

[54] **SHOTGUN PELLET ARRANGEMENT**
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[52] **U.S. Cl.**..... **102/92.4; 102/42 R; 102/67**
[51] **Int. Cl.**..... **F42b 11/00; F42b 7/04**
[58] **Field of Search**..... **102/42 R, 42 C, 91, 92.4, 102/67-69**

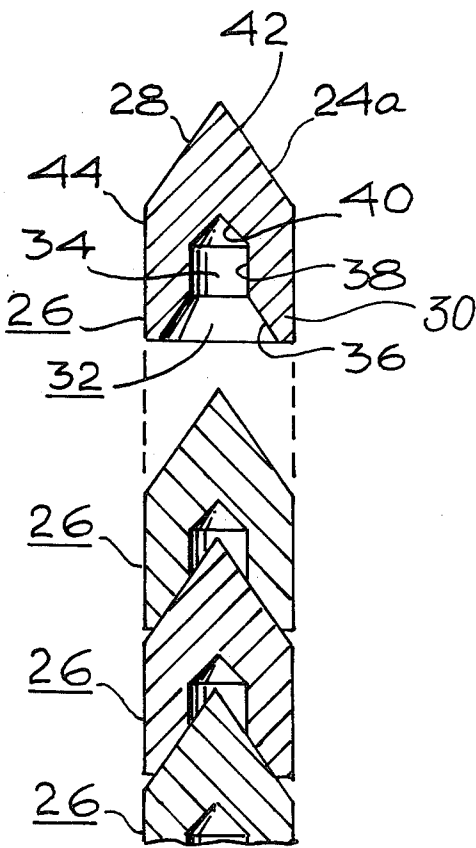
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[57] **ABSTRACT**

A charge for a shotgun shell comprising a plurality of stacks of nesting pellets. Each of the pellets is provided with a tapered cavity in one end and a tapered outer portion at the other end, whereby the tapered portion of one pellet is insertable in the cavity of the adjacent pellet. The nesting of the pellets provides a higher packing density than is achieved with spherical pellets. The pellets are preferably made of steel. The pellets may be inserted into the shell with either the tapered end forward or the cavity end forward, depending upon the desired aerodynamic characteristics.

5 Claims, 6 Drawing Figures



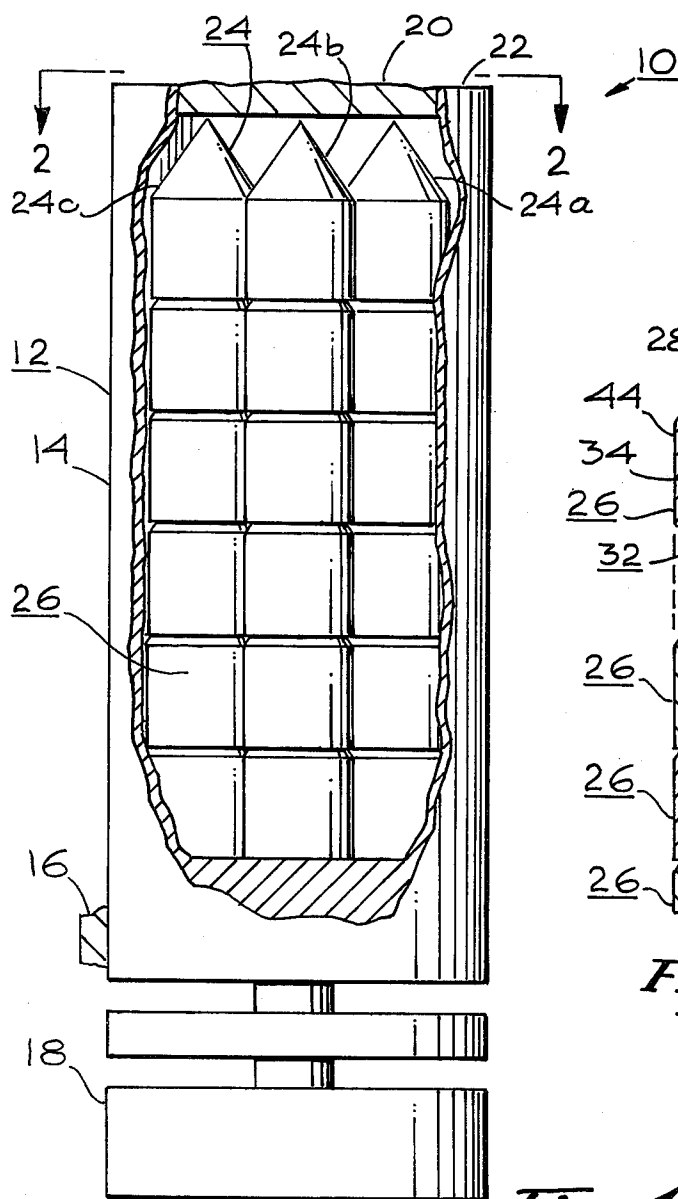


Fig. 1

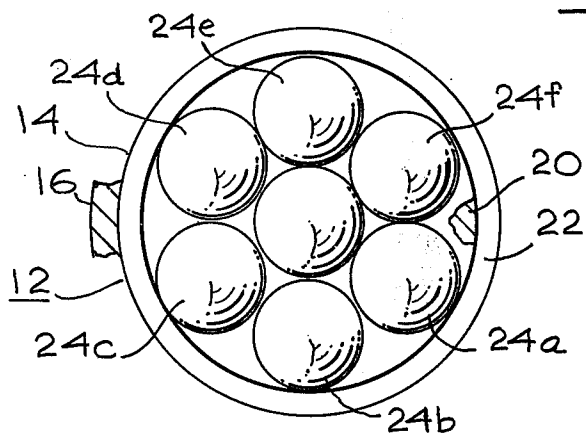


Fig. 2

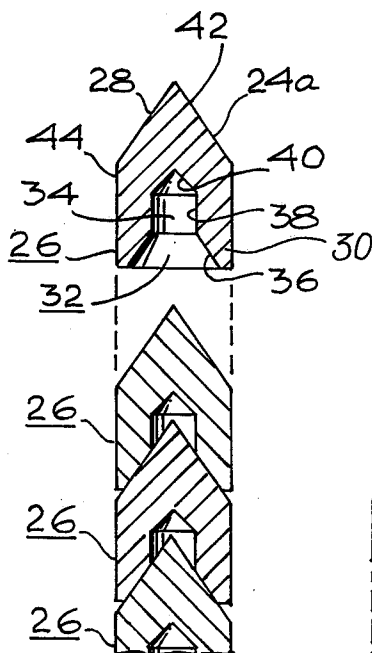


Fig. 3

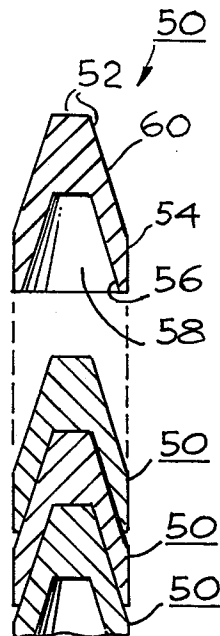


Fig. 4

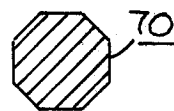


Fig. 5

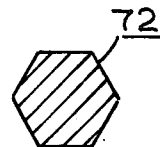


Fig. 6

SHOTGUN PELLET ARRANGEMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the munitions art and more particularly to an improved shotgun shell arrangement.

2. Description of the Prior Art

The charge for conventional shotgun shells has generally comprised a plurality of lead spheres loaded into a plastic or paper housing and retained therein by suitable wadding at the forward end thereof. A metallic shell casing having the explosive charge and the percussion primer for igniting the charge are attached to the aft end of the housing.

Spherical pellets, of course, do not provide a high packing density when enclosed in such a cylindrical shotgun shell, nor do they provide a configuration for good aerodynamic characteristics during flight. Certain prior art charges heretofore proposed for shotgun shells, such as disclosed in U.S. Pat. No. 1,583,559, utilized a mixture of spherical and flat discs. Such a configuration did not provide any great improvement in packing density or aerodynamic characteristics.

Further, because of recent ecological considerations, it is anticipated that lead shot, of which most charges for shotgun shells are fabricated will soon be prohibited and the pellets must be fabricated of materials other than lead such as, for example, steel. However, since steel is of a lower density than lead, in order to obtain the same weight of charge in a given shotgun shell the packing density must, of course, be increased. For example, in a 12-gauge shotgun cartridge of 2¾ inch length utilizing conventional lead spheres a standard charge weight of 1¼ ounce can be obtained. However, utilizing steel spheres only approximately 1½ ounces of charge can be obtained.

While spheres when fabricated of lead can be very inexpensively fabricated, with the anticipated requirement of a change to materials other than lead such pellets must also be economically fabricated.

While there have heretofore been proposed various bullets in which there is provided a conical or tapered forward surface and a cavity in the aft surface, such configurations were generally for single shot bullets and no consideration was given to a plurality of such bullets in close nesting configuration for utilization in a shotgun. Such bullets are shown, for example, in U.S. Pat. Nos. 326,231, 49,792, 55,796, and 2,036,292. However, none of these configurations show or indicate any nesting or stacking capability. U.S. Pat. No. 1,518,920 shows another type of configuration with a conical head and a cavity for replacing conventional shotgun pellets.

Therefore, there has not heretofore been proposed the utilization of a stack of nesting pellets suitable for use as a charge in a shotgun shell that is not only economic to fabricate, but also provides a packing density to achieve charge weights on the order of that achieved by lead spheres and also provide good aerodynamic characteristics.

It has been found that in many instances utilization of spheres, because of the poor aerodynamic characteristics thereof presents a "crippling" problem. That is, the kill probability is such that very often there would not be a clean kill but only a crippling of the bird. Merely replacing lead spheres with steel spheres would

not alleviate the crippling problem and, in fact, for a given distance from target may tend to increase the crippling effects because of the lower momentum associated with each individual pellet. Therefore, it is also desired to provide a new arrangement tending to minimize the crippling of birds.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved shotgun charge arrangement.

It is another object of the present invention to provide a shotgun charge arrangement that is economical to fabricate when fabricated of material other than lead.

It is another object of the present invention to provide a shotgun charge arrangement in which each individual pellet has improved aerodynamic characteristics over those associated with spheres.

It is another object of the present invention to provide an improved shotgun charge arrangement having a comparatively high packing density.

The above and other objects of the present invention are achieved, in the preferred embodiment thereof, by providing, in a shotgun shell a charge comprising a plurality of stacks of nesting pellets. Each of the stacks of nesting pellets is comprised of a plurality of individual pellets nesting into the adjacent pellets. Thus, each pellet is comprised of a body member having a tapered forward portion and a rear portion having walls therein defining an aperture. The tapered forward portion of each pellet is insertable, preferably, in substantially co-extensive contact with the aperture in the aft portion of the adjacent pellet.

The external configuration of the pellet may be cylindrical, hexagonal, octagonal, or the like. The stacks of nesting pellets, therefore, provide essentially columns of individual pellets with a minimization of waste space thus providing higher packing densities. For a 2¾ inch shotgun shell for a 12-gauge shotgun, pellets of the above-described configuration when fabricated of steel can provide a charge weight of approximately 1¼ ounces which is the same charge weight for such a shell when filled with lead spheres.

The shape of the pellet above-described has improved aerodynamic characteristics over those associated with a sphere and it has been found that for a given distance from target there is a lessening of the crippling probability. That is, there is an increase in the kill probability in that the pellets will either kill or miss completely, in general.

Federal law defines the maximum size of the pellets that may be used for migratory game birds. For example, 000 buckshot has a maximum dimension of 0.360 inches. Other sizes of shot are industry wide standards. Thus, 00 buckshot has a maximum dimension of 0.340 inches, 0 buckshot has a maximum dimension of 0.320 inches, and the smallest buckshot, No. 4 buckshot, has a maximum dimension of 0.240 inches. Birdshot is similarly subject to industry wide standards and the maximum for birdshot is 0.180 inches; for an air rifle 0.175 (the common "BB" size); No. 2 birdshot has a maximum dimension of 0.150 inches and No. 4 birdshot has a maximum dimension of 0.130 inches. Therefore, pellets fabricated in accordance with the principles of the present invention preferably have the maximum dimension in the longitudinal, or axial, length thereof. Thus, for example, in a pellet for 000 buckshot, the maximum

axial length will be on the order of 0.360 inches and the diameter will be on the order of three-sixteenths of an inch.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other embodiments of the present invention may be more fully understood from the following detailed description taken together with the accompanying drawings where similar reference characters refer to similar elements throughout and in which:

FIG. 1 is a view, partially in section, of a preferred embodiment of the present invention;

FIG. 2 is a view along the line 2—2 of FIG. 1;

FIG. 3 is a sectional view of one embodiment of pellets useful in the practice of the present invention;

FIG. 4 is a sectional view of another embodiment of pellets useful in the practice of the present invention;

FIG. 5 illustrates another embodiment of the present invention; and

FIG. 6 illustrates another embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing, there is illustrated in FIGS. 1, 2 and 3 an embodiment of the present invention generally designated 10. Embodiment 10 comprises a shotgun cartridge 12 having a holder 14 of conventional design. The holder 14 may be fabricated from plastic, paper, or the like. A metallic casing 16 is coupled to the lower end 18 of the cartridge 12 and in accordance with conventional design contains the powder charge and percussion primer, which have been omitted from the drawing for clarity.

A wadding 20 may be crimped into the top end 22 of the cartridge 12 and the wadding may be plastic, paper, batting or the like. The particular structure of the wadding 20, casing 16 and cartridge 12 do not form, per se, a part of the invention herein. Further, it has been found that a wadding 20 is not essential for proper operation of the present invention. If no wadding is utilized, it may be desirable to coat the pellets in the shotgun charge with, for example, Teflon, tin or other non-toxic coating to protect the gun bore.

The improved shotgun charge, generally designated 24 according to the principals of the present invention is contained within the cartridge 14 by the wadding 20 and is comprised of a plurality of stacks 24a, 24b, 24c, 24d, 24e and 24f. It will be appreciated that the number of the plurality of stacks forming the charge 24 may be any number desired. Thus, the drawing illustrates a total of seven stacks. However, depending upon the size of the stacks, any other desired number may be incorporated.

Each of the stacks comprises a plurality of substantially identical pellets 26 in a nesting arrangement. FIG. 3 is a sectional view through the stack 24a illustrating the structural details of the pellets 26. Each pellet 26 has a forward portion 28 and an aft portion 30 spaced from the forward portion 28. First walls generally designated 32 are provided in the aft portion 30 to define aperture 34 therein having a predetermined contour. For the pellet 26 the predetermined contour of the aperture 34 has an outermost frustro-conical portion 36, a central cylindrical portion 38 and a conical inner portion 40.

The forward portion 28 has second walls 42 defining a second predetermined configuration which, for the pellet 26 is conical and, preferably, has the same cone angle as the frustro-conical outer portion 36 of the aperture 34. The pellet 26 also has external walls 44 between the forward portion 28 and aft portion 30 having a first predetermined external configuration which, for the pellet 26, is cylindrical.

To provide the nesting between adjacent pellets 26 forming each of the stacks of pellets 24 the conical forward portion 28 is inserted into the aperture 34 of the adjacent pellet and, for the condition wherein the cone angle of the forward portion 28 is the same as the cone angle of the frustro-conical portion 36 of the aperture 34, there is contact along the walls 36 with the conical walls 42 of the adjacent pellet and the point of the conical forward portion 42 extends into the cylindrical portion 38 of the aperture 34 and/or into the conical portion 40.

It will be appreciated that the words "forward" and "aft" are utilized, in connection with the pellets 26, and other pellets described below, for clarity in description. That is, the pellets may be positioned in the shotgun cartridge 12 as shown in FIG. 1 or reversed 180° as desired for particular aerodynamic and/or ballistic characteristics and/or kill characteristics. Further, if desired, the orientation of the stacks 24 need not be uniform in any one cartridge 12. Some of the stacks 24 may have the tapered portion positioned as shown in FIG. 1, and other of the stacks 24 may be reversed 180°.

Thus, it can be seen that the pellets 26 provide a comparatively high density packing in the cartridge 12 with only the spaces between adjacent stacks of pellets and the spaces between the aperture 34 and the forward portion 28 of the adjacent pellet in each stack not filled with the charge 24. However, the particular configuration of the aperture 34 lends itself to high volume production on such machines as, for example, an automatic screw machine, in that the aperture 34 may be quickly and easily fabricated by drilling and counter-sinking which are well known machine operations. Utilizing the configuration of the pellet 26, it has been found that in a 2¾ inch long cartridge 12 for a 12-gauge shotgun and utilizing pellets having a maximum dimension, as allowed by law, of approximately 0.360 inches, approximately 1¼ ounces of pellets 26 when fabricated of steel can be installed in the manner as illustrated in the drawing. The weight of lead spherical shot is also approximately 1¼ ounces. However, when steel spheres are utilized, for example, the BB size on the order of 0.175 inches in diameter only approximately 1½ ounces of steel spheres can be contained. Thus, when the pellets 26 are fabricated of steel approximately the same weight of steel shot can be contained within any shotgun cartridge as with the conventional spherical lead shot.

FIG. 4 illustrates another embodiment, generally designated 50 of a pellet useful in the practice of the present invention. The pellet 50 has a forward portion 52 and the aft portion 54 has walls 56 defining an aperture 58 extending a preselected depth therein. The contour of the aperture 58 is frustro-conical.

The forward portion 52 has second walls 60 defining a frustro-conical configuration having the same cone angle as the aperture 58 and is designed to fit into the aperture 58 of an adjacent pellet to provide substan-

tially continuous coextensive contact with the first walls 56 of the adjacent pellet. Thus, the configuration of the pellet 50 shown in FIG. 4 achieves an even higher packing density than obtained for pellets 26 since there is an elimination of the empty space between nesting pellets. However, the manufacturing costs of the embodiment shown in FIG. 4 may be slightly higher because of the necessity of providing the frustro-conical aperture 58.

The external configuration of the pellets 50 and 26 is cylindrical between the forward portions and the aft portions thereof. However, it will be appreciated, that other desired external configurations may be utilized as desired for any nesting pellet configuration. For example, FIG. 5 illustrates a pellet 70 in which the external configuration is octagonal between the forward portion and the aft portion thereof and FIG. 6 illustrates a pellet 72 in which the external configuration is hexagonal between the forward portion and aft portions thereof.

Thus, from the above, it is apparent that there has been provided an improved charge for a shotgun shell in which a comparatively high density of packing of the charge in the cartridge is obtained by nesting pellets having preselected configurations. When fabricated of steel the pellets can provide, in the same size shell and within the maximum size limits allowed by law, approximately the same weight of charge as is currently obtained with spherical lead shot.

Further, the generally conical or frustro-conical configuration of the forward portion of the pellets provides a better aerodynamic flight of each pellet after it is fired from a gun than the aerodynamic flight achieved by the spherical lead pellets. It has been found that the better aerodynamic configuration gives a greater range and greater kill probability and tends to eliminate the "crippling" problem that has heretofore been associated with a change from spherical lead pellets to spherical steel pellets. That is, when fired at the same range as a conventional shotgun shell having spherical lead shot it has been found that the pellets in accordance with the principals of the present invention will either tend to kill or to miss completely in a manner statistically equal or better than that achieved by the spherical lead shot.

As noted above, the utilization of lead for shotgun shot is proving to be detrimental to the environment in that the expended lead shot, after falling into a body of water, is often ingested by migratory or other types of water fowl. It has been estimated that 2 to 4 percent of all North American water fowl die each year from lead poisoning due to such ingestion. Thus, by eliminating lead from the shot and providing either iron or steel shot the on-going lead poisoning problem of the water

fowl will ultimately be eliminated.

This includes a description of the improved charge for a shotgun shell according to the principles of the present invention. It is apparent that many variations and adaptations of the present invention may be made by those skilled in the art and the following claims are intended to cover all such variations and adaptations falling within the true scope and spirit thereof.

I claim:

1. A charge for a shotgun shell comprising, in combination:

a plurality of stacks of nesting pellets, each of said stacks of nesting pellets comprising a plurality of pellets, and each of said plurality of pellets comprising:

a body member having:

a central portion having first walls defining a first predetermined external configuration;

a forward portion forward of said central portion and having second walls defining a second predetermined external configuration;

an aft portion spaced from said forward portion and aft of said central portion and having third walls defining an aperture extending therein, and said third walls defining a third predetermined configuration, said third predetermined configuration of said aperture having a first frustro-conical section, a second cylindrical section, and a third conical section;

said second walls of each of said pellets insertable in said aperture in said aft portion of an adjacent pellet, and

said second predetermined external configuration being conical and having a first section in substantially co-extensive contact with said first frustro-conical section of said third walls of said adjacent pellet, and a second section extending a predetermined depth into said second cylindrical section of said aperture in said adjacent pellet.

2. The arrangement defined in claim 1 wherein: said first predetermined external configuration is cylindrical.

3. The arrangement defined in claim 1 wherein: said first predetermined external configuration defines a polygon.

4. The arrangement defined in claim 3 wherein: said first predetermined external configuration is hexagonal.

5. The arrangement defined in claim 3 wherein: said first predetermined external configuration is octagonal.

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