March 23, 1971 D. DARDICK 3,572,248

AMMUNITION FOR HIGH FIRING RATE HYPERVELOCITY GUN

Original Filed Sept. 1, 1967 2 Sheets-Sheet 1

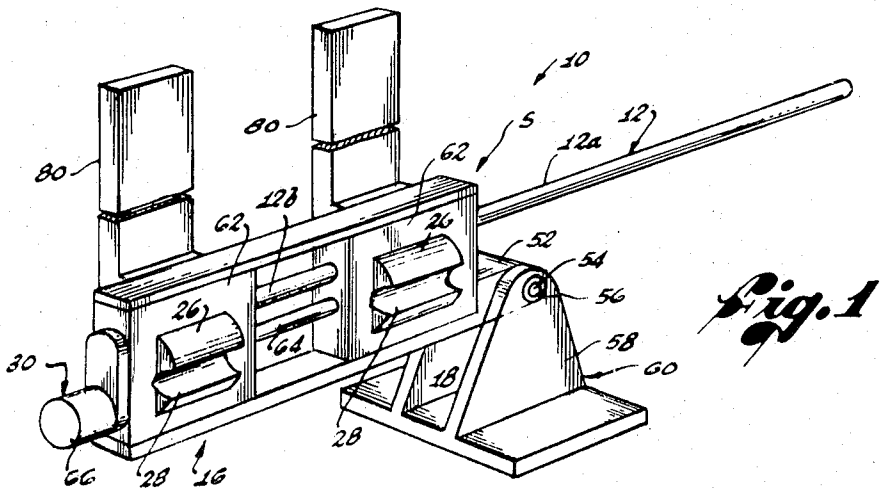


Fig. 1

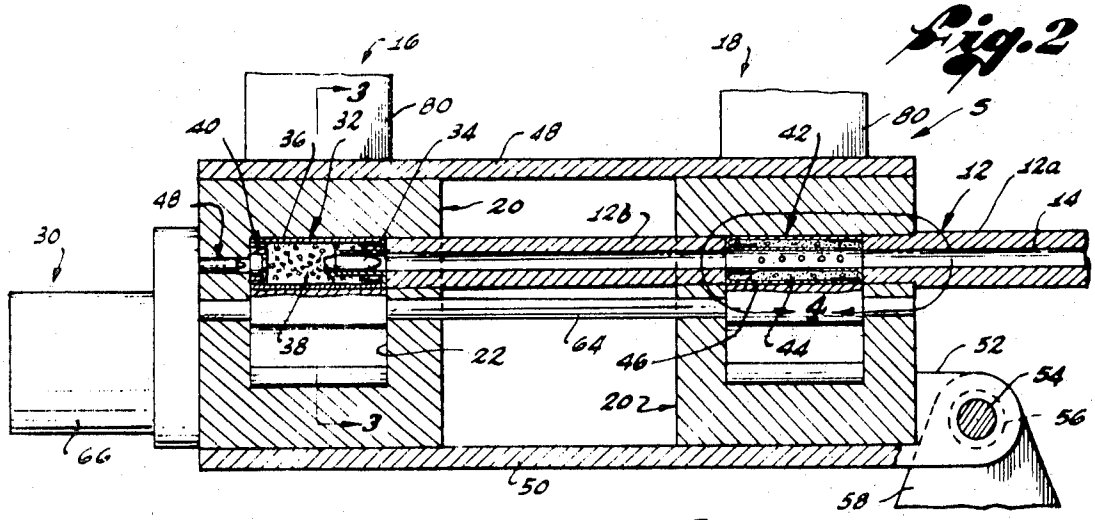


Fig. 2

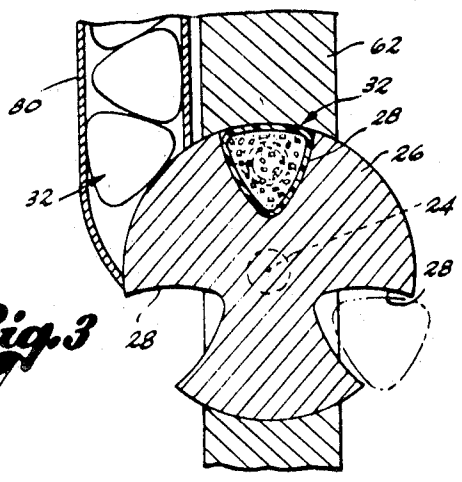


Fig. 3

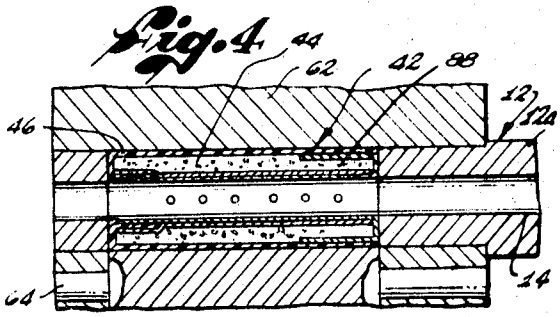


Fig. 4

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AMMUNITION FOR HIGH FIRING RATE HYPERVELOCITY GUN

Original Filed Sept. 1, 1967 2 Sheets-Sheet 2

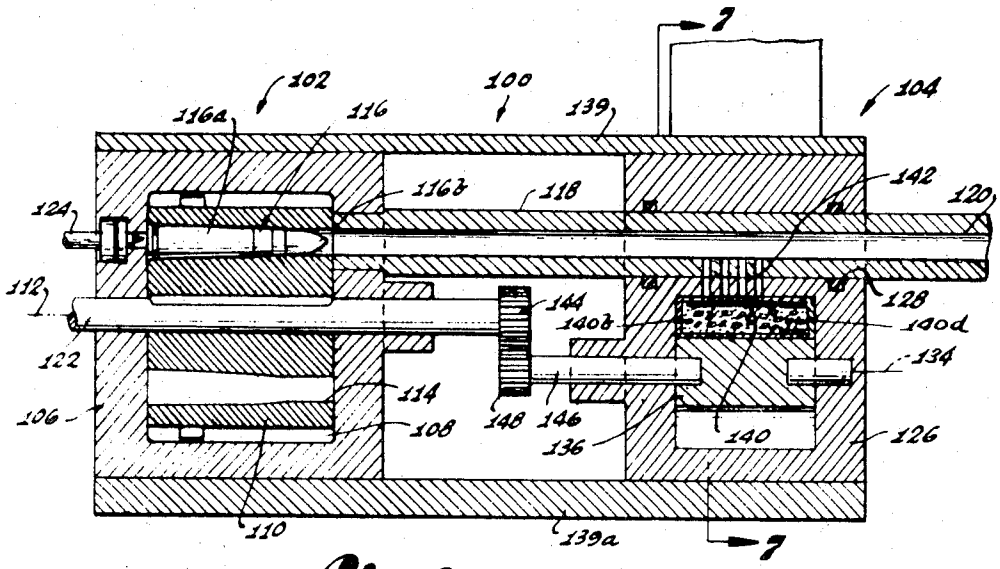


Fig. 6

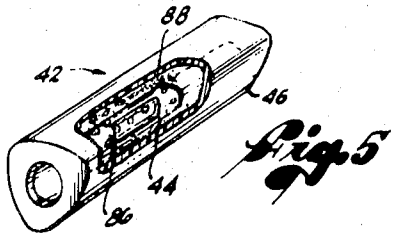


Fig. 5

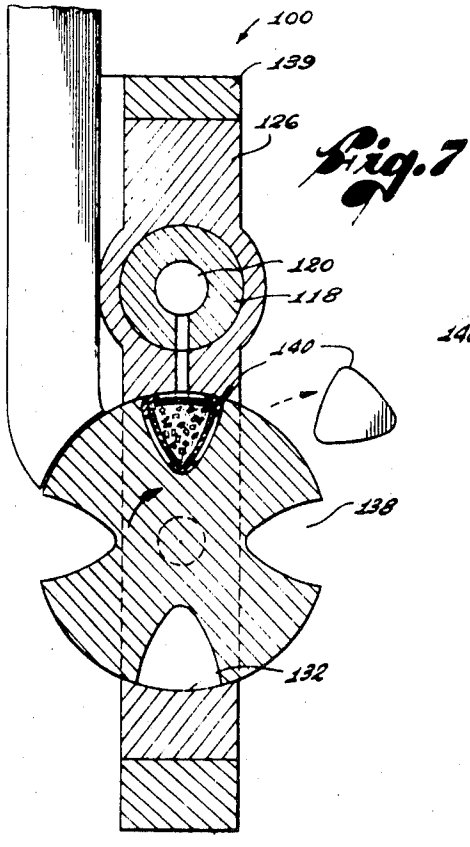


Fig. 7

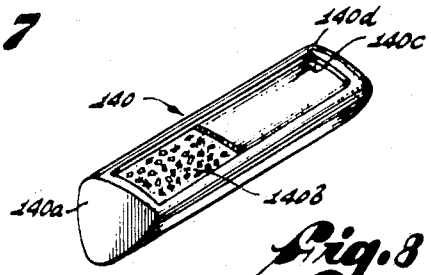


Fig. 8

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Patented Mar. 23, 1971

3,572,248

AMMUNITION FOR HIGH FIRING RATE HYPERVELOCITY GUN

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Original application Sept. 1, 1967, Ser. No. 665,155. Divided and this application Jan. 28, 1969, Ser. No. 794,697
Int. Cl. F41f 1/00; F24b 5/20
U.S. Cl. 102—39 2 Claims

ABSTRACT OF THE DISCLOSURE

Booster ammunition for a high firing rate hypervelocity gun having at least one barrel, a primary breech mechanism at the breech end of the barrel for successively transporting primary ammunition rounds to and firing each round in firing position to effect forward propulsion of its projectile through the barrel, and at least one secondary breech mechanism located at a booster station along the barrel forwardly of the primary mechanism for successively transporting the booster ammunition rounds to firing position simultaneously with the primary rounds in such manner that the propellant charge in each booster round is exposed to and ignited by the propellant gas generated by the corresponding fired primary round upon forward travel of its projectile through the respective booster station, thereby to increase the propellant gas pressure behind the projectile and accelerate the latter through the barrel.

REFERENCES TO COPENDING APPLICATIONS

This application is a division of my copending application Ser. No. 665,155, filed Sept. 1, 1967, and entitled "High Firing Rate Hypervelocity Gun and Ammunition Therefor," now Pat. No. 3,503,300.

Reference is made herein to copending applications, Ser. No. 671,910, filed Sept. 1, 1967, and entitled "Sealed Open Chamber Breech Mechanism and Caseless Ammunition Therefor," now Pat. No. 3,446,112 and Ser. No. 665,136, filed Sept. 1, 1967, and entitled "Semicombustible Ammunition for Open Chamber Breech Mechanism," now abandoned.

BACKGROUND OF THE INVENTION

(1) Field of the invention

This invention relates generally to guns and more particularly to so-called hypervelocity guns of the class wherein the advancing projectile of a fired primary ammunition round is accelerated to hypervelocity by the high pressure gas of a burning booster propellant. The invention relates more particularly to novel booster ammunition for such guns.

(2) Prior art

Hypervelocity guns are known in the art, and as their name implies, are characterized by extremely high muzzle velocity, i.e., hypervelocity. Such hyper-muzzle velocity may be achieved in various ways. The present invention is concerned with the particular hypervelocity technique which involves ignition of a booster charge at one or more positions along the bore directly behind the advancing projectile to increase or boost the propellant gas pressure behind the projectile and thereby accelerate the latter through the bore to a hypervelocity.

Hypervelocity guns which utilize this booster firing technique to achieve hyper-muzzle velocities have been devised. Generally speaking, such guns comprise a barrel with a breech mechanism for firing a primary round at the breech end of the barrel. This primary round contains a projectile which is propelled forwardly through the barrel by the propellant gas pressure generated by firing of the round. Arranged along the barrel, forwardly of the breech mechanism, are one or more secondary or booster firing chambers containing a booster propellant charge. Each booster chamber communicates to the bore in the gun barrel through ports in the barrel wall. As the projectile travels forwardly past each booster chamber, its contained booster charge is exposed to and ignited by the high temperature propellant gas of the fired primary round. The propellant gas generated by the burning booster charge then enters the bore to increase the total propellant gas pressure behind the projectile and thereby accelerate the latter through the bore.

While this type of gun achieves a hyper-muzzle velocity, it has certain inherent deficiencies. The major deficiency of the gun, for example, resides in the fact that reloading is very laborious and time consuming. As a consequence, hypervelocity guns of the characteristic described have never been adopted as a practical weapon.

My copending application, Ser. No. 665,155, provides a hypervelocity gun characterized by a primary breech mechanism located at the breech end of a barrel for successively transporting primary rounds to firing position and firing each round to effect forward propulsion of its projectile through the gun bore. Located at at least one booster station along the barrel forwardly of its breech end is a secondary breech mechanism for successively transporting projectileless booster rounds to firing position. When in firing position, the propellant charge in each booster round is disposed for ignition by the propellant gas generated by firing of a primary round upon forward travel of its projectile through the respective booster station. The propellant gas generated by each ignited booster round enters the gun bore and increases the propellant gas pressure directly behind the projectile to accelerate the latter forwardly through the bore.

The hypervelocity gun may employ either closed chamber or open chamber breech mechanism or both closed and open chamber breech mechanisms in various combinations. That is to say, both the primary and secondary breech mechanisms may embody a closed chamber breech action or an open chamber breech action, or one mechanism may embody a closed chamber action and the other an open chamber action. In this regard, it should be noted that a closed chamber breech action is one in which each ammunition round is inserted or rammed axially into a circumferentially closed firing chamber through one end of the chamber and the spent cartridge case of each fired round is extracted axially from the chamber. Examples of this type of breech mechanism are the conventional belt or clip fed mechanisms, the revolver mechanism, the Gatling mechanism, and the separate chamber mechanism. An open chamber breech action, on the other hand, is one in which each ammunition round is introduced laterally into a firing chamber through an open side of the chamber and the spent cartridge case of each fired round is ejected laterally through the open side of the chamber. Examples of such open chamber breech mechanisms are those disclosed in prior art Pats. Nos. 2,983,223; 3,041,938; 2,831,140; 2,847,784; and 3,044,890.

SUMMARY OF THE INVENTION

The present invention provides booster ammunition for the hypervelocity gun disclosed above. This booster ammunition is characterized in general terms by a cartridge case containing a booster propellant and having a wall containing at least one ignition opening through which the booster propellant is adapted to be ignited. When the booster round is located in firing position within the gun, the ignition opening is exposed to the gun bore so that the booster propellant is ignited by the hot propel-

lant gas behind the advancing projectile of a fired primary round as the latter travels through the secondary breech mechanism of the gun.

Two embodiments of the invention are disclosed. In one embodiment, the booster round has a central perforate tube which is aligned with and forms part of the gun bore when the round is located in firing position. The booster propellant surrounds this tube and is ignited through ignition ports in the tube as the projectile of a fired primary round travels through the tube. In the second disclosed embodiment, the booster round has an outer cartridge case containing the booster propellant and having a lateral ignition opening. This latter booster round, when in firing position, is laterally displaced from the gun bore and its ignition opening is exposed to the bore through ports in the wall of the gun barrel.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of an open chamber hypervelocity gun according to my copending application, Ser. No. 665,155;

FIG. 2 is an enlarged, fragmentary longitudinal section through the gun;

FIG. 3 is a section taken on line 3—3 in FIG. 2;

FIG. 4 is an enlargement of the area encircled by the arrow 4—4 in FIG. 2;

FIG. 5 is a perspective view, partly broken away, of a present booster ammunition round to be fired in the gun;

FIG. 6 is a longitudinal section through a modified hypervelocity gun according to my copending application, Ser. No. 665,155;

FIG. 7 is an enlarged section taken on line 7—7 in FIG. 6; and

FIG. 8 is a perspective view, partly broken away, of a present booster ammunition round to be fired in the hypervelocity gun of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The hypervelocity gun **10** shown in FIGS. 1 through 5 of the drawings is identical to that disclosed in copending application, Ser. No. 665,155, and has a barrel **12** containing a bore **14**. Spaced along the barrel **12** are a number of breech mechanisms **16** and **18**. Breech mechanism **16** is located at the breech end of the barrel and is hereinafter referred to as the primary breech mechanism. Breech mechanism **18**, which is hereinafter referred to as a secondary breech mechanism is located at a booster station S spaced forwardly along the barrel from the primary breech mechanism. The primary breech mechanisms **16** operates to transport primary ammunition rounds in succession to firing position at the breech end of the barrel **12** and to first each round in this position. The projectile of each fired round is propelled forwardly through the barrel by the high pressure propellant gas which is generated by the burning primary propellant charge in the round. The secondary breech mechanism **18** operates to transport secondary or booster ammunition rounds in succesion to firing position at the booster station S in such a way as to locate each booster round in firing position simultaneously with a primary round. Each booster round is a projectileless round containing a booster propellant charge which, in firing position, is disposed to be ignited by the hot propellant gas of the respective fired primary round upon forward travel of its projectile through the booster station. The propellant gas generated by the booster propellant enters the barrel bore **14** behind the advancing projectile to accelerate the latter through the bore.

Each of the illustrated breech mechanisms **16**, **18** has a breech frame **20** supporting a movable ammunition carrier **26** containing at least one firing chamber **28**. Carrier **26** is movable along a prescribed path of motion relative to its breech frame **20** to locate its firing chamber successively in an ammunition infeed position, a firing position, and an ejection position.

When in infeed position, the carrier **26** is disposed to receive an ammunition round to be fired. When in firing position, the carrier firing chamber **28** locates its contained ammunition round in firing relation to the gun bore **14**. Finally, when in ejection position, the carrier is disposed for ejection of the spent cartridge case of the fired round from the firing chamber after firing. Means **30** are provided for driving the two carriers **26** of the breech mechanisms **16**, **18** in unison to infeed, firing, and ejection positions.

The primary breech mechanism **16** is designed to fire primary ammunition rounds **32** including a projectile **34**. The particular primary ammunition illustrated is cased ammunition having a cartridge case **36** containing the projectile **34**, a primary propellant charge **38**, and a primer **40**. The secondary breech mechanism **18** is designed to fire ammunition booster rounds **42** including a booster propellant charge **44** only. The booster rounds, which also comprise cased ammunition having a cartridge case **46** containing the propellant **44**, constitute the subject matter of the present invention and will be described in greater detail presently.

Briefly, in operation of the hypervelocity gun **10**, the carriers **26** of the breech mechanisms **16**, **18** are first driven to infeed position. A primary ammunition round **32** is then introduced into the firing chamber **28** of the primary breech mechanism **16** and a booster round **42** is introduced into the firing chamber of the secondary breech mechanism **18**. Thereafter, the carriers are driven to firing position and the firing means **48** of the primary breech mechanism is actuated to fire the primary round in the latter mechanism. The firing chamber **28** of the primary breech mechanism **16**, when in firing position, is coaxially aligned with and opens forwardly to the gun bore **14**. Accordingly, when the primary round **32** is fired, its projectile **34** is propelled forward through the gun bore **14** by the propellant gas generated by the burning propellant charge **38** in the round. The firing chamber of the secondary breech mechanism **18**, when in firing position, opens to the gun bore **14** in such a way that the propellant charge **44** in the booster round **42** contained within the chamber is exposed to and ignited by the hot propellant gas of the fired primary round upon forward travel of its projectile through the booster station S. The propellant gas generated by the fired booster round then enters the gun bore **14** to increase the total propellant gas pressure behind the projectile and thereby accelerate the latter forwardly through the gun bore.

The primary and secondary breech carriers **26** are cylinders which contain the firing chambers **28**. These cylinders are rotatably mounted within chambers **22** in the primary and secondary breech frames **20**, respectively, for turning on a common axis **24**, parallel to and spaced laterally from the barrel **12**. The carrier drive means **30** drives the cylinders in intermittent rotation in unison to successively locate and momentarily arrest the primary and secondary firing chambers in their infeed, firing, and ejection positions.

Referring now in more detail to the hypervelocity gun **10** in FIGS. 1 through 5 of the drawings, it will be seen that the breech frames **20** of the primary and secondary breech mechanisms **16**, **18** are rigidly joined to one another by top and bottom connecting straps **48**, **50** to form a rigid breech structure. At the front end of this breech structure is a trunnion support or boss **52**. A trunnion **54** extends through this boss, laterally of the gun, and projects a distance beyond opposite sides of the boss. The projecting ends of the trunnion **54** are rotatably received in bearings **56** fixed within the upstanding arms **58** of a gun carriage bracket **60**.

Each breech mechanism **16**, **18** is an open chamber breech mechanism of the type disclosed in the aforementioned prior art patents. Thus, the breech frame **20** of

each breech mechanism has the characteristic, generally flat rectangular shape and contains a generally rectangular central opening which opens laterally through opposite sides of the frame to form the chamber **22**. Each breech cylinder **26** contains a number of uniformly spaced firing chambers **28** and is driven in unidirectional rotation to locate each firing chamber in its infeed, firing, and ejection positions. Each firing chamber **28** opens laterally through the circumference and longitudinally through the front and rear ends of its respective cylinder. The open sides of each chamber **22** define ammunition infeed and ejection openings with which each firing chamber of the contained breech cylinder **26** registers when in infeed and ejection positions, respectively. When in firing position, the open side of each firing chamber is closed by the firing strap **62** of the corresponding breech frame.

The firing chambers **28** and the ammunition rounds **32, 42** have complementary generally triangular round shapes in transverse cross-section. The sidewalls of each firing chamber and the sides of each ammunition round are cylindrically curved to the same radius of curvature as the breech cylinders **26**.

When an ammunition round is positioned in a firing chamber of either breech mechanism **16** or **18**, two sides of the round seat flush against the sidewalls of the chamber and the third, exposed side of the round is flush with the cylinder circumference. The inner surface of the firing strap **62** of each breech frame **20** is also cylindrically curved to the same radius as and slidably engages the circumference of its contained cylinder **26**.

In the particular open chamber gun under discussion, the barrel means **12** comprises front and rear barrel sections **12***a* and **12***b*, respectively. Front barrel section **12***a* is secured at its rear end to and extends forwardly from the front end of the secondary breech frame **20**. The rear barrel section **12***b* extends between and is secured at its ends to the front end of the primary breech frame and the rear end of the secondary breech frame. These barrel sections are coaxially disposed in spaced parallel relation to the common axis **24** of the breech cylinders **26**.

The cylinder drive means **30** comprises a connecting drive shaft **64** which extends between the cylinders along their common axis **24** of rotation. The rear end of this shaft extends rotatably through the forward end of the primary breech frame **20** and is coaxially secured to the forward end of the primary breech cylinder **26**. The forward end of the shaft extends rotatably through the rear end of the secondary breech frame and is coaxially secured to the rear end of the secondary breech cylinder. The cylinders are so oriented on their common axis **24** that their firing chambers are axially aligned. The corresponding firing chambers of the two cylinders thus rotate in unison to their infeed, firing, and ejection positions.

The illustrated cylinder drive means **30** further comprises an electric drive motor **66**, the shaft of which is drivably coupled to the rear end of the cylinder shaft **64** through an intermittent rotary drive mechanism such as a Geneva drive. This Geneva drive is constructed and arranged as to drive the breech cylinders **26** in intermittent rotation in such a way that the cylinder firing chambers **28** are momentarily arrested in their firing positions. As noted earlier, the primary ammunition rounds **32** are fired in firing position by the primary breech firing means **48**.

Gun **10** has ammunition infeed means for feeding primary ammunition rounds **32** laterally in succession to the primary breech firing chambers and feeding booster ammunition rounds **42** laterally in succession to the secondary breech firing chambers upon rotation of these chambers to infeed position. These infeed means comprise ammunition hoppers which feed their respective rounds to their corresponding cylinders through the ammunition infeed openings in the breech frames **20**. After entrance of each pair of the ammunition rounds **32, 42** into aligned primary and secondary firing chambers **28**, the rounds rotate with the chambers to firing position. In the hypervelocity gun **10** under discussion, both the primary and secondary firing chambers, when in firing position, are coaxially aligned with the gun bore **14**. Thus, each primary firing chamber, when in firing position, is coaxially aligned with and opens forwardly to the breech end of the bore. Each secondary firing chamber, when in firing position, is coaxially disposed between the front and rear barrel sections **12***a*, **12***b* and opens forwardly to the bore in the front barrel section and rearwardly to the bore in the rear barrel section.

The primary ammunition rounds **32** are identical to those disclosed in the aforementioned prior art patents. The construction of the booster ammunition rounds **42**, however, is novel and constitutes an important feature of the invention. One of these rounds is shown in detail in FIG. 5. Each illustrated booster round has an outer yieldable non-combustible cartridge case **46**. This cartridge case, and that of each primary round, have a generally triangular round shape in cross-section and are sized to complement and seal their respective primary and secondary breech cylinder firing chambers against propellant gas leakage during firing, in the same manner as explained in the earlier listed patents. Extending centrally through the cartridge case **46** of each booster round **42** is a perforated tube **86** containing booster propellant ignition openings or ports. The ends of this tube are sealed to the end walls of the cartridge case **46**. As explained below, the tube **86** of each booster round **42**, when in firing position, forms a section of the gun bore **14** and serves to guide the projectile **34** of a fired primary round **32** during its travel through the booster station **5**. To this end, the internal diameter of the tube is the same as that of the gun bore **14**, proper, and the tube is made of non-combustible material suitable to its projectile guiding function. The interior space of each booster round **42**, between the outer cartridge case **46** and inner tube **86** of the round, is filled with the booster propellant **44**. A combustible cover sleeve **88** may be disposed about the tube **86**, particularly if the booster propellant **44** is a loose grain propellant, to shield the propellant and prevent its loss through the tube ports during handling and infeed.

The gun **10** is operated by activating the cylinder drive means **30** to effect driving of the primary and secondary breech cylinders in intermittent rotary motion through their respective infeed, firing, and ejection positions. As each pair of correpsonding primary and secondary firing chambers **28** rotate to infeed position, a primary round **32** is fed laterally into the secondary chamber from the ammunition hoppers **80** and through the infeed openings in the breech frames **20** and the open sides of the firing chambers. Thereafter, the rounds are rotated to firing position in their respective breech mechanisms **16, 18** and the primary round is electriically fired in the primary breech mechanism by closure of the cam actuated firing switch **74**. Each booster round **42**, when in firing position, is located with its inner perforated tube **86** in coaxial alignment with the gun bore **14**, so as to effectively form a section of the bore, as shown in the drawings.

When each primary ammunition round **32** is fired in firing position, in the manner just explained, its projectile **34** is propelled forwardly through the gun bore **14** by the propellant gas pressure generated by the fired primary round. During its forward travel through the gun bore, the projectile passes through and uncovers the ignition ports in the central perforated tube **86** of the booster round **42** currently in firing position within the secondary breech mechanism **18**. The booster propellant **44** in the booster round is thereby exposed to and ignited by the hot propellant gas of the fired primary round. In this regard, attention is directed to the fact that the combustible sleeve **88** in the booster round serves merely to prevent escape of the booster propellant through the tube

ports during storage and handling of the round and is consumed by the hot propellant gas of the fired primary round to permit exposure of the booster propellant to the gas as just explained. The propellant gas generated by the burning booster propellant then enters the gun bore to increase the propellant gas pressure in the bore behind the advancing projectile of the fired primary round **32** and thereby accelerate the projectile to the desired hypermuzzle velocity.

After firing, the firing chambers **28** currently in firing position are rotated to ejection position to eject the spent cartridge cases of the fired primary and booster rounds, and a pair of live primary and booster rounds are rotated to and fired in firing position.

Turning now to FIGS. 6 through 8, there is illustrated a modified hypervelocity gun **100** having a primary breech mechanism **102** which utilizes a closed chamber breech action and a secondary breech mechanism **104** which utiilzes an open chamber breech action. In the interest of simplicity of description and illustration, only the breech means and barrel of the modified gun have been shown and will be described. It will be understood, of course, that the actual gun will be provided with cylinder drive means, and ammunition infeed means for each breech mechanism. In this regard, it should be noted that the open chamber breech mechanism may have a hopper feed like that just described. The closed chamber primary breech mechanism may be equipped with any conventional ammunition infeed means suitable for use with the illustrated mechanism.

The primary breech mechanism **102** has a breech frame **106** containing a breech chamber **108** in which is rotatably mounted a revolver cylinder **110**. Extending through the cylinder **110**, parallel to its rotation axis **112**, are a number of laterally closed firing chambers **114**. These firing chambers are uniformly spaced about the axis of and open through the front and rear ends of the cylinder **110**. Each firing chamber is conventionally shaped and dimensioned to receive a standard ammunition cartridge **116**, hereinafter referred to as a primary round. Breech chamber **108** opens through opposite sides of the breech frame **106**. Secured at its rear end to and extending forwardly from the front end of the breech frame **106** in spaced and parallel relation to the cylinder axis **112** is a barrel **118** containing a bore **120**.

Revolver or cylinder **110** is rotatable in the breech chamber **108** to locate each of its firing chambers **114** in ammunition infeed, firing, and cartridge case ejection positions. Each firing chamber, when in infeed position, is exposed through one open side of the breech chamber to permit axial insertion of a primary cartridge or round **116** into the chamber. When in firing position, each firing chamber is coaxially aligned with and opens forwardly to the gun bore **120** to condition a primary round to be fired in the chamber. Each firing chamber, when in ejection position, is exposed through one open side of the breech chamber to permit axial extraction of a spent cartridge case from the chamber after firing. Secured to and extending coaxially from the cylinder **110** and rotatably through the rear end of the breech frame **106** is a shaft **122** by which the cylinder may be rotated to sequentially locate each of its firing chambers in infeed, firing and ejection positions. Mounted in the rear end of the breech frame **106**, on the axis of the gun bore **120**, is a firing pin **124**.

The secondary breech mechanism has a breech frame **126** containing a bore **128** receiving the barrel **118**. The secondary breech frame is rigidly secured to the barrel in any convenient way and is sealed to the barrel. Breech frame **126** contains a chamber **132** which is laterally offset from the frame bore **128**. Rotatably mounted within the chamber **132**, for turning on an axis **134** parallel to and spaced from the axis of the gun bore **120**, is an open chamber carrier or cylinder **136**. Cylinder **136** contains a number of uniformly spaced longitudinal firing chambers **138** which open laterally through the circumference of the cylinder. Each of these firing chambers has the same generally triangular round shape in transverse cross-section as the firing chambers in the earlier described hypervelocity gun **10** of the invention. Breech chamber **132** opens through opposite sides of the secondary breech frame **126** to define ammunition infeed and ejection openings. Breech frames **106**, **126** are rigidly joined by connecting plates **139**, **139***a*.

The secondary breech cylinder **136** is rotatable to locate each of its firing chambers **138** in ammunition infeed, firing, and ejection positions. Each firing chamber, when in infeed position, opens laterally through one open side of the chamber **132** to permit lateral infeed movement of a booster ammunition round **140** into the chamber. When in firing position, each firing chamber is closed by the secondary breech frame **126** to permit firing of the booster round in the chamber. When in ejection position, each firing chamber opens laterally through one open side of chamber **132** to permit lateral ejection of the spent cartridge case of a fired booster round from the chamber. Extending through the wall of the barrel **118** and the secondary breech frame **126** are a number of propellant gas ports **142** which communicate each firing chamber **138**, when in firing position, to the gun bore **120**.

As in the earlier hypervelocity gun **10**, the breech cylinders **110**, **136** of the modified hypervelocity gun **100** are drivably coupled for unified rotation of the firing chambers **114**, **138** to firing position. To this end, the shaft **122** of the primary breech cylinder **110** extends forwardly from the cylinder and rotatably through the front end of the primary breech frame **106**. Fixed to the forward end of this shaft is a gear **144**. Fixed to and extending coaxially from the secondary breech cylinder **136** and rotatably through the rear end of the secondary breech frame **126** is a shaft **146**. A gear **148** fixed on the end of the shaft **146** meshes with the gear **144** to drivably couple the primary and secondary breech cylinders **110**, **136**.

As already noted, the primary ammunition cartridges or rounds **116** which are fired in the primary breech mechanism **102** are conventional. Accordingly, these primary rounds need not be described in detail. Suffice it to say that each primary round comprises a generally cylindrical metallic cartridge case **116***a* containing a primary propellant charge (not shown) and a projectile **116***b* which is secured to and extends forwardly from the front end of the cartridge case. The primary firing chambers **114** are shaped to complement the cartridge case **116***a* as shown.

The booster ammunition rounds **140** which are fired in secondary breech mechanism **126** comprise a yieldable, non-combustible cartridge case **140***a* which is shaped to complement the secondary firing chambers **138**. Contained within the cartridge case is a booster propellant charge **140***b*. Formed in at least the side of the cartridge case which is exposed when the booster round is positioned in a secondary firing chamber **138** is an ignition opening **140***c* closed by a combustible cover sheet **140***d*.

The modified hypervelocity gun **100** is conditioned for firing by rotating the primary and secondary breech cylinders **110**, **136** to locate firing chambers **114**, **138** of the respective cylinders in infeed position. Primary and booster rounds **116**, **140** are then inserted into the respective firing chambers, after which the cylinders are rotated to locate these rounds in firing position. At this point, the firing pin **124** is actuated to fire the primary round. The projectile **116***b* of the fired primary round is thereby propelled forwardly through the gun bore **120** by propellant gas pressure. During its forward travel through the gun bore, the projectile uncovers the propellant gas ports **142** in the wall of the barrel **118**. The booster round **140** currently in firing position within the secondary breech mechanism **104** is thereby exposed to the hot propellant gas generated by the fired primary round. As in

the previous embodiment of the invention, the hot propellant gas consumes the combustible cover sheet **140***d* and ignites the booster propellant charge **140***b* in the round. The propellant gas then generated by the booster propellant enters the gun bore **120** through the ports **142** to increase the propellant gas pressure behind the advancing projectile **116***b* of the fired primary round and thereby accelerate the projectile to the desired muzzle velocity. After firing, the primary and secondary firing chambers **114**, **138** currently in firing position are rotated to ejection position to permit ejection of the spent cartridge cases of the fired rounds from the chamber.

It should also be noted that while the invention has been disclosed in connection with cased booster ammunition, the present invention may be embodied in uncased ammunition. The uncased booster ammunition will be like that illustrated in the present drawings, except that the outer cartridge case will be eliminated and replaced by an additional quantity of molded booster propellant. When firing uncased ammunition of this type, of course, the primary and secondary breech mechanisms of the gun will be equipped with suitable obturator means, such as those disclosed in the application, for sealing the breech interfaces against propellant gas leakage.

What is claimed as new in supports of Letters Patent is:

1. A booster ammunition round for a hypervelocity gun of the class described comprising:

a perforated tube;

a booster propellant about said tube;

said tube having a central circular passage of uniform diameter which opens longitudinally through the ends of said tube and said booster propellant; and

a cartridge case containing said tube and booster propellant and having end walls secured to the ends of said tube, said tube passage opening through said case end walls.

2. An open chamber booster ammunition round for an open chamber hypervelocity gun of the class described comprising:

a perforated tube;

a booster propellant about said tube;

said tube having a central circular passage of uniform diameter which opens longitudinally through the ends of said tube and said booster propellant; and

said round having a generally triangular shape in transverse cross-section and convex cylindrically curved sides of equal radii.

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ROBERT F. STAHL, Primary Examiner

U.S. Cl. X.R.

102—43

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,572,248 Dated March 23, 1971

Inventor(s) David Dardick

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 41 correct "3,446,112" to read -- 3,446,113 --.

Col. 6, line 56 correct "electriically" to read

-- electrically --.

Signed and sealed this 25th day of February 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks

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