April 10, 1945. H. WELLCOME 2,373,364

BOLAS PROJECTILE

Filed Nov. 14, 1941 2 Sheets-Sheet 1

Fig. 1

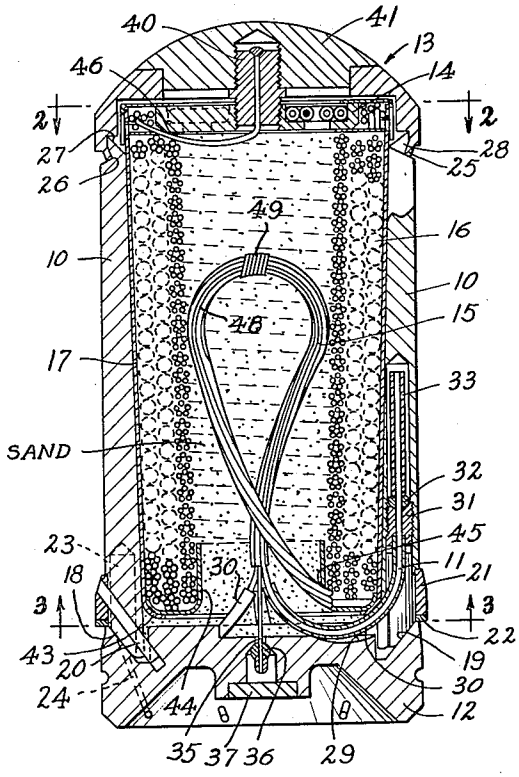


Fig. 2

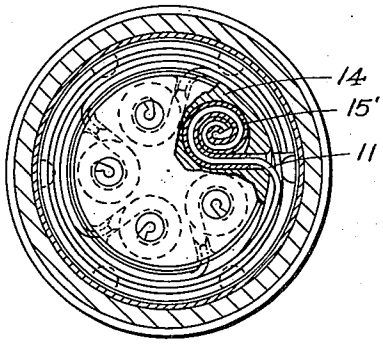


Fig. 4

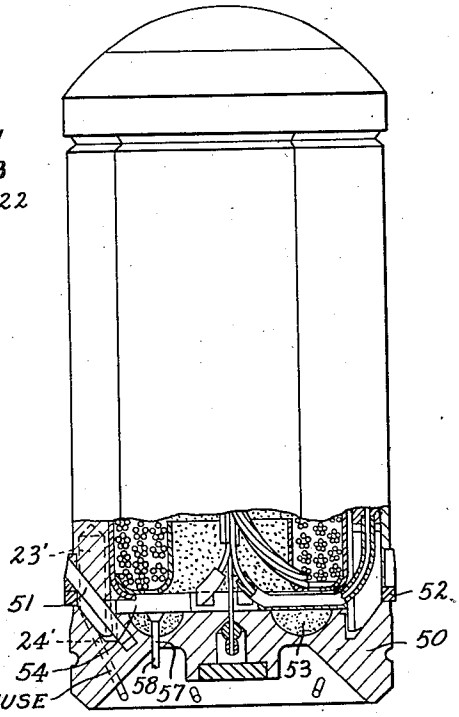
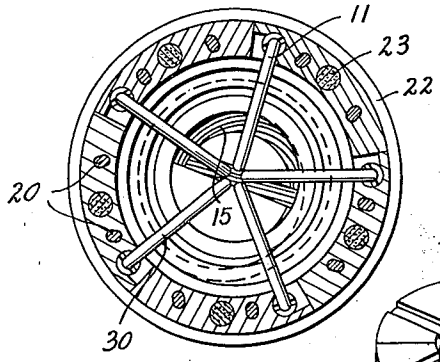


Fig. 3



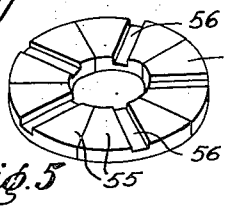


Fig. 5

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Fig. 6

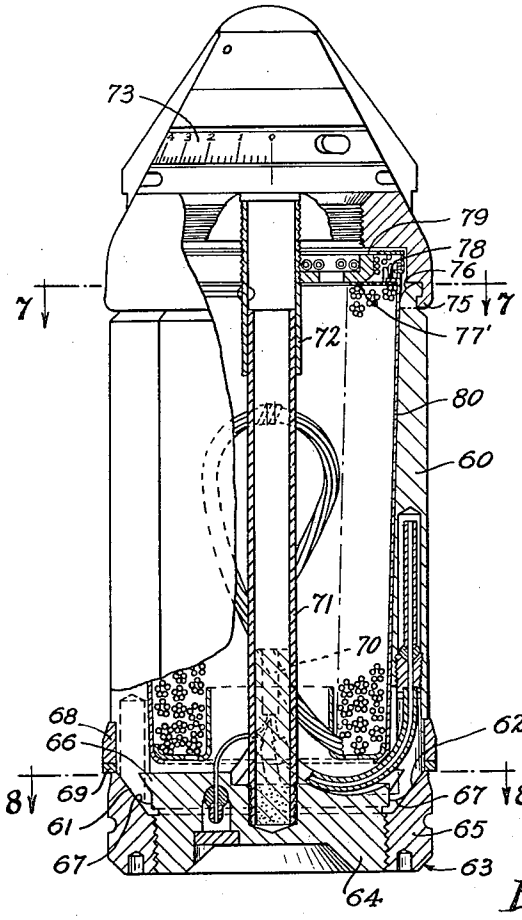


Fig. 7

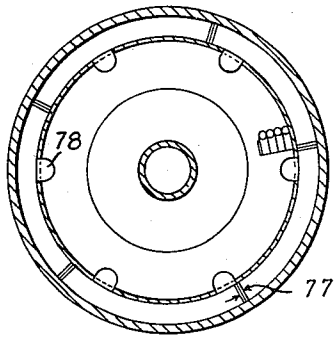
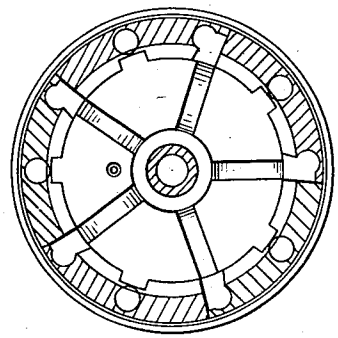


Fig. 8



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Patented Apr. 10, 1945

2,373,364

UNITED STATES PATENT OFFICE

2,373,364

BOLAS PROJECTILE

Hubert Wellcome, Mount Kisco, N. Y.

Application November 14, 1941, Serial No. 419,092

In Canada November 15, 1940

19 Claims. (Cl. 102—63)

The present invention relates to ordnance projectiles of the bolas type designed primarily for use against aircraft but adaptable for other uses.

The invention has for an object to provide for an improved projectile, adapted to be shot from an ordinary rifled gun, wherein a bolas is included in the projectile and is arranged to spread as it approaches the target.

Another object is to provide an improved arrangement of the coiled bolas wires whereby effective spread of the bolas is insured.

Another object is to provide an improved method of forming the bolas wires into a coil such that the outer diameter of the coil can be accurately pre-determined.

Another object is to provide improved means for insuring the uncoiling of the bolas wires in a manner to avoid undue pull of the wires upon the weights.

Another object is to provide means in addition to the weights for uncoiling the bolas wires.

Still another object is to provide a momentum member connected to the bolas wires and operating to untwist the wires if still twisted after they are completely uncoiled.

The nature and objects of the invention will be better understood from a description of an illustrative embodiment thereof.

This application is in part continuation of application Ser. No. 266,067, filed April 5, 1939, and in part describes an improvement on the same.

The bolas to be more particularly described for the purposes of illustrating the principles of the present invention comprises a plurality of weights, each eccentric to the axis of the projectile, and wires connecting the weights, wherein the wires are twisted together to form a cable and the cable is formed into a coil. In uncoiling, the cable is pulled axially from the coil and it is quickly unstranded to free the individual wires and permit spread of the bolas. The weights move outward under the action of centrifugal force and pull the wires but preferably additional means is provided for uncoiling the wires and for untwisting the cable.

In the preferred embodiment of the invention, the weights are arcuate in cross-section and arranged to form a cylindrical shell with base and nose members closing the opposite ends of the shell. The wires connecting the weights are coiled within the shell formed by the weights. The base member is connected to the cable near one end in a manner to aid in uncoiling the same and the nose member is connected to the other end of the cable to serve as a rotating momentum member for holding the end of the cable in position for untwisting and for untwisting the same in flight.

The present invention includes an improved method of forming the wires into a cable whereby the extent of twist of the cable, the twist of the individual wires, and the number of turns of the coil are so correlated to the rate of rotation of the projectile as to insure spread of the bolas.

The novel features of the invention are illustrated in embodiments shown in the accompanying drawings wherein:

Figure 1 is a central sectional view of a bolas projectile embodying certain principles of the invention,

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1,

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1,

Fig. 4 is a view partly in transverse section and partly in elevation of a modified bolas projectile including an explosive charge,

Fig. 5 is a perspective view of a transverse pressure plate of the projectile shown in Fig. 4,

Fig. 6 is a longitudinal central sectional view of another bolas projectile embodying features of the invention,

Fig. 7 is a transverse sectional view taken on the line 7—7 of Fig. 6,

Fig. 8 is a transverse sectional view taken on the line 8—8 of Fig. 6.

The projectile shown in Figs. 1 to 3 is designed more especially for use in defense at relatively close range, as for example for shooting, from one aircraft at a pursuing aircraft, or for attacking a low flying craft from the ground. Accordingly it is desirable that this bolas should spread immediately.

Spreading is caused by rotation imparted by the rifling of the gun used. The projectile shown is designed to be shot from a gun having right-handed rifling. Five weights 10 are connected by wires or strands 11 to form a bolas capable of spreading to a distance determined by the length of the wires. The weights are arcuate in cross-section and when assembled together form a cylindrical shell which is closed at one end by base member 12 and at the opposite end by a nose assembly 13. Each of the wires is connected at one end to a weight and at their opposite ends they are connected together by being secured to a clip 14 which, in turn, is secured to the nose assembly 13. The wires are twisted together to form a cable 15 which, in turn, is formed into a coil 16, fitted tightly into a casing 17. The

several parts are assembled to constitute a unitary projectile which may be shot from a standard rifled gun.

The connection between the base member 12 and the weights 10 is such that the radial outward movement of the ends of the weights, which will occur as the result of centrifugal force when the shell is shot, will force the base rearwardly. As shown at 18, the ends of the weights are tapered at an angle to the axis of the projectile and the base is formed with a similar annular conical surface 19 engaging the same. In order to hold the projectile together for handling, taper pins 20 extend through the ends of the weights and into the base member. Two pins are provided for each weight as indicated in Fig. 3. The two pins of each weight are parallel to each other rather than exactly radial of the projectile in order to avoid a binding action, and they are substantially parallel to the surface 18. The angle between the conical surface 19 of the base and the axis of the projectile, which has been selected for the bolas shown, is 37°.

The taper pins 20 may be of steel or of a soft metal such as copper. If of copper, they may extend through the rotating band 21 and may be turned off flush with the surface of said band in the finishing of the shell. The rotating band is made in segments, one for each weight, and a gas sealing ring 22 against its lower edge insures a gas-tight seal within the gun. This ring will assist in holding the parts of the projectile together during handling, but is sufficiently frangible so that it will yield immediately under the action of centrifugal force to permit spreading of the bolas.

In the lower ends of the weights 10 pockets 23 are drilled as shown in dotted lines in Fig. 1 and in cross-section in Fig. 3 to receive charges of tracer powder, and diagonal passages 24 are drilled through the base member in alignment with these pockets to cause the tracer powder to be ignited when the gun is discharged.

All of the weights 10 are connected to the nose member in such a way that they will be securely held thereby until they swing out laterally, and then they will be readily freed. The connection is formed by providing an annular inturned lip 25 engaging in suitable corresponding recesses 26 in the upper ends of the weights.

In order to prevent binding of the weights as they move outwardly and turn about the lip 25 as a pivot, the weights are cut away on their inner end edges, as indicated at 27, and also they are slightly cut away on their side edges adjacent the ends, as indicated at 28.

Slots 29 are formed in the base for the wires leading to the point of connection to the weights. A length of metal or fibrous protective sheath 30 is shown as applied to each wire in this position. In order to accommodate rotation of the weights and permit relief of the torsion in the individual wires when unstranding or later during flight, the connection between the wires and weights is made rotatable. To this end the wire passes centrally through a threaded bushing 31 and is secured against withdrawal by a bronze or steel ball 32, held in place on the wire by a soft copper sleeve 33 compressed onto or otherwise secured to the wire. The connection is preferably at the trailing edge of the weight, which is cut away as shown.

It is desirable to provide means other than the weights to pull out and thus uncoil the cable. For this purpose, the base member is connected to the cable by a wire cord 35, which may conveniently serve as a central core member of the cable. The base member is projected rearwardly at an initial relative velocity comparable to the relative lateral velocity of the weights and very quickly encounters an additional relative rearward force due to air resistance.

The connection between the cord and base may be such as to permit rotation. As shown, the cord passes through a central hole in the base and a ball 36 is suitably fastened thereon. A cover plate 37 protects the ball and end of the cord from the powder charge.

In order to connect the inner ends of the several wires of the bolas as spread, they are firmly secured to a central clip 14. A suitable method of connecting these wires to the clip 14 is indicated in Fig. 2, wherein a sleeve 15' of copper or the like is shown as clamped securely on the end section of each wire and the wire and sleeve are coiled and clamped within a recess in the clip.

The central cord 35 may extend the full length of the cable or it may be shorter and it may be free to permit relative rearward movement of itself and the base independent of the nose in either case.

In the preferred arrangement, the clip is rigidly connected to the nose member to rotate therewith. As shown, a threaded central stud 40 is threaded into the clip and into the central cap 41 of the nose assembly. The central strand 35 of the cable is shown as connected to the nose of the projectile by being passed through the center of the stud and formed with an enlargement at its end.

The end turns of the coil adjacent the base are held in place by a stiff retainer ring 43 fitting within an inturned edge of the casing 17 and by a soft metal flanged retainer sleeve 44. A slot 45 is formed in the flange of sleeve 44, through which the cable extends. The sleeve 44 serves more particularly to hold the innermost layer of coils in position during assembly. This bushing is made of zinc of sufficient hardness to hold the coils in place, but soft enough so that its flanged end will be reamed off by the wire cable as it is pulled from the coil. The retainer 43 must also prevent undesired displacement during pull-out of the cable and must, therefore, be of substantial strength and stiffness.

At the nose end of the coil, a similar but wider stiff retainer ring 46 holds the end turns of the coil against displacement.

Preferably there is a little slack in the cable between the coil and the weights so that the coil itself does not begin to uncoil immediately at the instant of the beginning of spread of the bolas. As shown, a loop 48 of slack cable is indicated as placed within the center of the shell.

When the projectile is shot, the sudden acceleration will tend to cause the loop of wire in the center of the bolas to be pressed against the base of the projectile and perhaps distorted. In order to prevent such distortion, which might cause kinks in the wires tending to inhibit spread of the bolas, the interior of the projectile, or at least the base end of the same, may be filled with sand or other effective support for the loop. Sand is indicated by stippling.

Let us assume that there are 80 turns in the coil. Then if the cable is pulled out axially of the coil, instanteously or without any rotation of the coil in either direction during the time of pull-off, then the pulling-out will give 80 twists

to the cable in a direction depending upon the direction of the winding of the coil.

If, during the pull-out of the cable, the coil rotates 80 times toward the point of pull-off, then the pulling-out of the coil will neither add to nor subtract from the twist of the cable as coiled. In this case, if the cable is coiled with no twist, then it would have no twist after pull-off. But if during the pull-out of the cable, the coil rotates 80 turns in the opposite direction, then the pulling-out of the cable will, of itself, give 80 twists in one direction and the 80 rotations will give another 80 twists in the same direction, that is to say, the cable will be given 160 twists during the pull-out. These considerations apply whether the cable is pulled axially from within the coil, as herein indicated, or axially from the exterior of the coil in a modified arrangement. Now this means practically that if the cable is to come out straight or completely untwisted, then the original cable should have been given 160 twists or lays in the suitable direction.

In other words, if the cable is originally formed with 160 left-handed lays in its full length and is formed into a coil of 80 turns wound or coiled in the suitable direction, then when the cable is pulled longitudinally from the coil, there will be eighty eventual lays to the left in the cable. In this condition, 80 rotations of one end of the cable will remove all of the lay or twist. In practice, the pull-out and the rotation occur, at least in part, simultaneously.

It has been found in winding the cable into a coil, that if there is very little lay in the cable, then the several turns of the coil tend to flatten and it is difficult to build up a complete coil of the exact outside diameter desired. On the other hand, if there is a rapid lay in the cable, then the cable has more of the character of a firm solid member and it is possible to wind the cable on a mandrel and obtain a coil which has almost exactly the desired outside diameter. Such a coil is more satisfactory, partly because assembly is easier, and partly because the tight fit of the coil within the casing and within the shell formed by the weights effectively inhibits rotation of the coil relative to the weights when the projectile is rotated by the rifling of the gun from which it is shot.

The rigid connection of the nose member and the center clip provides a central bolas weight of substantial rotative inertia. Accordingly, when the bolas cable is entirely pulled from the coil, if there is still a length of cable which has not been entirely untwisted, then this rotating weight will continue the untwisting movement and, therefore, aid the spread of the bolas.

The eccentric point of connection of the separate strands to the clip will, when the bolas is entirely spread, exert a pull on the clip and nose member in a manner to tend strongly to stop further rotation and, therefore, retwisting of the wires.

The length of time during which the cable is being uncoiled will vary with the conditions, such as muzzle velocity and the rifling of the gun. It is possible to estimate the time with reasonably close approximation and to devise a suitable lay of the cable. The rotating control weight will unstrand a reasonable number of excess twists.

It is desirable that the character of the individual wires forming the strands of the cable, the number of lays or twists of the cable and the torsional strain in the individual strands and in the cable as a whole be so correlated that there will be the least possible tendency to kink when uncoiling and unstranding, and the least practicable resistancee to unstranding. These objects are attained in the bolas illustrated, by the method of winding. The extent of twist of the individual strands and of cable as a whole in this example are illustrative merely and in practice should be correlated to the rate of rotation and other conditions of a particular bolas.

The cable, when finally arranged in the coil, may be either dead or live cable. Dead cable may be defined as cable in which the condition of twist of the individual strands and of the cable as a whole is such that when straightened it has no tendency to twist in either direction. Live cable may be defined as cable in which the individual strands are twisted from normal and, because of their tendency to twist due to the spring of the wire, tend to untwist the cable.

The cable, as wound in the coil of the bolas shown in Fig. 1, is live cable to the extent that if the cable were unwound and released at both ends, it would untwist to the extent that about one-half of the twist would come out.

As above explained, the pull of the cable axially from the coil will give to the cable one complete twist for each coil pulled out. The direction of rotation of the coil is preferably away from the point of pull-off in the sense that each rotation of the coil during pulll-off will give one complete twist to the cable in the same direction.

The wire used may be single strand wire, such as piano wire, or each wire may be formed of a number of fine wires braided or twisted together to form strands. The wire preferably used in the bolas shown in Fig. 1 is a 19 wire strand with a right-handed lay.

The condition of the wire in the coil will be better understood from a description of the method of forming and winding the coil.

This projectile is designed for use with a gun rifled right-handedly in accordance with American practice. The projectile, therefore, will rotate right-handedly or clockwise in flight when viewed from behind.

To assemble the bolas of a three inch shell of the type illustrated in Fig. 1, the five wires or strands, which are later to be connected to the weights, and the smaller strand, which is later to be connected to the base, are arranged side by side with the larger strands arranged circumferentially around the smaller strand as a core. The relative sizes of the strands are such that the central strand fits closely within the group of five arranged circumferentially around it. The cable, which is about 40 ft. long, or a little longer, is arranged into a coil of three layers having 80 turns or individual coils.

In the forming of the cable, the strands are twisted individually and twisted together in a manner to form a cable having 50% life. This avoids on the one hand the disadvantages of completely dead cable which would present difficulties when untwisted, that is to say unstranded, and avoids on the other hand difficulties which a completely live cable would involve. If the cable were coiled as dead cable, then when pulled out and completely untwisted each strand would be twisted to a quite considerable extent and, for this reason, would have a tendency to kink if any slack should occur. Dead cable also offers an objectionable resistance to unstranding. Live cable on the other hand has a considerable tendency to kink and, therefore, must be handled with

more care during manufacture and assembly. The tendency to kink (torsion in the cable) is apt to cause trouble during pull-out and untwisting. A compromise should be made.

In the forming of the cable of the bolas under consideration, each strand is given 80 turns or twists to the left (facing the end of the strand). This untwists to that extent the lay of the original strand if left hand lay strand is used, or tightens the twist if right hand lay strand is used. The strands are arranged together and the complete cable is given 160 turns to the right. In practice, these two operations are performed simultaneously with suitable apparatus. The cable then has a left hand lay. It is to be noted that the effect on the individual strands of the 160 turns to the right is to cancel the original 80 turns to the left and to introduce 80 turns to the right so that the individual strands in this condition are tightened as compared with the original lay if right hand lay strand is used.

The cable so formed, because of the twisting of the individual strands and the twisting of the cable as a whole and, therefore, of the strands in the opposite direction has, what may be termed for convenience, 50% life. That is to say, if the cable were left free to twist, it would untwist to the extent of about half of the total twist or lay which has been given to it.

This half live cable is then wound onto a slightly tapered mandrel by rotating the mandrel and the whole cable is formed into a coil of the form indicated in Fig. 1 having 80 turns. It is convenient to wind the cable between the retaining members **43** and **44** at what is to become the base end of the coil, and the similar retainer ring **46** at the opposite end. The mandrel is suitably channeled to receive the sleeve **44** so that the outer diameter of the coil will be of the exact size to fit the casing. These retaining members are suitably held on the mandrel during winding, and when the coil is completely formed, the thin metal, slightly tapered casing **17** is placed over the coil and is flanged over the retainer rings **43** and **46** to fix them securely in position. The taper of the coil as a whole and of the inner casing facilitates the making of a tight fit between the coil and weights such as inhibits relative rotation during the acceleration of the rotation of the projectile in the gun.

The strands of the cable at one end are then connected to the clip **14**. The central pull-out strand may be connected to the nose assembly or not, as preference or the action of bolas of a particular type may dictate. Usually it is good practice to provide a loop of slack **48**. The loop should be bound with a frangible wire seizing, as indicated at **49**.

The section of cable in the loose loop should be at least partly untwisted in order that during the initial rearward movement of the base member the cable, which is pulled out, will be unstranded, thereby permitting the radial outward movement of the weights without any interference due to twist of the cable.

In Fig. 4 is shown a bolas with a different form of base construction wherein the base is forced rearwardly by an explosive charge instead of being forced rearwardly merely by the centrifugal action of the weights.

In this embodiment of the invention, the base member **50** is connected to the weights by taper pins **51** substantially as in the case of the embodiment shown in Fig. 1. These taper pins may be made of steel and stronger in order that the rearward motion of the base member may, by acting on the taper pins, force the weights laterally outward. The steel pins are short enough so that they do not extend outward through the rotating band to score the gun from which the projectile is shot. In this projectile, as in that shown in Fig. 1, the rotating band is made in segments, one for each weight and a continuous gas sealing ring **52** is positioned immediately adjacent the rotating band. The segments of the rotating band may be secured to the weights in any suitable manner. The explosive charge is confined in pockets or an annular recess **53** in the base member and between the base member and a heat resisting member such as an asbestos plate **54**. This plate fits against the retainer members at the lower end of the coil of cable. Preferably it is formed in sections **55**, one for each weight, which sections will fall free of the bolas so as not to interfere with spreading.

The sections of the plate are grooved, as indicated at **56**, to acccommodate the individual strands of the cable as they extend from within the coil outward to the point of connection with the weights. In this embodiment, as in that shown in Fig. 1, a central strand of the cable is connected to the base member to serve as a tension connection for pulling the cable from the coil as the base is projected rearwardly by the explosive charge.

A passageway **57** is formed in the base to receive a suitable fuse member **58** to provide for ignition of the explosive charge in the annular recess of the base. The timing of the fuse member will determine the time of spread of the bolas because in this embodiment the strength of the gas sealing ring and the arrangement of the pins is such as to prevent spreading by centrifugal force alone as contrasted with the structure of the projectile shown in Fig. 1. Pockets **23'** and diagonal passages **24'** are provided for tracer powder and for ignition thereof as in Fig. 1.

The base member of this bolas may well be made of aluminum to be more readily impelled backward by the explosive. It may be so shaped as to have a substantial parachute effect whereby air resistance will aid the pull-out of the cable.

Figs. 6 to 8 illustrate another embodiment of the invention, including several inventive features which may be used in one bolas or each of which may be used in combination with other features. The connection between the weights and the base member is designed primarily to simplify manufacture but presents various features which are advantageous for other purposes. This base structure is here shown as used in a projectile designed for use at long range, but obviously it is adaptable for short range projectiles which spread entirely by centrifugal force. The arcuate weights **60** are formed with tapered end surfaces **61**, which fit against a similarly tapered annular or conical surface **62** in the base member **63**. The base member is made in two parts, a central part **64** and a sleeve member **65** threaded onto the central member. The central member is formed with lugs **66**, one for each weight segment, which lugs take into correspondingly shaped recesses in the weight segments. In the projectile shown, the conical surface **62** lies at an angle of 37° to the axis of the projectile. The angle between the underside of the lugs **66** and the conical surface **62** should be less than 11° in order that a locking taper may be pro-

vided. If the angle is too great, then when the sleeve nut is screwed tight, it would be possible for the weights to be squeezed laterally outward between the lower surface of the lug and the conical surface of the sleeve. On the other hand, if this angle is made too small, then when the weights should spread, there may be a locking of the end of the weight segment between these two surfaces to prevent spreading. The lower ends of the weights are curved at 67 to provide clearance for spreading. The rotating band 68 is segmental and a gas tight seal is insured by a sealing ring 69. If the bolas is designed to be spread by the action of centrifugal force alone, then the sealing ring must be sufficiently frangible. The outward movement of the weights will force the base rearwardly and the cable will be pulled out by the connection between the base and cable as previously described. If the projectile is designed for long range anti-aircraft use, the sealing ring 69 will be made strong enough so that, in proper cooperation with the base and weight connection, it will withstand the centrifugal force. The sealing ring, however, is designed to be fractured by means of an explosive charge. The connection between the base member and the weights, including the lugs 66, is such that rearward movement of the base member will force the weights laterally. While this projectile and that shown in Fig. 4 are designed primarily for use with rifled guns, the construction is such that substantial spread of the bolas can be obtained even if the projectile is shot from a smooth bore gun.

An explosive charge 70 is carried in a tubular member 71 of sufficient strength to withstand the force of the explosion. A similar tubular member 72 is carried by the nose assembly and telescoped with the first mentioned tubular member to carry the ignition flash from a time fuse in the nose of the projectile.

The weights 60 are hooked within an inturned flange 75 of the nose as in the projectile of Fig. 1. To avoid binding when the bolas spreads, as in the projectile of Fig. 1, the weights are cut away at their inner end edges as indicated at 76, and also at their side end edges as indicated at 77.

The arrangement of the clip which connects the inner ends of the bolas wires in the end of the coil enclosing casing is the same as that shown in Fig. 1. A coil retainer 77' is held by inwardly flanged lugs 78 in the extended end of the casing. The clip is held against the retainer 77' by an annular keeper 79 having a peripheral flange fitting over the end of the coil casing 80. Lugs formed on the peripheral flange are bent inward to take into holes formed by the bending in of the retaining lugs 78.

The foregoing description of particular embodiments is illustrative merely and is not intended as defining the limits of the invention. Numerous modifications may be made in the various inventive features and recombinations of features may be made without departing from the spirit of the invention, as defined in the claims. The loop of loose cable between the coil and the base may be made longer or shorter and may be more or less completely unstranded in projectiles of various types.

It is preferable that when the bolas spreads, the nose section should be slightly retarded so that the weights are slightly in advance of said nose section in flight during spread of the bolas and thereafter. In the arrangement shown, there are two factors which tend to bring this about. The ballistic coefficient of the weight segments is higher in their developing position than that of the nose section which is of about the same weight, while only one strand is pulling on each weight, whereas six strands are pulling on the central section. Secondly, the pull on the central wire due to the rearward movement and drag of the base section retards the forward movement of the nose section but does not retard the forward movement of the weights.

The weights and the base member may be made of metal or other material selected in accordance with the purposes of a particular bolas. The lower mass of the modified aluminum base permits a quicker rate of unstranding and, therefore, a quicker spreading bolas and, furthermore, its lesser momentum makes it less likely that the base will catch up to and pass the rest of the bolas after development has taken place.

Inasmuch as one object of the base member is to pull out and uncoil the cable, it may be replaced by a true parachute device. In such event, the pull cord should not be attached to the clip or nose at the forward end of the projectile but should be allowed to free itself from the projectile when it has served its purpose.

I claim:

1. A bolas projectile of the character described comprising, in combination, a plurality of weights each positioned eccentric to the axis of the projectile, wires connecting said weights to each other, said wires being twisted together to form a cable and said cable being formed into a coil, and means other than the weights for uncoiling said cable.

2. A projectile comprising a bolas including a plurality of weights and a wire connected to each weight, the wires being twisted together to form a cable and said cable being formed into a coil, and means other than the weights for drawing the cable axially from said coil and untwisting the same to permit spread of the bolas.

3. A projectile comprising a bolas including a plurality of weights and a wire connected to each weight, the wires being twisted together to form a cable and said cable being formed into a coil, the wires leading from within the coil to the point of connection with the weights whereby the wires are drawn from within the coil when the weights pull them, and means other than the weights for pulling the cable from within the coil to facilitate uncoiling.

4. A bolas projectile of the character described comprising, in combination, a plurality of weights each positioned eccentric to the axis of the projectile, and a base member connected to said weights, the base member and weights having cooperating cam surfaces so arranged that radial outward movement of the weights will force the base member rearwardly, wires connecting said weights to each other, said wires being twisted together to form a cable, and said cable being formed into a coil, and a tension member connected to the base member and to said cable whereby upon rearward movement of the base member the cable is pulled to uncoil said cable.

5. A bolas projectile of the character described comprising, in combination, a plurality of weights, each positioned eccentric to the axis of the projectile and a base member, connections between said weights and base member controlling relative movement thereof so that radial outward movement of the weights causes rearward movement of the base member, wires connecting said weights to each other, said wires being

twisted together to form a cable, and said cable being formed into a coil, and a tension member connected to the base member and to said cable whereby upon rearward movement of the base member, the cable is pulled to uncoil said cable.

6. A bolas projectile of the character described comprising, in combination, a plurality of weights, each positioned eccentric to the axis of the projectile, and a base member, dowell pins extending diagonally to the axis of the projectile separably connecting the weights to the base and controlling the relative movement of the weights and base to cause rearward movement of the base when the weights move radially outward, wires connecting said weights to each other, said wires being twisted together to form a cable, and said cable being formed into a coil, and a tension member connected to the base member and to said cable whereby upon rearward movement of the base member the cable is pulled to uncoil said cable.

7. A bolas projectile of the character described comprising, in combination, a plurality of weights connected to form a cylindrical shell, wires connecting said weights to each other, said wires being twisted together to form a cable, and said cable being formed into a coil within the cylindrical shell, a base member at one end of said weights forming a closure for said shell, means connecting the weights and the base member in such manner that radial outward movement of the weights will cause rearward movement of the base, a tension member connected to the base member and the cable to uncoil said cable, and a nose member at the other end of said weights forming a closure for said shell, said cable being connected to said nose member.

8. A bolas projectile of the character described comprising, in combination, a plurality of weights connected to form a cylindrical shell, wires connecting said weights to each other, said wires being twisted together to form a cable, and said cable being formed into a coil within the cylindrical shell, a base member at one end of said weights forming a closure for said shell, an inner shell enclosing said coil and fitting within said weights, an annular retainer secured to the inner casing at the end of the coil adjacent the base member, and a connection between the base member and the cable for drawing the cable from within the coil through said annular retainer.

9. A projectile comprising a bolas including a plurality of weights and a wire connected to each weight, the wires being twisted together to form a cable and said cable being formed into a coil, a member connected to the cable to draw the same axially from the coil, and an explosive charge for actuating said member.

10. A bolas projectile of the character described comprising, in combination, a plurality of weights each positioned eccentric to the axis of the projectile, a weight positioned axially of said projectile and rotatable as a part thereof, wires connected to said weights and twisted together to form a cable, said cable being formed into a coil, the end of said cable being connected to said rotatable weight, the direction of twist of the cable being such that rotation of the weight after uncoiling of the cable tends to untwist the cable when the projectile is shot from a rifled gun.

11. A bolas projectile of the character described comprising, in combination, a plurality of weights, wires connected to said weights and twisted together to form a cable, said cable being formed into a coil, a nose member connecting said weights to hold them together at one end to form a shell, a base member connecting said weights at the opposite end and forming a closure for the shell, a tension member connected to said base member and to said cable at one end of said coil and means non-rotatably connecting the other end of said cable to the nose member.

12. A bolas projectile of the character described comprising, in combination, weights arcuate in cross-section forming a shell, said weights being tapered inwardly at one end to form together a frustro-conical surface and having tapered recesses on their inner faces at the same ends, a two-part base comprising an inner threaded member having projections tapered on one side and extending into the tapered recesses in the weights and an outer member having a frustro-conical surface opposed to the tapered surfaces on the projections, said latter frustro-conical surface engaging the tapered surfaces of the weights.

13. A bolas projectile of the character described comprising, in combination, weights arcuate in cross-section forming a shell, wires connecting said weights, a two-part base having an inner member with radial projections and an outer member having a frustro-conical inwardly presented surface, the angle between the frustro-conical surface and the opposed surfaces of the projections being less than 11° and the weight members being engaged between said surfaces substantially as and for the purposes described.

14. A bolas projectile of the character described comprising, in combination, weights arranged to form a shell, wires connecting said weights and formed in a coil within the shell, a base member and a nose assembly engaging said weights at opposite ends to form closures for the shell, telescoping tubular members secured to said base and nose members to enclose an explosive charge, and a connection between said base member and coil to uncoil the latter.

15. The method of assembling a bolas projectile which comprises assembling a number of strands side by side, twisting each strand a number of times in one direction and twisting the whole assembly of strands in the opposite direction a greater number of times thereby producing a twisted cable, the strands of which are in torsional tension tending to untwist the cable, winding the cable into a coil on a mandrel, applying a sheath to said formed coil and securing the individual wires to weights to form a bolas and applying base and nose members to the weights to form a projectile.

16. A bolas projectile as defined in claim 1 wherein the individual wires have less twist than the cable as a whole to provide partially live cable to facilitate uncoiling and to prevent snarling.

17. A bolas projectile as defined in claim 2 wherein the wires are reversely twisted before twisting into a coil for the purposes described.

18. A bolas projectile as defined in claim 2 wherein the torsional tension of the individual wires as twisted into the cable is partially relieved.

19. A bolas as defined in claim 10 wherein the torsional twist of the individual wires is of the order of one-half of the twist of the cable substantially as and for the purpose described.

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