

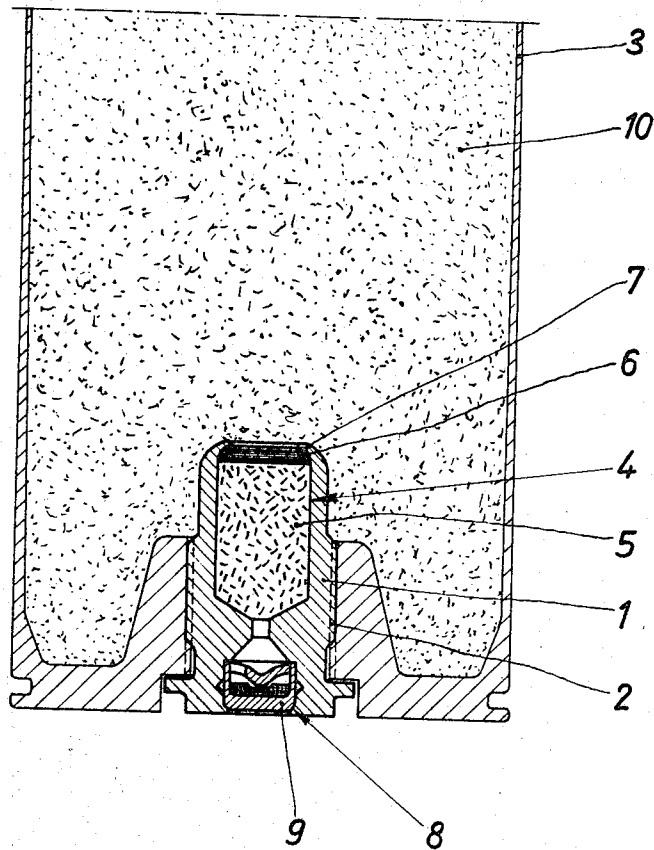
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PRIMER CHARGE

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**PRIMER CHARGE**

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1 Claim. (Cl. 102-86.5)

This application is a continuation-in-part of co-pending application Ser. No. 104,546 filed Apr. 21, 1961, now abandoned.

The invention relates to a primer charge of smokeless powder for the ignition of propellant charges, and in particular to a primer charge for threaded percussion primers such as are customary in 20 to 40 mm. cartridges for automatic guns.

When primer or ignition charges of this type are used, sometimes a surprisingly large amount of smoke develops upon the firing of certain propellant charges, the cause being insufficient firing pressure and/or insufficient heat in the flame developed by the primer charge, burning gases usually emerging at the same time on the breech side of the gun which process may lead, in extreme cases, to so-called "breech firing." This can endanger the crew of such a gun to a considerable extent, particularly when these guns are built into enclosed spaces such as tanks, bunkers, etc.

This "breech firing" occurs for example in gas-operated guns, usually when the combustion of the powder gases has not been completed by the time that the forward-moving projectile passes the bleed-opening in the barrel and thus exposes this opening from which, as is known, the gas pressure for unlocking the breech mechanism is tapped. Similar processes also occur in recoil-operated guns, especially when the combustion of the powder gases has not been completed by the time the opening movement of the breech mechanism commences.

The invention has for its object to obviate these disadvantages and to provide a primer charge which creates the conditions for a well-timed combustion process, that is, which is capable of influencing the initiation of the ignition, and thus, the further progress of the combustion of the propellant charge progresses in such a way that a pre-determined pressure maximum is achieved and the termination of the combustion process is placed, in time and space, precisely in a pre-determined point of the gas pressure characteristic. The primer charge, in other words, is to have characteristics and a composition such that, when matched to a given propellant used in the cartridge, it generates a sufficiently high firing pressure as well as a sufficiently hot ignition flame.

According to the present invention, this object is achieved in that the primer charge is composed of a mixture of porous nitro-cellulose powder (determining the gas pressure of the ignition) and nitro-glycerin powder (oxygen-carrying agent for a hot flame). The best possible quantity ratio of this mixture will have to be established for each particular case when the chemical composition and thus the pyrotechnical properties of the type of powder which is used as the propellant charge will be taken into account, as well as the construction of the gun itself, since the instant when the breech is unlocked largely depends on this construction. As proportions of the mixture that may be produced as to the porous nitro-cellulose powder with the nitro-glycerin powder is in proportions between 2:1 and 7.5:1.

The addition of the nitroglycerin powder component may take place in a number of different ways, still within the scope of the invention. Thus, it is possible, for ex-

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ample, to mix the porous nitro-glycerin powder with the nitro-cellulose powder; however, the nitro-glycerin powder may also be inserted in the threaded percussion primer in the form of a foil or like element.

In the latter case, it may be advantageous to use such a foil simultaneously as a cover foil or lid for the threaded percussion primer.

The nitro-cellulose powder used in the threaded percussion primer as a priming charge is a porous non-surface treated nitro-cellulose powder (single base powder), having a nitro-cellulose content of approximately 97%, whereas, the propellant charge powder is a homogeneous surface treated nitro-cellulose powder with an approximation of about 93-94% nitro-cellulose. The oxygen content of the powder in both cases is about 12.2%.

By the mention of nitro-glycerin powder is understood a nitro-cellulose powder treated with nitro-glycerin. Nitro-glycerin powder, that is a double base powder, is produced for example, by gelatinizing tri-nitro-cellulose with nitro-glycerin, whereby the nitro-glycerin is remaining as a gelatinizer in the nitro-cellulose powder. This nitro-glycerin powder, used as a component of the primer charge mixture, has a nitro-glycerin content about 44.5% and a nitro-cellulose content about 52.5%.

According to the invention, the primer charge is produced for the purpose of providing combustion and lighting the propelling charge from a mixture of porous nitro-cellulose powder (single base powder) with nitro-glycerin powder (double base powder).

By the expression "porous nitro-cellulose powder," there is understood in the art such a nitro-cellulose powder which is produced from gelatinized nitro-cellulose by suitable grinding so that the powder will have a particular and definite granular size, whereby a greater porosity is achieved by different ways, also well known in the art.

In the invention, use is made of a porous nitro-cellulose powder to achieve a particularly high ignition pressure, the nitro-glycerin powder which is the oxygen material carrier, is mixed therewith in order to produce an adequate hot igniting flame. The excess of oxygen relative to the nitro-glycerin powder will provide thereby for the discharge of the burning process with such strength that the gas from the ignition and propelling charge will be totally burned when the breech block is opened. Due to the more rapid combustion, there is attained at the same time also an acceleration of the driving charge gases toward the muzzle of the gun so that the former tendency of the gases to remain behind or forced backwardly, is practically reversed and upon opening the breech block there will be no danger of combustion gases being forced out through the rear of the gun.

The drawing shows, by way of an example, a cross section of a portion of a cartridge shell on an enlarged scale and illustrating how the primer charge is incorporated therein. The threaded percussion primer or casing 1 is provided with a threaded portion 2 which serves the purpose of a screw connection with the cartridge sleeve 3 at the bottom thereof. In the inner portion of a cartridge sleeve 3 the primer charge casing is provided with a chamber portion 4 to receive the primer charge 5 itself and this is closed or covered by means of a disk 6. The upper portion of the casing 1 is bent over as indicated at 7 and this portion 7 is adjacent the closure disk 6. At the other end of the casing 1 there is provided a chamber or bore 8 to receive a cup-shaped element 9 which contains the primer composition and an anvil associated therewith. Upon the movement of a firing pin which has not been shown, the charge 5 will be ignited, whereby the charge 10 in the shell or cartridge 3 will be also ignited and will burn accordingly.

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For the firing of a charge for a 2 cm. shell for a gas operated gun, there may be provided in the chamber 4 a primer charge 5 of 0.24 g. porous nitro-cellulose powder. This powder has a nitrocellulose content of 97.15% and this powder charge is provided with a 1 mm. thickness of disc or foil 6 of nitroglycerin powder and having a weight of 0.053 g. This nitroglycerin powder has a nitroglycerin content of 44.5% of a nitrocellulose content of 52.5%. The propellant charge 10 in the shell has a weight of 51 g. and consists of a homogeneous surface treated nitrocellulose powder with a nitrocellulose content of 93.75%. Upon firing, that is upon rapid continuous fire, there is no danger of gas discharge rearwardly or in the direction of a breech mechanism and there is no smoke development.

In the example of the mixture, there is a mixture proportion of nitrocellulose powder to nitroglycerin powder of 0.24 g. to 0.053 g.=4.53 to 1.

We claim:

A percussion primer for igniting the propellant charge of automatic weapon ammunitions having a primer charge containing a smokeless charge of porous nitrocellulose

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powder, said primer charge having an inner end and an outer end, a foil of nitroglycerine powder covering said inner end, in which the proportion, by weight, of porous nitrocellulose powder is 2 to 7.5 times the nitroglycerine powder content.

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