

Sept. 12, 1967

H. STADLER ETAL

3,340,809

CARTRIDGE

Original Filed May 28, 1964

FIG. 1

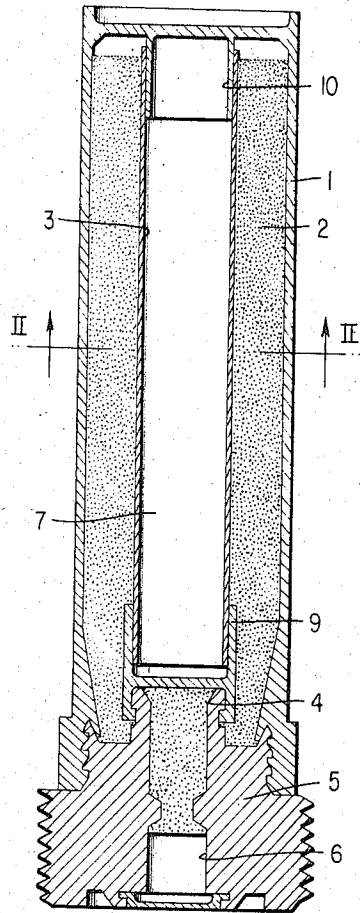


FIG. 1a

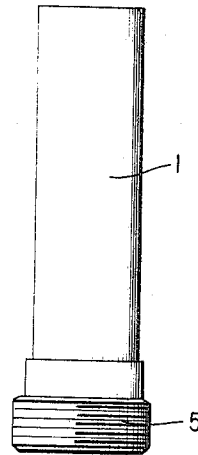


FIG. 2

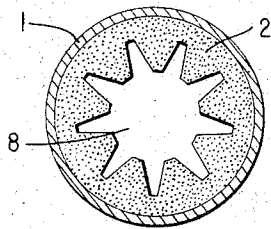
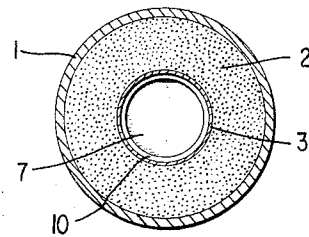


FIG. 3

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Continuation of application Ser. No. 370,820, May 28, 1964. This application June 10, 1966, Ser. No. 556,781
Claims priority, application Germany, June 1, 1963, D 41,704

21 Claims. (Cl. 102-39)

This application is a continuation of application Ser. No. 370,820, filed May 28, 1964, now abandoned.

The present invention relates to cartridges, and more particularly to fired cartridges for shells or grenades of guns, mortars, rocket projectors, or the like.

Cartridges of this type are known in the prior art in which the propellant charge is arranged adjacent to the rear of the ignition charge. With these prior art cartridges, the ignition and burning of the charge takes place from the end face thereof. The attainment of the normal burning velocity only takes place very slowly, and the burning velocity itself is also slow by reason of the small end face.

However, a liberation of the energy which is as instantaneous as possible is demanded from a cartridge to be fired or shot. Since the burning of the propellant charge takes place only at its surface, the duration of burning may be decreased in that the surface of the propellant charge is increased.

This goal is achieved in accordance with the present invention in that a central chamber, extending parallel to the axis of the cartridge, is arranged in the center of the cylindrically shaped propellant charge which chamber extends through the entire propellant charge. The ignition and burning of the charge then does not take place, as customary heretofore, from the end face thereof, but from this chamber. By reason of the much larger surface, the burning and consumption of the charge is correspondingly more rapid. It is most simple from a manufacturing point of view to give to the central chamber a circularly shaped cross section. However, such shape does not exhaust the one and only possible shape for the chamber, but the chamber may also be constructed of star-like shape which leads to a further surface increase and therewith to a further burning acceleration.

Appropriately, the chamber in accordance with the present invention is made of material that can be readily torn and/or destroyed, for example, of thin paper or plastic sheet material. However, the chamber may also consist of a powder foil. It is, however, important that the chamber is punctured or penetrated in all places as fast as possible by the ignition or tears as evenly as possible over the entire length thereof under the ignition gas pressure.

Accordingly, it is an object of the present invention to provide a cartridge of the type described above for use with guns, mortars, rocket projectors or the like which is simple in construction, may be readily manufactured, yet effectively eliminates the aforementioned drawbacks and shortcomings encountered with the prior art constructions.

It is another object of the present invention to provide a cartridge to be shot or fired which permits a significant increase in the speed of burning or combustion of the propellant charge.

Another object of the present invention resides in the provision of a cartridge of the type described above in which the propelling energy is set free considerably more instantaneously than realizable heretofore.

Still another object of the present invention resides in the provision of a cartridge of the type described above

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in which the exposed surface of the propellant charge is effectively increased.

Another object of the present invention resides in the provision of a cartridge to be fired or shot which is provided with a chamber on the inside of the propellant charge of such design and construction as to expose substantially instantaneously after ignition, the entire surface of the propellant charge facing this chamber to the effects of the ignition charge.

These and other objects, features and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, several embodiments in accordance with the present invention, and wherein

FIGURE 1 is a longitudinal cross-sectional view through a cartridge in accordance with the present invention;

FIGURE 1a is an elevational view, on a reduced scale, of a cartridge similar to that of FIGURE 1;

FIGURE 2 is a cross-sectional view through the cartridge of FIGURE 1 taken along line II-II and provided with a chamber of circular cross section, and

FIGURE 3 is a cross-sectional view, similar to FIGURE 2, taken through the cartridge along line II-II of FIGURE 1 with a chamber of star-shaped cross section.

Referring now to the drawing wherein like reference numerals are used throughout the various views to designated like parts, and more particularly to FIGURE 1, reference numeral 1 designates therein the cartridge case which contains on the inside thereof, the powder 2 of the propellant charge. A wall 3 is inserted into the cartridge case 1 on the inside of the propellant charge 2. The powder serving the ignition; that is, the ignition charge, is designated by reference numeral 4 while reference numeral 5 designates the base portion of the cartridge and reference numeral 6 the primer or ignition cap.

FIGURE 1a shows the assembled cartridge in side-elevational view.

FIGURES 2 and 3 are cross-sectional views, through the cartridge of FIGURE 1, taken along line II-II of FIGURE 1, and illustrating the chambers with circularly shaped cross section 7 and star-shaped cross section 8, respectively.

To maintain the chamber 7 or 8 in its coaxial relation to the cartridge 1, appropriate securing and centering means are provided at both ends thereof. For that purpose, a terminal cap 9 of H-shaped cross section is provided at the base portion 5 of the cartridge and a centering ring 10 at the upper end of the cartridge along the mouth of the cartridge case 1.

As mentioned above, the chamber walls 3 may be constituted by any known material that tears easily or is easily destroyed such as thin paper, plastic sheet material, powder foils or the like.

While we have shown and described several embodiments in accordance with the present invention, it is understood that the same is not limited thereto, but is susceptible of numerous changes and modifications as known to a person skilled in the art. For example, the chamber formed by walls 3 may have any appropriate configuration in cross section. Thus, it is obvious that the present invention is not limited to the details shown and described herein, but is susceptible of numerous changes and modifications, and we therefore do not wish to be limited to the details shown and described herein, but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

We claim:

1. A cartridge, comprising: a substantially tubular car-

tridge case; a base portion closing the rear end of said cartridge case, a relatively small igniting charge in said base portion; a substantially tubular propellant charge within said cartridge case and defining a continuous substantially axial firing channel extending substantially the entire length of said cartridge case within said propellant charge; said firing channel consisting essentially of gases and being substantially free of any explosive material; said igniting charge and said firing channel being substantially axially aligned; means, including said firing channel, being operable to conduct the combustion gases produced by the firing of said igniting charge freely over the entire length of said firing channel to substantially instantaneously ignite said propellant charge along substantially the entire internal surface; said cartridge case having a homogeneously integral forward front wall closing the entire front end of said cartridge case; said front wall having a homogeneously integral central ring means extending axially inwardly and telescopically engaged with tubular propellant charge for preventing transverse movement of the forward portion of said propellant charge; a readily destructible tubular wall engaging said tubular propellant charge along substantially its entire inside surface; said tubular wall being telescopically engaged with said ring means.

2. The device of claim 1, wherein said propellant charge fills substantially the entire space between said cartridge case, said tubular wall, and said bottom piece.

3. The device of claim 2, wherein there is only one firing channel; said firing channel being centrally located; said base portion having a forwardly centrally extending substantially tubular homogeneously integral projection; a terminal cap having an H-shaped cross-section and comprising a tubular forwardly extending portion telescopically engaged within said tubular propellant charge, a homogeneously integral rearwardly extending tubular portion telescopically engaged with said projection, and a homogeneously integral intermediate portion forming a wall entirely closing the rear end of said forwardly extending portion and the front end of said rearwardly extending portion; said tubular wall telescopically engaging said forwardly extending portion; said projection and said rearwardly extending tubular portion having means forming an interengaging snap-type connection; said base portion having a central axially extending bore; said igniting charge including a primer within and closing the rear of said bore; said cap closing the forward end of said bore; said igniting charge additionally including a booster charge filling the remainder of said bore; the diameter of said bore being generally less than the diameter of said firing channel; said bore having a throat portion of reduced diameter forwardly of said primer and a diverging forward end portion; said base portion and said cartridge case having axially telescopically engaged portions with interengaging means preventing relative axial movement; and the rear end of said base portion having a screw threaded exterior of greater diameter than the exterior diameter of said cartridge case.

4. A cartridge, comprising: a substantially tubular cartridge case, a base portion closing the rear end of said cartridge case; a relatively small igniting charge in said base portion; a substantially tubular propellant charge within said cartridge case and defining a continuous substantially axial firing channel extending substantially the entire length of said cartridge case within said tubular propellant charge, said firing channel consisting essentially of gases and being substantially free of any explosive material; said igniting charge and said firing channel being substantially axially aligned; means, including said firing channel, operable to conduct the combustion gases produced by the firing of said igniting charge freely over the entire length of said firing channel to substantially instantaneously ignite said propellant charge along substantially its entire internal surface; said base portion having a forwardly centrally extending substantially tubular

homogeneously integral projection; a terminal cap having an H-shaped cross-section, a substantially tubular forwardly extending portion telescopically engaging with said tubular propellant charge, a homogeneously integral rearwardly extending tubular portion telescopically engaged with said projection, and a homogeneously integral intermediate portion forming a wall entirely closing the rear end of said forwardly extending portion and the front end of said rearwardly extending portion.

5. The device of claim 4, wherein said rearwardly extending tubular portion and said projection have means forming a snap-type interengaging projection.

6. The device of claim 4, wherein there is only one firing channel, and said firing channel is centrally located.

7. The device of claim 4, wherein said base portion has a central axially extending bore, said igniting charge includes a primer within and closing the rear of said bore, including a cap closing the forward end of said bore, and wherein said igniting charge additionally includes a booster charge filling the remainder of said bore.

8. The device of claim 4 including a readily destructible tubular wall engaging said tubular propellant charge along substantially its entire inside surface, said tubular wall being telescopically engaged with said forwardly extending portion.

9. The device of claim 8, wherein said rearwardly extending tubular portion and said projection have means forming a snap-type interengaging projection.

10. The device of claim 8, wherein said cartridge case has a homogeneously integral forward front wall closing the entire front end of said cartridge case; said front wall has a homogeneously integral central ring means extending axially inwardly and telescopically engaged within said tubular propellant charge for preventing transverse movement of the forward portion of said propellant charge; and a readily destructible tubular wall engaging said tubular propellant charge along substantially its entire inside surface, said tubular wall being telescopically engaged with said ring means.

11. The device of claim 10, wherein said propellant charge fills substantially the entire space between said cartridge case, said tubular wall, and said bottom piece.

12. The device of claim 4, wherein said cartridge case has a homogeneously integral forward front wall closing the entire front end of said cartridge case, and said front wall has a homogeneously integral central ring means extending axially inwardly and telescopically engaged with said tubular propellant charge for preventing transverse movement of the forward portion of said propellant charge.

13. The device of claim 12, wherein said base portion has a central axially extending bore, said igniting charge includes a primer within and closing the rear of said bore, including a cap closing the forward end of said bore, and wherein said igniting charge additionally includes a booster charge filling the remainder of said bore.

14. A surface igniter provided with ignition means for igniting incendiary compositions, comprising a cartridge case having a tubular case shaft closed at its forward end and a bottom piece closing the rearward end of said tubular case shaft; a readily destructible axially extending hollow tubular body means within said cartridge case operable to form a substantially annular sealed chamber between said cartridge case and said body means; an axially extending firing channel formed by and within said body means consisting solely of gases, and extending for substantially the entire length of said tubular case shaft; a rapidly ignitable pyrotechnical mixture within said cartridge case substantially filling said substantially annular sealed chamber; ignition means located adjacent the rear of said body means for producing an ignition flash that will first enter and fill said firing channel, and then pierce and destroy said body means to ignite said pyrotechnical mixture substantially simultaneously over the entire internal surface adjacent said body means; said

hollow tubular body means including a tubular member and a separate cup-shaped member telescopically connected with the rearward portion of said tubular member; said bottom piece having a forwardly extending projection; said cup-shaped member being telescopically connected with the forward portion of said projection.

15. A surface igniter according to claim 14, wherein said case shaft includes a depending cup-shaped element at its forward closed end, telescopically connected with the forward end of said tubular member.

16. A surface igniter according to claim 14, wherein said cup-shaped member includes a transversely extending partition wall means operable to close the rearward end of said tubular member and provide said cup-shaped member with a substantially H-shaped cross-section; said bottom piece projection having an enlarged annular forward end; said cup-shaped member having a rearwardly extending tubular portion engaging said projection annular enlargement and provided with an inwardly extending annular flange at its rearward end engaging the rearward portion of said projection annular enlargement.

17. A surface igniter according to claim 16, wherein said ignition means includes primer means and booster charge means partially located within said projection.

18. A surface igniter provided with ignition means for igniting incendiary compositions, comprising a cartridge case having a tubular case shaft closed at its forward end and a bottom piece closing the rearward end of said tubular case shaft; a readily destructible axially extending hollow tubular body means within said cartridge case operable to form a substantially annular sealed chamber between said cartridge case and said body means; an axially extending firing channel formed by and within said body means consisting solely of gases, and extending for substantially the entire length of said tubular case shaft; a rapidly ignitable pyrotechnical mixture within said cartridge case substantially filling said substantially annular sealed chamber; ignition means located adjacent the rear of said body means for producing an ignition flash that will first enter and fill said firing channel and then pierce and destroy said body means to ignite said pyrotechnical mixture substantially simultaneously over the entire internal surface adjacent said body means; said hollow tubular body means including a tubular member, and a separate cup-shaped member telescopically connected with the rearward portion of said tubular member and operatively connected to said bottom piece; said cup-shaped member including a transversely extending partition wall means operable to close the rearward end of said tubular member.

19. A surface igniter according to claim 18, wherein said case shaft includes a dependent cup-shaped element at its forward closed end telescopically connected to its forward end of said tubular member.

20. A cartridge, comprising: a substantially tubular cartridge case, a base portion closing the rear end of said cartridge case; a relatively small igniting charge in said base portion; a substantially tubular propellant charge within said cartridge case and defining a continuous substantially axial firing channel extending substantially the entire length of said cartridge case within said tubular

propellant charge; said firing channel consisting essentially of gases and being substantially free of any explosive material; said igniting charge and said firing channel being substantially axially aligned; means, including said firing channel, being operable to conduct the combustion gases produced by the firing of said igniting charge freely over the entire length of said firing channel to substantially instantaneously ignite said propellant charge along substantially its entire internal surface; said base portion having a centrally axially extending bore; said igniting charge including a primer within and closing the rear of said bore; cap means closing the forward end of said bore; said igniting charge additionally including a booster charge filling the remainder of said bore; the diameter of said bore being generally less than the diameter of said firing channel, and said bore having a throat portion of reduced diameter forwardly of said primer and a diverging forward end portion.

21. A cartridge, comprising: a substantially tubular cartridge case; a base portion closing the rear end of said cartridge case; a relatively small igniting charge in said base portion; a substantially tubular propellant charge within said cartridge case and defining a continuous substantially axial firing channel extending substantially the entire length of said cartridge case within said propellant charge; said firing channel consisting essentially of gases and being substantially free of any explosive material; said igniting charge and said firing channel being substantially axially aligned; means, including said firing channel, being operable to conduct the combustion gases produced by the firing of said igniting charge freely over the entire length of said firing channel to substantially instantaneously ignite said propellant charge along substantially the entire internal surface; said cartridge case having a homogeneously integral forward front wall closing the entire front end of said cartridge case; said front wall having a homogeneously integral central ring means extending axially inwardly and telescopically engaged with tubular propellant charge for preventing transverse movement of the forward portion of said propellant charge; said base portion having a central axial extending bore; said igniting charge including a primer within and closing the rear of said bore; a cap closing the forward end of said bore; and said igniting charge additionally including a booster charge filling the remainder of said bore.

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