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(54) **BOTTLENECK AMMUNITION WITH HIGH MUZZLE VELOCITY**

FLASCHENHALS-FÖRMIGE MUNITION MIT HOHER MÜNDUNGSGESCHWINDIGKEIT

MUNITIONS A EPAULEMENT A VITESSE INITIALE ELEVEE

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(73) Proprietors:

- **Bauer, Nicodemus Eran
Norton Disney, Lincoln LN6 9JP (GB)**
- **Bauer, Gerard Miet
Wellingore, Lincoln LN5 0JF (GB)**

(72) Inventors:

- **BARRACLOUGH, Trevor, Joe
Stafford ST16 3DB (GB)**
- **ALEXANDER, William, Rogers, Henry
Ranton, Stafford ST18 9JY (GB)**

(74) Representative: **Elsworth, Dominic Stephen
Hargreaves Elsworth
Suite 14
i6, Charlotte Square
Newcastle-upon Tyne, NE1 4XF (GB)**

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Description

Field of the Invention

[0001] The invention relates to firearms, and in particular to improved ammunition for side arms and improved side arms to fire such ammunition.

Background to the Invention

[0002] There is a need for an ammunition capable of being fired from a side arm which has high muzzle velocity, great penetrative power and excellent accuracy. None of these characteristics is found in present ammunition types suitable for firing from a side arm. The need is particularly great in police forces and special forces. Body armour which is currently available makes most side arms ineffective. However, in many cases a rifle, which would provide the penetrative power necessary is not suitable, simply because it cannot be drawn quickly enough, or concealed.

[0003] It is well understood by those skilled in the art of weaponry that firearms fall into four separate families, those being:

- a) Small calibre weapons using ammunition ranging in size from 0.22 inch which are commonly fired from small handguns;
- b) Small arms weapons which use straight sided centre fire ammunition, the ammunition being fired from handguns and semi-automatic guns, the common bores being 0.38 inch, 0.357 inch, 0.44 inch, 9 mm and 10 mm which offer accuracy over a range up to 50 metres;
- c) Combat rifles which fire ammunition sending projectiles at very high velocities over ranges of 500 metres plus, the common bores being 0.223 inch (5.56 mm), 5.7 mm, 0.303 inch, 7.62 mm and 0.50 inch; and
- d) Heavy weapons for firing ammunition up to 2 kilometres commonly having bores of 20 mm, 30 mm and larger, and which are used in extreme range combat to deliver large payloads, e.g. anti-tank and anti-aircraft ammunition.

[0004] Small arms and small calibre weapons are convenient simply because they are small and lightweight, which makes them easy to use and carry about the person. However, the performance of these types of weapon is limited. They cannot fire projectiles over long distances, and furthermore are very inaccurate at anything more than short distances. In general, pistol ammunitions have projectiles of a diameter which corresponds to the internal diameter of the cartridge case, the walls of the cartridge case being parallel, whereas rifle ammunitions have projectiles significantly smaller in diameter than the cartridge cases to which they are attached. The result is a projectile which travels further

and is more accurate.

[0005] The types of wound produced by standard pistol and rifle ammunitions are quite different. Pistol ammunition produces low velocity wound characteristics, characterised in animals by the destruction of tissue in the path of the projectile, and a minor amount of secondary cavity damage around the path to the projectile. It is the effect of the projectile destroying objects in its path which neutralises the target. On the other hand, rifle ammunition produces a different type of wounding characteristic, where it is not only the destruction of tissue by the projectile which causes neutralisation, but damage to tissues caused by a velocity induced shock wave. In fact, the projectile itself causes limited damage, rather it is the shock wave induced by the projectile passing through the tissue which causes severe trauma, sometimes known as temporary cavity damage. This type of wounding is known as "high velocity wounding".

[0006] Any projectile has a limit velocity, the limit velocity for the projectile in question being the change over point between low velocity wounding and high velocity wounding occurring on impact with an animal target.

[0007] Single shot pistols, often being of bolt action type have been adapted to receive a rifle cartridge. However, it would be desirable to produce ammunition suitable for a standard side arm capable of producing high velocity wounding in a target.

[0008] Many attempts have been made to optimise the performance of small arms and small calibre weapons. Each time the result has been a larger weapon. For example the Calico made by Calico Arms, and the P() made by FN. Although both of these weapons increase the accuracy and distance of the projectile fired, neither is suitable for single handed use. The only known ammunition for use in side arms which utilised a projectile of smaller diameter than the internal diameter of the cartridge case to which it was attached was the Mauser Parabellam, which consisted of a projectile having an external diameter of 7.65 mm attached to a case having an external diameter of 9.6 mm. Whilst improved velocity and penetrative capacity were noted, this ammunition still produced low velocity wounding.

[0009] Many of the improved weapons also suffer problems in their re-arranged feed mechanisms and magazines.

[0010] The constraints of a small automatic or semi-automatic weapon mean that a small compact ammunition having a short case length is required. Assuming that the weapon is to provide a reasonable number of shots then the ammunition will generate a low velocity, have drastically reduced terminal effects, and produce problems with terminal effects as a result of its small size.

[0011] The problem in controlling the burn characteristics of the powder in cartridge cases suitable for use in automatic or semi-automatic side arms have lead those skilled in the art to develop ammunition having parallel sides. However, there is a need for police offic-

ers to be provided with sidearms having penetrative power greater than that which can presently be provided.

[0012] Bottleneck ammunition known as the 30 (7.63mm) Mauser is described in the book entitled Cartridges of the World (ISBN 0-695-80326-3) at page 152, and dimensional data of this ammunition is set out on page 177 of the same book. The muzzle velocity provided by this ammunition is between 381 and 429 metres per second, which is less than the muzzle velocity required to cause high velocity wounding. The ratio of the external diameter of the cartridge case at its widest point to the ratio of the projectile at its widest point is about 1.2 to 1.

[0013] There is a limit velocity above which a projectile of a given diameter will cause a high velocity wound.

[0014] It would therefore be desirable to provide ammunition capable of being fired from a sidearm which has a longer range and gives greater accuracy than currently available ammunition. It would also be desirable to provide a sidearm suitable for, or to modify parts of existing sidearms to make them capable of, firing such ammunition.

[0015] It would be advantageous to be able to utilise commonly available projectiles. It would also be advantageous to be able to utilise commonly available cartridge cases.

[0016] Furthermore, it would be desirable to provide ammunition for a self-loading, automatic, or semi-automatic sidearm capable of firing the projectile at a velocity in excess of the limit velocity of the said projectile.

[0017] The term sidearm shall be understood to encompass weapons such as pistols, and carbines.

Summary of the Invention

[0018] According to the invention there is provided self-loading sidearm ammunition as specified in Claim 1.

[0019] One aspect of the invention provides ammunition suitable for firing from a side arm comprising a cartridge adapted to fire a projectile, the cartridge case having at one end a portion of reduced diameter, the projectile being held in the said portion of reduced diameter, wherein the ratio of the external diameter of the cartridge case at its widest point to the external diameter of the projectile at its widest point is such that when the projectile is fired into a target high velocity wounding is caused.

[0020] The invention also provides a cartridge case having at one end a portion of reduced diameter to receive a projectile therein, wherein the ratio of the external diameter of the cartridge case at its widest point to the internal diameter of the portion of reduced diameter at its widest point is greater than 1.26 to 1, and is preferably between 1.5 to 1 and 2.8 to 1, and still more preferably is 1.3 to 1 and 2.0 to 1.

[0021] Preferably, the ratio of the external diameter of

the cartridge case at its widest point to the external diameter of the projectile at its widest point is between 1.5 to 1 and 2.8 to 1.

[0022] Preferably, the external diameter of the cartridge case at its widest point is 1.3 to 2.0 times the external diameter of the projectile.

[0023] Even more preferably, the external diameter of the cartridge case at its widest point is substantially 1.8 times the external diameter of the projectile.

[0024] Still more preferably, the external diameter of the projectile is substantially 5.56 mm, and the external diameter of the cartridge case is substantially 10.80 mm.

[0025] Advantageously, the cartridge case is formed from a standard parallel sided cartridge case, having a length of between 17 and 25 mm.

[0026] The projectile may be a standard 5.56 mm (0.224 inch) projectile.

[0027] The cartridge may be formed from a standard 10 mm cartridge case, having a length of 25 mm.

[0028] The cartridge may be formed from a standard 40 Smith & Wesson parallel sided cartridge case, having a length of 21.5 mm.

[0029] In another embodiment of the invention, the external diameter of the cartridge case is substantially 9.6 mm and the external diameter of the projectile is greater than or equal to 4.5 mm and less than or equal to 6 mm.

[0030] In another aspect of the invention the external diameter of the cartridge case is substantially 12 mm and the external diameter of the projectile is greater than or equal to 4.5 mm and less than or equal to 6 mm.

[0031] The cartridge case may be swaged to provide the portion of reduced diameter.

[0032] The cartridge case is preferably formed from brass.

[0033] The projectile may be a standard full metal jacketed projectile.

[0034] The powder used in the cartridge is preferably a nitro based powder.

[0035] One aspect of the invention also provides a gun barrel having a chamber at one end so shaped and dimensioned as to receive ammunition according to the invention, one end of the said chamber entering into a rifled barrel of a diameter corresponding to the diameter of the projectile to be shot therethrough.

[0036] Another aspect of the invention provides a self-loading, automatic, or semi-automatic side-arm comprising a gun barrel having a chamber at one end so shaped and dimensioned as to receive ammunition according to the invention, one end of the said chamber entering into a rifled barrel of a diameter corresponding to the diameter of the projectile to be shot therethrough.

[0037] The ammunition of the invention fires its projectile at a much greater velocity, and therefore over a much longer range than would be the case with ammunition attached to a straight sided cartridge case. This is because the diameter of the projectile is less than the diameter of the case.

[0038] The ammunition of the invention allows side arms to fire projectiles which behave in a similar manner to projectiles fired from rifles. The projectiles fired from ammunition according to the invention can produce high velocity wounding.

[0039] The ammunition uses known components which are the subject of considerable research regarding flight characteristics and terminal effects.

[0040] Existing side arms can easily be modified to use the ammunition of the invention by the replacement of a standard barrel with a barrel according to the invention.

Brief description of the Drawings

[0041] In the drawings which illustrate exemplary embodiments of the invention:

Figure 1 is a side view of a cartridge case comprising part of ammunition according to the invention; Figure 2 is a cross-section of a cartridge case comprising part of ammunition according to the invention; and

Figure 3 is a cross-section of ammunition according to the invention;

Figure 4 is a cross-section of a barrel according to another aspect of the invention;

Figure 5 is a graph of bullet velocity against distance for the ammunition of the invention and two other ammunition types of the art;

Figure 6 is a graph of bullet energy against distance for the ammunition of the invention and two other ammunition types of the art;

Figure 7 is a graph of bullet drop against distance for the ammunition of the invention and two other ammunition types of the art;

Figure 8 is a graph of time of flight against distance for the ammunition of the invention and two other ammunition types of the art;

Figure 9 is a graph of bullet path against distance for the ammunition of the invention and two other ammunition types of the art; and

Figure 10 is a graph of combined distance from center against distance for the ammunition of the invention and two other ammunition types of the art.

Detailed Description of the Preferred Embodiments

[0042] Figure 1 shows a cartridge case 1 having a primer 2 attached to one end thereof. At the other end of the case 1 there is a portion of reduced diameter 3. In the region 4 between the straight sided portion of the cartridge case 1 and the portion of reduced diameter 3, the sides of the cartridge case slope.

[0043] In the preferred embodiment the diameters A and B are 10.80 mm, the diameter C is 10.75 mm, the diameter D of the portion of reduced diameter 3 is 6.46 mm, and the internal diameter E is 5.66 mm.

[0044] Letters F to K designate lengths of different parts of the cartridge case 1. In the preferred embodiment K is 23.00 mm, J is 19.25 mm, I is 15.82 mm, H is 3.20 mm, G is 2.48 mm and F is 1.40 mm.

5 [0045] The angle γ is 32 degrees in the preferred embodiment.

[0046] The cartridge case 1 is formed by taking a standard 25 mm cartridge case and forming the portion of reduced diameter and the region having sloping sides 10 by means of swaging.

[0047] The internal diameter E of 5.66 mm accommodates a standard 0.224 inch (5.56 mm) projectile.

[0048] The cartridge case 1 is shown in cross-section in Figures 2 and 3, and it can be seen that the case 1 15 has an internal chamber 5 in which powder is held. As can be seen from Figure 3, a projectile 6 is fitted in the portion of reduced diameter 3. As the powder (not shown) held in the internal chamber 5 burns energy is released, and so the projectile is forced out of the cartridge case 1.

[0049] The projectile 6 comprises an inner shaped steel or lead mass 8, surrounded by a copper jacket 7. Many different projectiles of a size suitable to fit into the portion of reduced diameter 3 are known and may be 25 used in place of the projectile 6 shown.

[0050] In Figure 4 there is shown a barrel 10, comprising at one end a chamber 11 which is shaped to accommodate ammunition according to the invention, and a rifled barrel section 12.

[0051] The barrel 10 is attached to a weapon by means of block 13 having an aperture 14 through which a pin may pass.

[0052] The chamber 11 has a sloping face 15 and a portion of reduced diameter 16 which co-operate with the sloping face 4 and portion of reduced diameter 3 of the cartridge case shown in Figures 1 and 2. In the barrel 10, beyond the portion of reduced diameter 16, the diameter of chamber 11 tapers 17 for a short distance to the end of the chamber 11. At the end of the chamber 11, the rifled barrel section 12 begins.

[0053] Tapered section 17 accommodates the shaped projectile such as the projectile 6 shown in Figure 3.

[0054] The dimensions of the chamber may be nominally 0.1 mm greater than those of the ammunition according to the invention.

[0055] Figures 5 to 10 are graphs showing the performance of the ammunition of the present invention compared with the performance of 9mm FMJ and 0.40 Smith and Wesson as modelled on the "Oehler Ballistic Explorer". In each graph, trace 1 indicates the performance of the ammunition of the invention, trace 2 indicates the performance of 9mm FMJ ammunition, and trace 3 indicates the performance of 0.40 Smith and Wesson ammunition. Each of the graphs serves to show that the ammunition of the invention significantly outperforms the 9mm FMJ and the 0.40 Smith and Wesson.

Claims

1. Self-loading sidearm ammunition comprising a high pressure cartridge case (1) and a projectile (6), the cartridge case (1) consisting of a first portion with an external first diameter of between 9.6 and 12 millimetres having substantially parallel sides and a second portion (3) of reduced diameter, the said first and second portions each having substantially parallel sides and being joined together by a sloping surface, wherein the projectile (6) is held in said second portion (3), the part of said projectile held in the said second portion having an external diameter of between 4.5 and 6 millimetres, and the cartridge case (1) including a primer (2) and a chamber (5), which chamber (5) is charged with an amount of propellant powder, wherein the length of the cartridge case (1) is greater than 17 millimetres and less than or equal to 25 millimetres, and in that the ratio of the external diameter of the cartridge case (1) at its widest point to the external diameter of the projectile (6) at its widest point is greater than or equal to 1.3 to 1, so that when the ammunition is fired from an appropriate self loading-sidearm the combination of the above features will allow the projectile to achieve a muzzle velocity of about 600 metres per second (about 2000 feet per second) or in excess thereof and a muzzle energy of about 624 Joules (about 460 ft-lbs) or in excess thereof so that said projectile does not only cause destruction of tissue but also causes damage to the tissue by a velocity induced shock wave resulting in trauma damage, when the projectile hits a target.
2. Ammunition according to Claim 1, wherein the ratio of the external diameter of the cartridge case (1) at its widest point to the external diameter of the projectile (6) at its widest point is in the range 1.5 to 2.8 to 1.
3. Ammunition according to Claim 1 or 2, wherein the ratio of the external diameter of the cartridge case (1) at its widest point to the external diameter of the projectile (6) at its widest point is in the range 1.3 to 2.0 to 1.
4. Ammunition according to any preceding claim, wherein the external diameter of the cartridge case (1) at its widest point is substantially 1.8 times the external diameter of the projectile (6).
5. Ammunition according to Claim 1, wherein the ratio of the external diameter of the cartridge case (1) at its widest point to the internal diameter of the portion of reduced diameter (3) at its widest point is greater than 1.3 to 1.
6. Ammunition according to Claim 5, wherein the ratio of the external diameter of the cartridge case (1) at its widest point to the internal diameter of the portion of reduced diameter (3) at its widest point is between 1.5 to 1 and 2.8 to 1.
7. Ammunition according to Claim 5, wherein the ratio of the external diameter of the cartridge case (1) at its widest point to the internal diameter of the portion of reduced diameter (3) at its widest point is between 1.3 to 1 and 2.0 to 1.
8. Ammunition according to Claim 1, wherein the external diameter of the projectile (6) is substantially 5.56 mm, and the external diameter of the cartridge case (1) is substantially 10.80 mm at its widest point.
9. Ammunition according to any of Claims 1 to 7, wherein the projectile (6) is a standard 5.56 mm (0.224 inch) projectile.
10. Ammunition according to any of Claims 1 to 7, wherein the cartridge case (1) is formed from a standard 10 mm cartridge case, having a length of 25 mm.
11. Ammunition according to Claim 1, wherein the cartridge case (1) is formed from a standard 40 Smith & Wesson parallel sided cartridge case, having a length of 21.5 mm.
12. Ammunition according to any preceding claim, wherein the cartridge case (1) is swaged to provide the portion of reduced diameter.
13. Ammunition according to any preceding claim, wherein the cartridge case (1) is formed from brass.
14. Ammunition according to any preceding claim, wherein the projectile (6) is standard full metal jacketed projectile.
15. A gun barrel (10) suitable for a side arm, said barrel having a chamber (11) at one end so shaped and dimensioned as to receive ammunition according to any of claims 1 to 15.
16. A sidearm comprising a gun barrel (10) having a chamber (11) at one end so shaped and dimensioned as to receive ammunition according to any of claims 1 to 15.

Patentansprüche

1. Munition für eine selbstladende Seitenwaffe, die eine Hochdruck-Patronenhülse (1) und ein Projektil (6) aufweist, wobei die Patronenhülse (1) aus ei-

- nem ersten Teil mit einem ersten Außendurchmesser von zwischen 9,6 und 12 Millimetern mit im Wesentlichen parallelen Seiten und einem zweiten Teil (3) mit reduziertem Durchmesser besteht, wobei die ersten und zweiten Teile jeweils im Wesentlichen parallele Seiten besitzen und durch eine geneigte Oberfläche miteinander verbunden sind, wobei das Projektil (6) in dem zweiten Teil (3) gehalten wird, wobei der Teil des Projektils, der in dem zweiten Teil gehalten wird, einen Außendurchmesser von zwischen 4,5 und 6 Millimetern besitzt, und wobei die Patronenhülse (1) eine Zündereinrichtung (2) und eine Kammer (5) aufweist, wobei die Kammer (5) mit einer Menge von vortreibendem Pulver geladen ist, wobei die Länge der Patronenhülse (1) größer als 17 Millimeter und kleiner als oder gleich 25 Millimeter ist, und **dadurch**, dass das Verhältnis des Außendurchmessers der Patronenhülse (1) an ihrer breitesten Stelle zu dem Außendurchmesser des Projektils (6) an seiner breitesten Stelle größer als oder gleich 1,3 bis 1 ist, so dass, wenn die Munition von einer geeigneten selbstladenden Seitenwaffe gefeuert wird, die Kombination der obigen Merkmale es dem Projektil gestatten, eine Mündungsgeschwindigkeit von ungefähr 600 Metern pro Sekunde (ungefähr 2000 Fuß (ft) pro Sekunde) oder darüber hinaus und eine Mündungsenergie von ungefähr 624 Joule (ungefähr 460 Fuß-Pfund (ft-lbs)) oder darüber hinaus zu erreichen, so dass das Projektil nicht nur eine Zerstörung von Gewebe verursacht, sondern ebenfalls einen Schaden für das Gewebe durch eine geschwindigkeitsinduzierte Stoßwelle verursacht, was eine traumatische Schädigung zur Folge hat, wenn das Projektil ein Ziel trifft.
2. Munition nach Anspruch 1, wobei das Verhältnis des Außendurchmessers der Patronenhülse (1) an ihrer breitesten Stelle zu dem Außendurchmesser des Projektils (6) an seiner breitesten Stelle in dem Bereich von 1,5 bis 2,8 zu 1 ist.
 3. Munition nach Anspruch 1 oder 2, wobei das Verhältnis des Außendurchmesser der Patronenhülse (1) an ihrer breitesten Stelle zu dem Außendurchmesser des Projektils (6) an seiner breitesten Stelle in dem Bereich von 1,3 bis 2,0 zu 1 ist.
 4. Munition nach einem der vorhergehenden Ansprüche, wobei der Außendurchmesser der Patronenhülse (1) an ihrer breitesten Stelle im Wesentlichen das 1,8-fache des Außendurchmessers des Projektils (6) ist.
 5. Munition nach Anspruch 1, wobei das Verhältnis des Außendurchmessers der Patronenhülse (1) an ihrer breitesten Stelle zu dem Innendurchmesser des Teils mit reduziertem Durchmesser (3) an seiner breitesten Stelle größer als 1,3 zu 1 ist.
 6. Munition nach Anspruch 5, wobei das Verhältnis des Außendurchmessers der Patronenhülse (1) an ihrer breitesten Stelle zu dem Innendurchmesser des Teils mit reduziertem Durchmesser (3) an seiner breitesten Stelle zwischen 1,5 zu 1 und 2,8 zu 1 ist.
 7. Munition nach Anspruch 5, wobei das Verhältnis des Außendurchmessers der Patronenhülse (1) an ihrer breitesten Stelle zu dem Innendurchmesser des Teils mit reduziertem Durchmesser (3) an seiner breitesten Stelle zwischen 1,3 zu 1 und 2,0 zu 1 ist.
 8. Munition nach Anspruch 1, wobei der Außendurchmesser des Projektils (6) im Wesentlichen 5,56 mm ist, und wobei der Außendurchmesser der Patronenhülse (1) im Wesentlichen 10,80 mm an ihrer breitesten Stelle ist.
 9. Munition nach einem der Ansprüche 1 bis 7, wobei das Projektil (6) ein Standard 5,56 mm (0,224 Zoll) Projektil ist.
 10. Munition nach einem der Ansprüche 1 bis 7, wobei die Patronenhülse (1) aus einer Standard-10 mm-Patronenhülse mit einer Länge von 25 mm gebildet ist.
 11. Munition nach Anspruch 1, wobei die Patronenhülse (1) aus einer Standard-40-Smith & Wesson-parallelseitigen Patronenhülse mit einer Länge von 21,5 mm gebildet ist.
 12. Munition nach einem der vorhergehenden Ansprüche, wobei die Patronenhülse (1) verjüngungsbearbeitet ist, um den Teil mit reduziertem Durchmesser vorzusehen.
 13. Munition nach einem der vorhergehenden Ansprüche, wobei die Patronenhülse (1) aus Messing gebildet ist.
 14. Munition nach einem der vorhergehenden Ansprüche, wobei das Projektil (6) ein Standardvollmetallmantelprojektil ist.
 15. Ein Geschützlauf (10), der für eine Seitenwaffe geeignet ist, wobei der Lauf an einem Ende eine Kammer (11) besitzt, die so geformt und dimensioniert ist, um Munition nach einem der Ansprüche 1 bis 15 aufzunehmen.
 16. Eine Seitenwaffe, die einen Geschützlauf (10) mit einer Kammer (11) an einem Ende aufweist, die so geformt und dimensioniert ist, um Munition nach ei-

nem der Ansprüche 1 bis 15 aufzunehmen.

Revendications

1. Munition à épaulement semi-automatique comprenant une douille haute pression (1) et un projectile (6), la douille (1) étant constituée d'une première partie ayant un premier diamètre externe compris entre 9,6 et 12 millimètres présentant sensiblement des faces parallèles et une seconde partie (3) d'un diamètre réduit, lesdites première et seconde parties présentant chacune des faces sensiblement parallèles et étant reliées ensemble par une surface inclinée, dans laquelle le projectile (6) est maintenu dans ladite seconde partie (3), la partie dudit projectile maintenue dans ladite seconde partie présentant un diamètre externe compris entre 4,5 et 6 millimètres, et la douille (1) comprenant une amorce (2) et une chambre (5), laquelle chambre (5) est chargée d'une quantité de poudre de propulsion, dans laquelle la longueur de la douille (1) est supérieure à 17 millimètres et inférieure ou égale à 25 millimètres, et en ce que le rapport du diamètre externe de la douille (1) en son point le plus large sur le diamètre externe du projectile (6) en son point le plus large est supérieur ou égal à 1,3 sur 1, de sorte que lorsque la munition est tirée par un épaulement semi-automatique approprié, la combinaison des caractéristiques ci-dessus permettra au projectile de réaliser une vitesse initiale d'approximativement 600 mètres par seconde (approximativement 2000 pieds par seconde) ou plus et une énergie initiale d'approximativement 624 Joules (approximativement 460 pieds-livres) ou plus, de sorte que ledit projectile ne provoque pas seulement la destruction du tissu mais endommage également le tissu par une onde de choc induite par la vitesse entraînant des traumatismes, lorsque le projectile heurte une cible. 5
2. Munition selon la revendication 1, dans laquelle le rapport du diamètre externe de la douille (1) en son point le plus large sur le diamètre externe du projectile (6) en son point le plus large est dans la plage de 1,5 à 2,8 sur 1. 10
3. Munition selon la revendication 1 ou 2, dans laquelle le rapport du diamètre externe de la douille (1) en son point le plus large sur le diamètre externe du projectile (6) en son point le plus large est dans la plage de 1,3 à 2,0 sur 1. 15
4. Munition selon l'une quelconque des revendications précédentes, dans laquelle le diamètre externe de la douille (1) en son point le plus large est sensiblement 1,8 fois le diamètre externe du projectile (6). 20
5. Munition selon la revendication 1, dans laquelle le rapport du diamètre externe de la douille (1) en son point le plus large sur le diamètre interne de la partie présentant un diamètre réduit (3) en son point le plus large est supérieur à 1,3 sur 1. 25
6. Munition selon la revendication 5, dans laquelle le rapport du diamètre externe de la douille (1) en son point le plus large sur le diamètre interne de la partie présentant un diamètre réduit (3) en son point le plus large est compris entre 1,5 sur 1 et 2,8 sur 1. 30
7. Munition selon la revendication 5, dans laquelle le rapport du diamètre externe de la douille (1) en son point le plus large sur le diamètre interne de la partie présentant un diamètre réduit (3) en son point le plus large est compris entre 1,3 sur 1 et 2,0 sur 1. 35
8. Munition selon la revendication 1, dans laquelle le diamètre externe du projectile (6) est sensiblement de 5,56 mm, et le diamètre externe de la douille (1) est sensiblement de 10,80 mm en son point le plus large. 40
9. Munition selon l'une quelconque des revendications 1 à 7, dans laquelle le projectile (6) est un projectile standard de 5,56 mm (0,224 pouce). 45
10. Munition selon l'une quelconque des revendications 1 à 7, dans laquelle la douille (1) est formée à partir d'une douille standard de 10 mm, présentant une longueur de 25 mm. 50
11. Munition selon la revendication 1, dans laquelle la douille (1) est formée à partir d'une douille standard à faces parallèles 40 Smith & Wesson, présentant une longueur de 21,5 mm. 55
12. Munition selon l'une quelconque des revendications précédentes, dans laquelle la douille (1) est matricée pour fournir la partie présentant un diamètre réduit. 60
13. Munition selon l'une quelconque des revendications précédentes, dans laquelle la douille (1) est formée en laiton. 65
14. Munition selon l'une quelconque des revendications précédentes, dans laquelle le projectile (6) est un projectile chemisé standard. 70
15. Canon (10) convenant à un épaulement, ledit canon présentant une chambre (11) à une extrémité, formée et dimensionnée de manière à recevoir la munition selon l'une quelconque des revendications 1 à 14. 75
16. Epaulement comprenant un canon (10) présentant

une chambre (11) à une extrémité, formée et dimensionnée de manière à recevoir la munition selon l'une quelconque des revendications 1 à 15.

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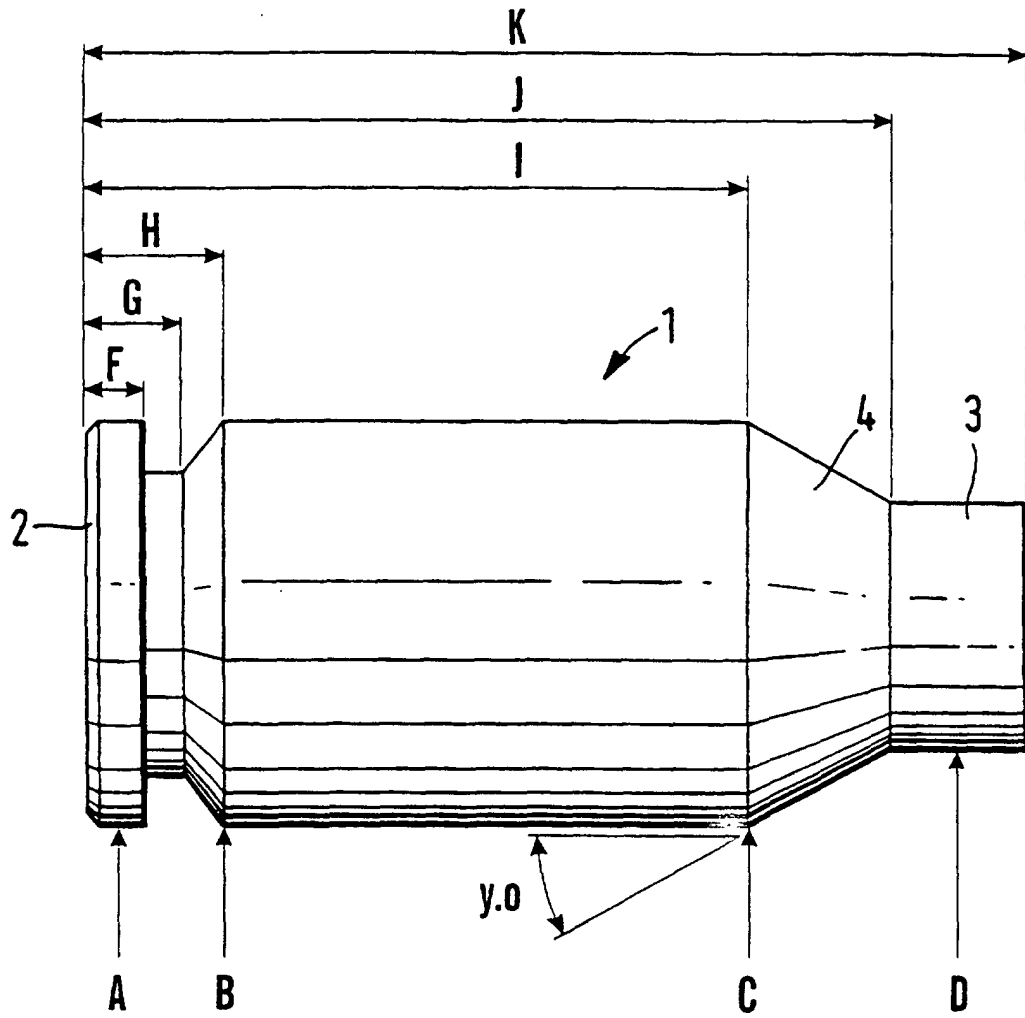


Fig.1

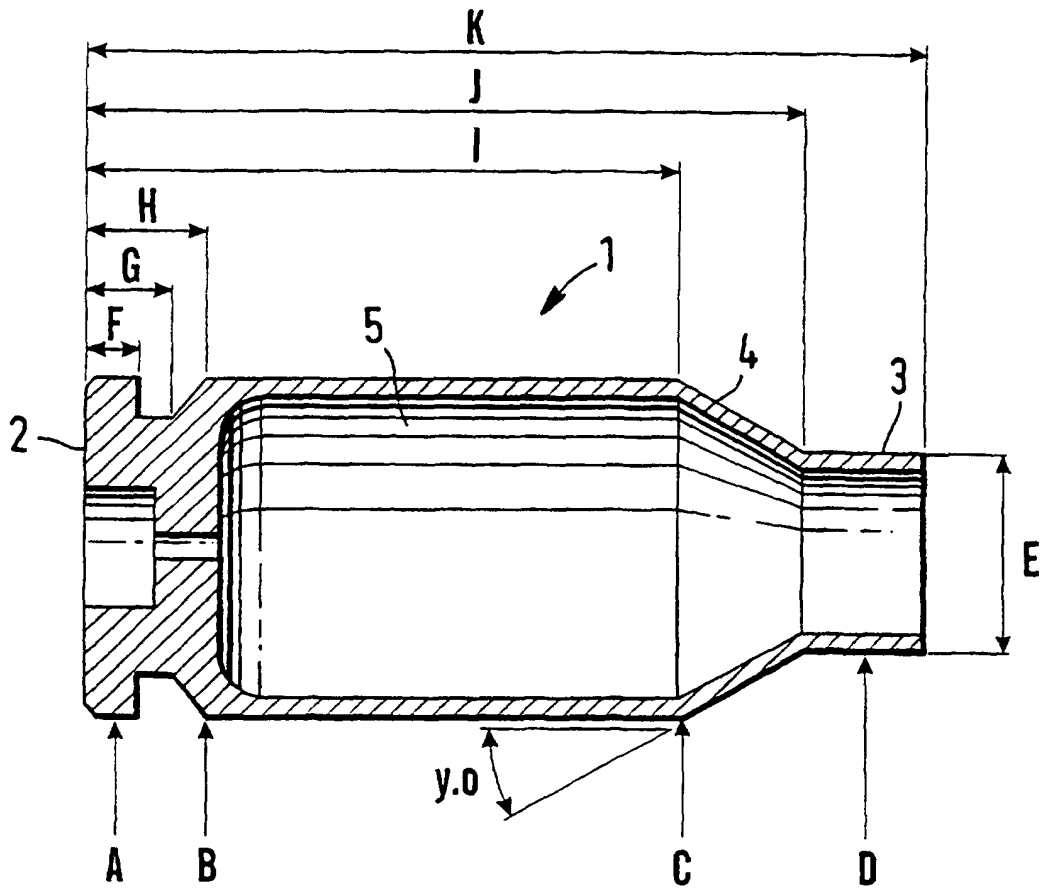


Fig. 2

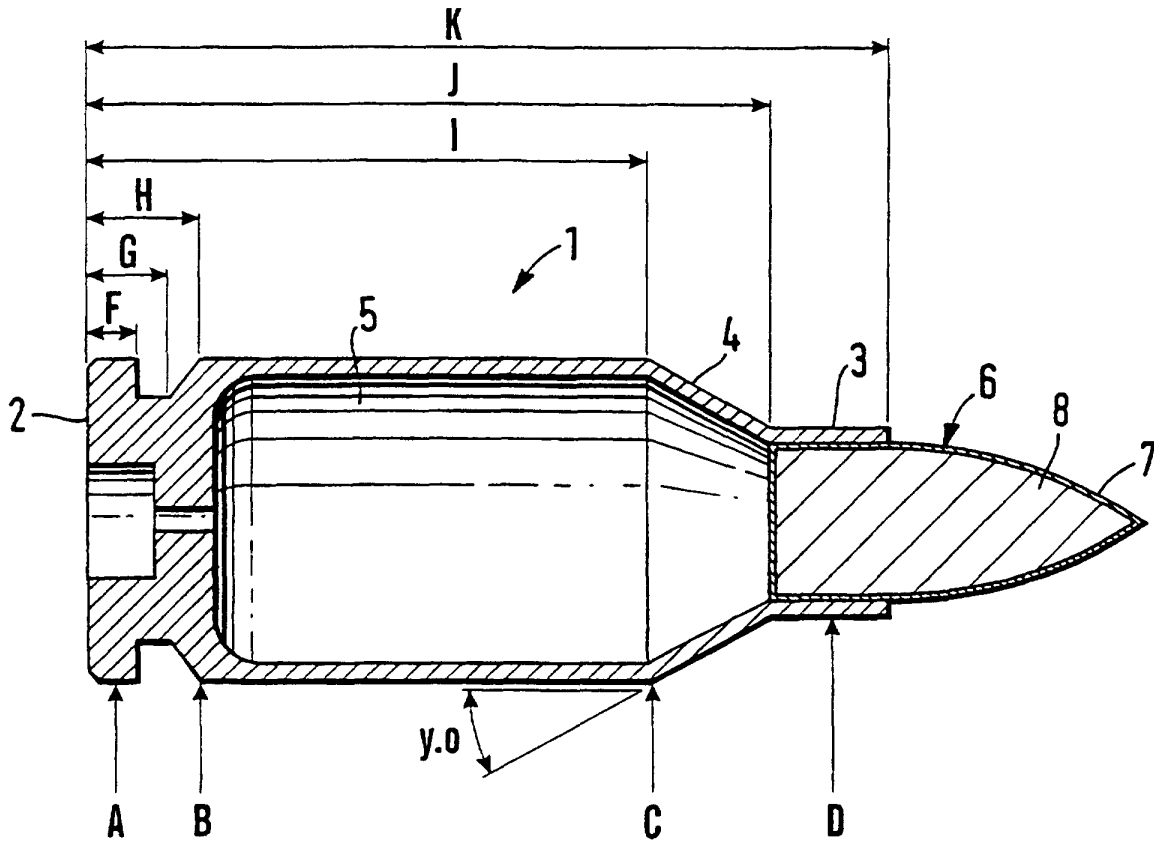


Fig. 3

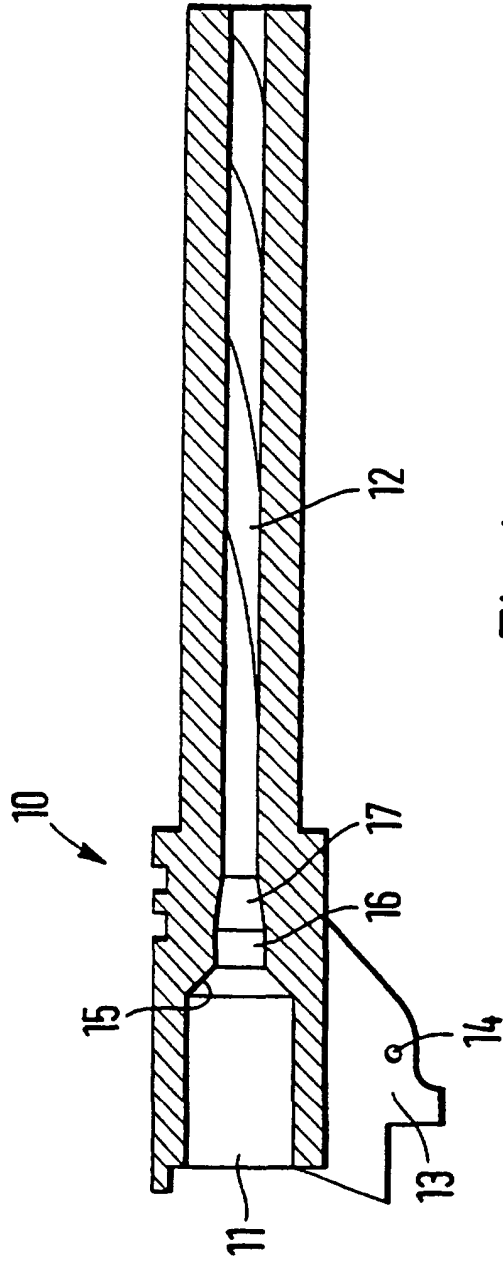
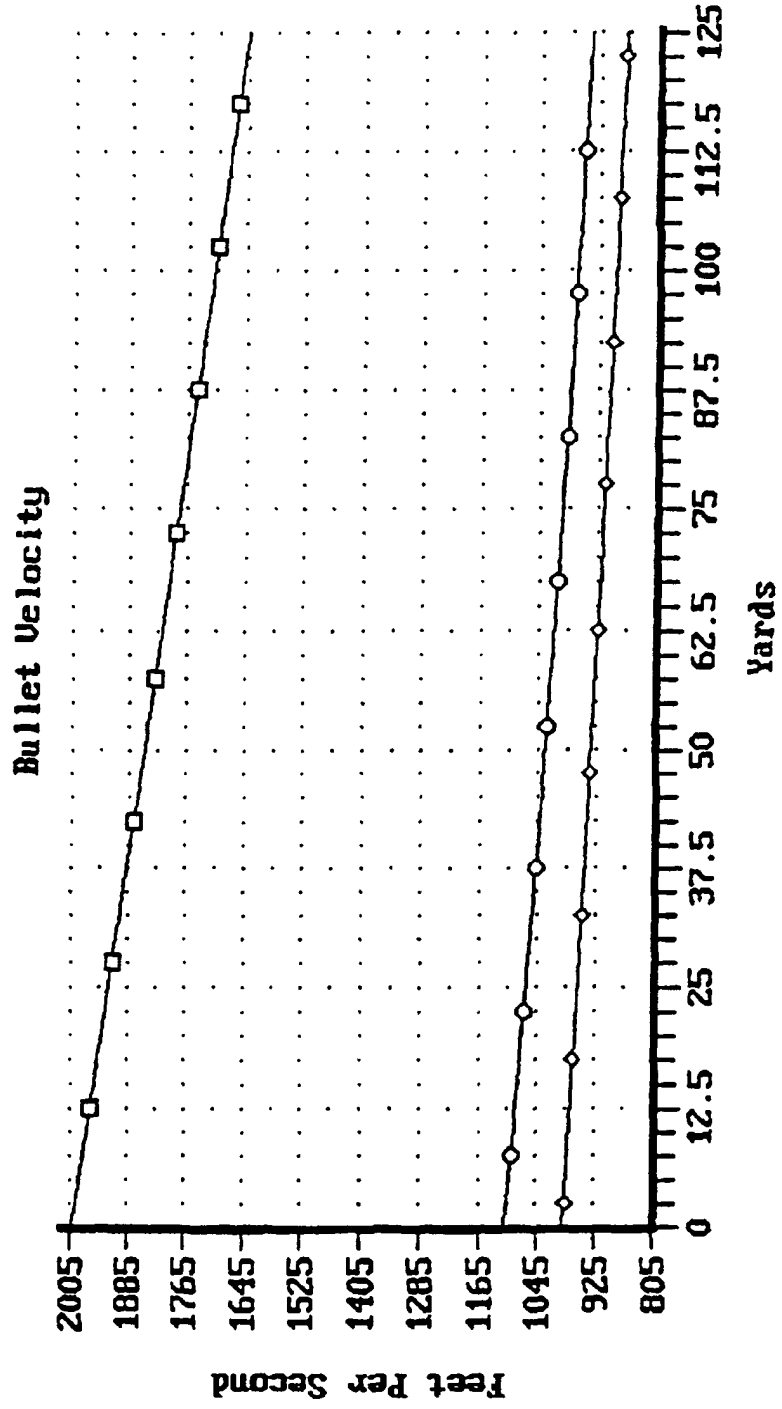


Fig. 4

Dehler Ballistic Explorer

Fig 5

Graph Key
Trace 1: □-□-□
Trace 2: ○-○-○
Trace 3: ◇-◇-◇



Oehler Ballistic Explorer

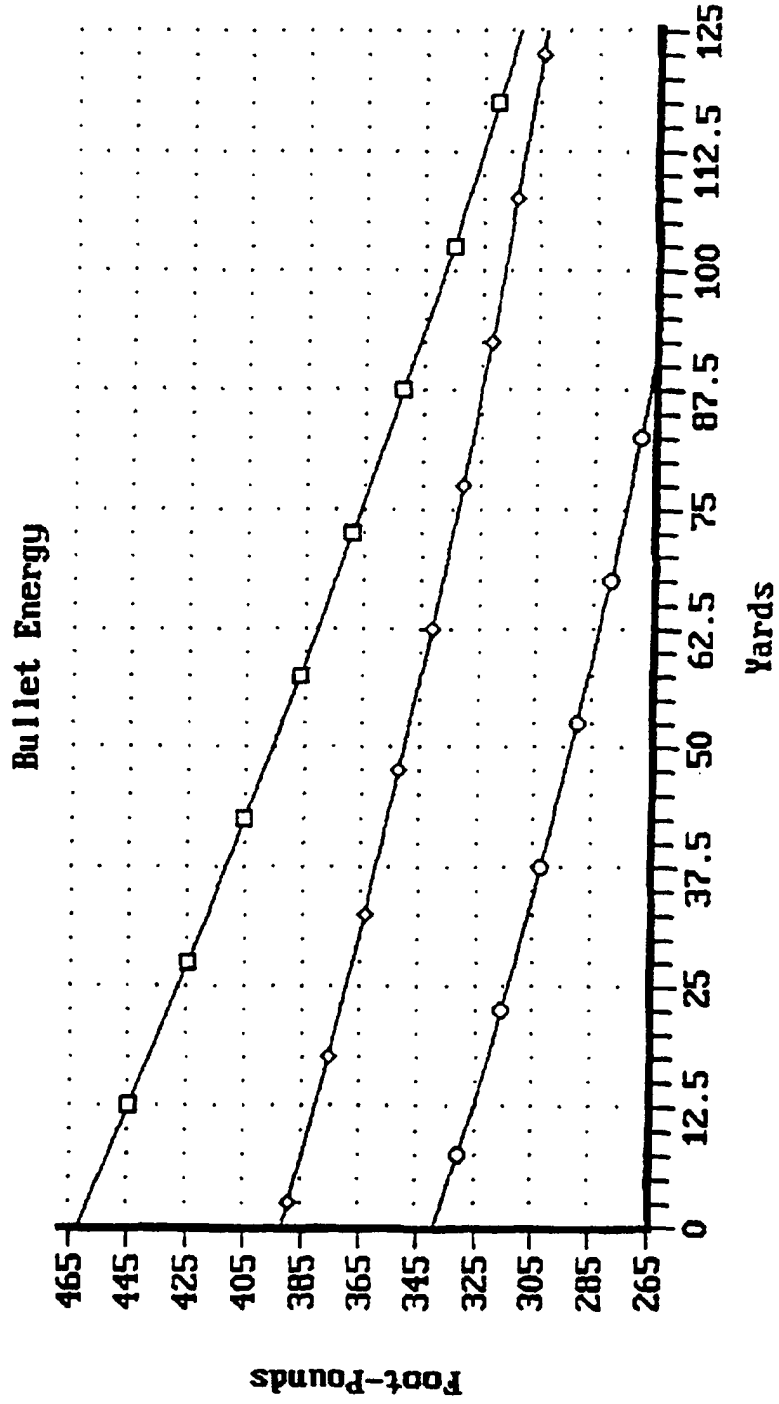
Fig 6

Graph Key

Trace 1: □-□-□

Trace 2: ○-○-○

Trace 3: ◇-◇-◇

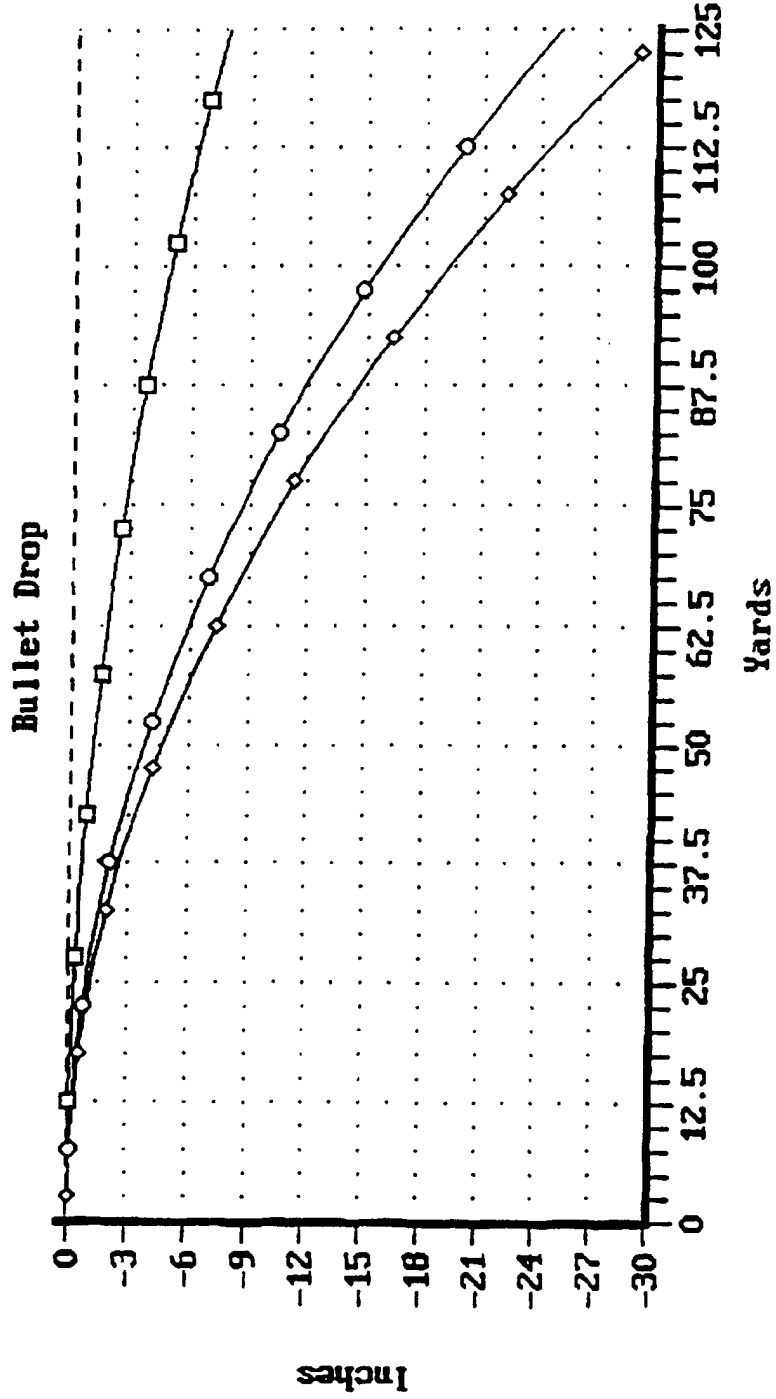


Dehler Ballistic Explorer

Fig 7

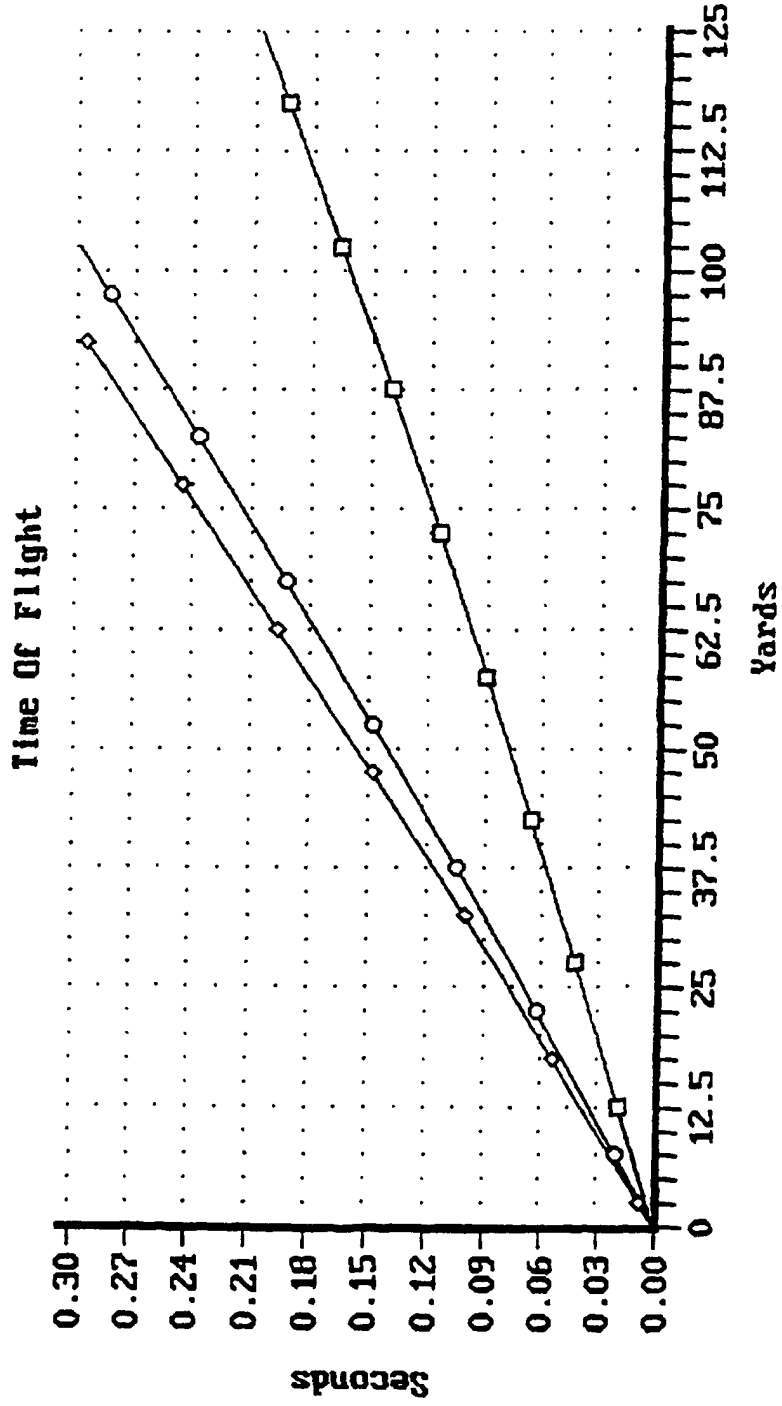
Graph Key

- Trace 1: □-□-□
- Trace 2: ○-○-○
- Trace 3: ◇-◇-◇



Dehler Ballistic Explorer
Fig 8

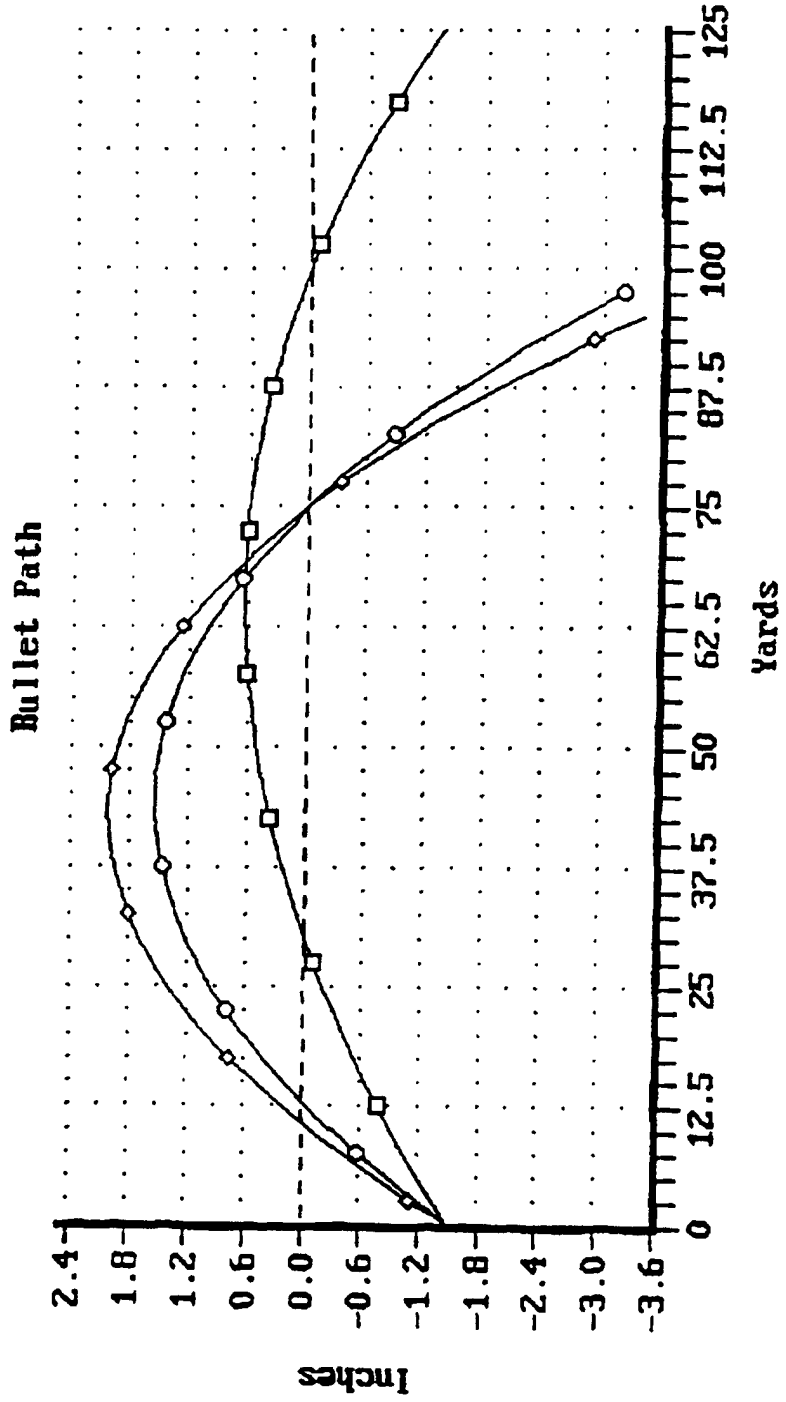
Graph Key
Trace 1: □-□-□
Trace 2: ○-○-○
Trace 3: ◇-◇-◇



Oehler Ballistic Explorer

Fig 9

Graph Key
Trace 1: □-□-□
Trace 2: ○-○-○
Trace 3: ◇-◇-◇



Oehler Ballistic Explorer

Fig 10

Graph Key

- Trace 1: □-□-□
- Trace 2: ○-○-○
- Trace 3: ◇-◇-◇

