelatinized powder grain with a material which is a solvent for the grain, and melting the solvent during the tumbling operation with a hot aqueous vapor to colloid the solvent with the material of the powder grain and impregnate the surface of the grain with the solvent.

3. The process which comprises tumbling a gelatinized powder grain with a powdered dinitrotoluene mixture, and melting the dinitrotoluene with steam during the tumbling operation to colloid the solvent with the material of the powder grain, and impregnate the surface of the grain with the solvent.

4. The process which comprises tumbling a gelatinized nitrocellulose grain with a

material which can exert a solvent action on the grain, and heating the powder and solvent during the tumbling operation to a temperature sufficient to melt the solvent in the presence of water vapor to colloid the solvent with the surface material of the nitrocellulose grain, and thus impregnate the surface of the grain with the solvent.

5. The process which comprises applying to a gelatinized powder grain a powdered material which can exert a solvent action on the grain, and melting said material with a hot vapor to impregnate the surface of the grain with said material.

6. The process which comprises applying to a gelatinized powder grain a dinitrotoluene solvent, and melting the dinitrotoluene with steam to colloid the dinitrotoluene with the material of the powder grain, and impregnate the surface of the grain with the dinitrotoluene.

7. The process which comprises applying to a gelatinized powder grain a material which can exert a solvent action on the grain, and heating the powder and said material to a temperature sufficient to melt the material in the presence of water vapor to colloid the material with the surface material of the grain, and impregnate the surface of the grain with said material.

In testimony that I claim the foregoing I have hereunto set my hand.

OLIVER J. TEEPLE, JR.

Witnesses:
W. W. RICHARDS,
F. W. BRADWAY.