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Description

This invention relates to an ammunition conveyor system for providing rounds of ammunition seriatim from a stationary supply to a gun in a turret which has unrestricted rotation in train.

Conventional systems for providing rounds seriatim to a gun rotating in train have been of two kinds:

(1) flexible chute or link systems, shown, for example, in US—A—3437005; US—A—3650176; and on page 161 of "The Gatling Gun" by Wahl and Toppel, Arco Publishing Co., Inc., New York 1965.

(2) Rotary differential mechanisms, shown, for example, in US—A—3974738. Neither system type permits unlimited rotation in train. After the gun has rotated 360° more or less in one direction, it must unwind back in the other direction. If the gun is to have unlimited rotation in train, then the supply cannot be stationary, it must rotate with the gun. Some pivoting of rounds is shown in US—A—3021761 and in US—A—3901123. While most conveyor or link systems are designed to preclude unlimited pivoting of one conveyor or link with respect to the next adjacent one, US—A—2851927 shows telescoped rounds fixed to lengths of flexible cable.

US—A—2649840 describes an ammunition conveyor for providing rounds from a stationary supply to a gun in a turret which has unrestricted rotation in train about an axis;

said conveyor comprising;

a train of rounds carriers adapted to carry rounds from the supply, each carrier being coupled to the next adjacent carrier by a pivot capable of unrestricted rotation and each carrier carrying a respective round; and

orientation means comprising a hollow cylinder disposed coaxially of said train axis and rotatable about said train axis, and engagement means disposed within the cylinder to engage and orient each assembly of carrier and respective round by rotation about its respective pivot into an orientation in train determined by the current orientation in train of the gun turret.

In that system the hollow cylinder is driven in continuous rotation in one direction of rotation by means of a motor. The engagement means disposed within the cylinder is a brush of resilient material. The brush, carried by the continuously rotating hollow cylinder, serves to frictionally engage each round and rotate them always in the same sense into the current orientation of the gun turret.

The present invention is characterised in that:

said rotatable hollow cylinder is secured to the gun turret for rotation in train with said gun turret; and

said engagement means comprises a single nose cam providing two symmetrical cam surfaces one each side of said nose and formed by a cut through said cylinder along a substantially diagonal plane, said cam surfaces having a common high portion at said nose which is 180°

out of phase with the current orientation in train of the gun turret and respective low portions which are each in phase with said current orientation;

Whereby each carrier and round assembly conveyed into said orientation means, other than an assembly already in phase with the current orientation, is engaged by one or other of said cam surfaces and is cammed thereby about its respective pivot respectively clockwise or anti-clockwise through no more than 180° into said current orientation in train of the gun turret.

In another aspect the present invention is characterised in that:

said rotatable hollow cylinder is secured to the gun turret for rotation in train with said gun turret; and

said engagement means comprises first and second single nose cams each providing two symmetrical cam surfaces one each side of the respective nose and together formed by two cuts through said cylinder along two substantially diagonal mutually intersecting planes, the two cam surfaces of each cam having a common high portion at the respective nose which is 90° out of phase with the current orientation in train of the gun turret and respective low portions one of which is in phase and the other of which is 180° out of phase with said current orientation;

whereby each carrier and round assembly conveyed into said orientation means other than an assembly already in phase or 180° out of phase with the current orientation, is engaged by one or other of the cam surfaces of one or other of said cams and is cammed thereby about its respective pivot respectively clockwise or anti-clockwise through no more than 90° into either the current orientation or into an orientation 180° out of phase with the current orientation in train of the gun turret; and

additional cam means for receiving carrier and round assemblies from said cylinder, for passing an in-phase assembly without changing its orientation and for camming an out-of-phase assembly through 180° about its respective pivot into phase with the current orientation.

The characterising structure provides for positive mechanical engagement with each round to effect its rotation into the desired orientation. Moreover a round is rotated about its pivot axis by no more than 180° at a time.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic showing of a gun turret system embodying an ammunition conveyor according to this invention;

Fig. 2 is a respective view of a carrier assembly for a round of ammunition permitting unrestricted swiveling between immediately adjacent carrier assemblies;

Fig. 3 is a perspective view of the carrier assembly of Fig. 2 in a disassembled state;

Fig. 4 is a perspective view of a train of the carrier assemblies of Fig. 2 with respective rounds

of ammunition, showing unrestricted swiveling about the longitudinal axis of the train;

Fig. 5 is a side view in elevation of a first embodiment of the rounds orientation mechanism through which the train of carrier assemblies of Fig. 4 passes from the stationary supply to the rotating-in-train gun;

Fig. 6 is a front view in elevation of the assembly of Fig. 5;

Fig. 7 is a perspective view of the orientation cam;

Fig. 8 is a side view in elevation of a second embodiment of the rounds orientation mechanism through which the train of carrier assemblies of Fig. 4 passes from the stationary supply to the rotating-in-train gun;

Fig. 9 is a front view in elevation of the assembly of Fig. 8; and

Figs. 10 through 17 are bottom views in cross-section through the assembly of Fig. 9 taken along the planes X—X through XVII—XVII respectively.

Description of the Invention

As seen in Fig. 1, the gun turret system includes a gun turret 10 having a gun 12 which is unrestricted in its rotation in train or azimuth with respect to a stationary deck 14. The turret, for example, may be of the type shown in US—A—3,766,826 or US—A—3,995,509.

Rounds of ammunition are provided to the gun from an ammunition supply system 16 which is stationary with respect to the deck. The supply system may be generally of the type shown in US—A—4,004,490, but without a return of fired cases to the storage drum, or US—A—3,788,189. In the system specifically shown in Fig. 1, the supply system 16 is of the type wherein a linked belt of ammunition is hung in festoons from support elements, as shown, for example, in US—A—2,573,774, or US—A—2,710,561, or the H. C. Foshag designed system used with the 20 mm towed vulcan air defense system. The rounds of ammunition travel from the supply to the gun in a train 18 of interconnected carriers 20. The train 18 passes through a lower chute 22 from the supply to a rounds orientation means 24 and therefrom through a booster 25 and an upper chute 26 to the feeder 28 of the gun 12.

As seen in Figs. 2, 3, and 4, the carriers are a modified form of a conventional link or pivot 30 such as the XM28AS-78D006-002. Each link comprises a first element 32 having a yoke shape with a central portion 34 and two distal portions 36 and 38 adapted to snap onto the cartridge case of the round. The link also comprises an element 40, adapted to snap onto the case between the portions 36 and 38 of the next succeeding link, and having two biased apart bent fingers 42 and 44 which are adapted to pass through a hole 46 in the central portion 34. A clip 47 having a "U" shaped aperture therein is adapted to engage the bent fingers to interlock the two elements 32 and 40. The hole 46 may be made substantially elliptical and the fingers substantially flat to normally

align the two elements in parallel, yet permit full 360° rotation about a diameter through the cartridge case, between the two elements via the rotation of the fingers within the hole. This diameter of the case should preferably pass through the centroid of the assembly of round and clipped thereon to link elements. The link may include a special orienting element, such as a bent-in element 48 to engage an annular groove 50 in the case 52 of the round 54. The link may also include guide feet 56 and 58 adapted to ride in guide channels in the chutes 22 and 26.

As seen in Figs. 5, 6 and 7, the first embodiment of the rounds orientation means 24 comprises a plate 60 which has fixed thereto a hollow cylinder 62 which is coaxial with the axis of rotation 64 of the turret in azimuth, and is coupled to the turret to rotate therewith. The plate has a cutout 66 therein adapted to pass a carrier assembly and a respective round of ammunition in a predetermined orientation to the axis of rotation 64. The cylinder 62 is cut at its distal end along a substantially diagonal plane, to form a symmetrical, single nose cam surface 68. The nose of the cam, the axis of rotation 64, and the longitudinal axis of the round of ammunition as it passes through the cutout 66 all lie in a common plane. The cam surface 68 is symmetrical with respect to this common plane.

A roller 80 is journaled for rotation at the end of a lever arm 82 which is mediately mounted to the cylinder 62 by a pivot 83 passing through an oversize hole in the arm. A spring 84 biases the arm downwardly against the pivot. The other end of the lever arm 82 has a pocket cam surface 85 which is engaged by an eccentric cam 86 fixed on a shaft 88 which is driven by suitable shafting from the turret. As the shaft 88 turns, the lever with the roller dithers to and fro a few degrees. The roller 80 serves as the actual nose of the cam surface 68, and the high point of this actual nose is in continual movement with respect to the remainder of the cam surface. The purpose of this moving nose is to preclude a round of ammunition, as it passes through the rounds orientation mechanism, from being perfectly aligned with the plane of symmetry, but 180° out of alignment with the cutout 66, and hanging up on the nose. The inside diameter of the cylinder 62 is made small enough that the nose engages the side of the projectile of the round, yet large enough that the base of the cartridge case clears the inner wall of the cylinder. Optionally, an additional pair of elements 90 may be fixed within the cylinder to provide respective cam surfaces 92 each adapted to engage the base, i.e., the extractor disk, of a cartridge case. In operation, as each round of ammunition is carried along into the rounds orientation mechanism, its projectile will abut the cam surface 68 and the round and its associated carrier assembly will be progressively swiveled about its respective pivots with the next succeeding and next preceding carrier assemblies. As the round approaches alignment with the cutout 66, its extractor disk will engage one or the other of

the cam surfaces 92 and be guided thereby. Alternatively, the elements 90 may be omitted, and the cutout 66 may be provided with a downwardly extending bellmouth 94 to guide the base portion of the round into the cutout 66.

As the round and its carrier assembly pass through the cutout 66 they enter the booster 25 and then the upper chute 26 which leads to the loader 28 of the gun 12. The booster 25 has a sprocket 91 which assists in the pulling of the train of rounds up through the rounds orientation mechanism and third delivery into the loader. The loader has an in-feed sprocket which pulls the train of rounds into an extraction mechanism to remove each round in sequence from its carrier assembly. Each stripped round is then fed into the gun. The extraction mechanism may, for example, be of the type shown in US—A—3,333,506.

While the embodiment here shown has had the rounds orientation mechanism acting directly upon the projectile as it is carried by its carrier, it will be appreciated that the mechanism can be made to act upon the carrier, for example, if the carrier were made longer than the round of ammunition.

As seen in Figs. 8 through 17, the second embodiment of the rounds orientation means 100 comprises a plate 102 which has fixed thereto a hollow cylinder 104 which is coaxial with the axis of rotation 64 of the turret in azimuth, and is coupled to the turret to rotate therewith. The plate 102 has a cutout 106 (similar to cutout 66) therein adapted to pass a carrier assembly and a respective round of ammunition in a predetermined orientation to the axis of rotation 64. The cylinder 104 is cut at its distal end along two, substantially diagonal, mutually intersecting planes, to form two, symmetrical, single nose cam surfaces 108 and 110. The two noses, the axis of rotation 64, and the longitudinal axis of the round of ammunition as it passes through the cutout 106 all lie in a common plane 124. Each of the cam surfaces 108 and 110 is symmetrical with respect to this common plane 124. A dithering roller assembly 112 and 114 is respectively mounted on each nose, as described with respect to the first embodiment, to preclude a round of ammunition from hanging up on the nose.

As each round is pulled up into the orientation mechanism, its projectile will engage either the cam surface 108 or the cam surface 110, and the round will be deflected up to 90° into alignment with the cutout 106 in the plate 102. However, as it passes through the cutout 106, the round will be either aligned with the chute 26 leading to the feeder of the gun or 180° out of alignment with the chute 26. A second stage cam means (120, 122) is fixed to and between the plate 102 and the chute 26. This mechanism comprises an outer tube 120 which is an extension of the tube 104, coaxial with the axis 64, whose interior wall just clears the base of the round, and an interior tube 122, also coaxial with the axis 64. More than the front portion of the outer tube 120 is omitted along a plane which is

parallel to the plane 124 which passes through the centerline of the cutout 106. The round 116 is shown aligned with the cutout 106. The round 118 is shown 180° out of alignment with the cutout 106. The distal margins of the outer tube 120 are bent to provide two guide surfaces 126 and 128, either of which will bear on the projectile of a round which is either aligned or 180° misaligned with the cutout 106. The inner tube 122 has two helical slots 130 and 132 therein. The slot 130 is adapted to clear the diameter of the projectile of a round. The slot 132 is adapted to clear the diameter of the case of a round. The inner tube 122 has a plurality of guides fixed to its edges which bound these helical slots. Guides 134, 135, 136 and 138 are adapted to engage the feet 56 or 58 of a carrier 30, guides 140 and 141 are adapted to bear on the projectile, and guides 142 and 143 are adapted to bear on the case, all to guide a misaligned round through the helical slots, as it is pulled upwardly through the orientation mechanism, into the upper chute 26. (No booster has been shown between the orientation mechanism and the upper chute, but a booster may be provided as shown in Fig. 6). As shown in Figs. 10 through 17, a round 118 which is 180° misaligned, is progressively rotated, as it is pulled upwardly, into alignment with upper chute 26. The upper chute 26 is aligned with the cutout 106. A round 116 which is aligned with the cutout 106 is pulled up without rotation between the guides 128 and 140.

Claims

1. An ammunition conveyor for providing rounds from a stationary supply (16) to a gun (12) in a turret (10) which has unrestricted rotation in train about an axis (64);

said conveyor comprising:

a train (18) of rounds carriers (20) adapted to carry rounds from the supply, each carrier being coupled to the next adjacent carrier by a pivot (30) capable of unrestricted rotation and each carrier (20) carrying a respective round; and

orientation means (24) comprising a hollow cylinder (62) disposed coaxially of said train axis (64) and rotatable about said train axis, and engagement means (68) disposed within the cylinder (62) to engage and orient each assembly of carrier (20) and respective round by rotation about its respective pivot (30) into an orientation in train determined by the current orientation in train of the gun turret (10);

characterised in that:

said rotatable hollow cylinder (62) is secured to the gun turret (10) for rotation in train with said gun turret; and

said engagement means (68) comprises a single nose cam providing two symmetrical nose cam surfaces (68) one each side of a nose (80) and formed by a cut through said cylinder (62) along a substantially diagonal plane, said cam surfaces (68) having a common high portion at said nose (80) which is 180° out of phase with the current

orientation in train of the gun turret and respective low portions which are each in phase with said current orientation;

whereby each carrier and round assembly conveyed into said orientation means (24), other than an assembly already in phase with the current orientation, is engaged by one or other of said cam surfaces (68) and is cammed thereby about its respective pivot (30) respectively clockwise or anti-clockwise through no more than 180° into said current orientation in train of the gun turret.

2. An ammunition conveyor for providing rounds from a stationary supply (16) to a gun (12) in a turret (10) which has unrestricted rotation in train about an axis (64);

said conveyor comprising:

a train (18) of rounds carriers (20) adapted to carry rounds from the supply, each carrier being coupled to the next adjacent carrier by a pivot (30) capable of unrestricted rotation and each carrier (20) carrying a respective round; and

orientation means (100) comprising a hollow cylinder (104) disposed coaxially of said train axis (64) and rotatable about said train axis, and engagement means (108, 110) disposed within the cylinder (104) to engage and orient each assembly of carrier and respective round by rotation about its respective pivot (30) into an orientation in train determined by the current orientation in train of the gun turret (10);

characterised in that:

said rotatable hollow cylinder (104) is secured to the gun turret (10) for rotation in train with said gun turret; and

said engagement means (108, 110) comprises first and second single nose cams (108, 110) each providing two symmetrical cam surfaces one each side of the respective nose (112, 114) and together formed by two cuts through said cylinder (104) along two substantially diagonal mutually intersecting planes, the two cam surfaces of each cam (108, 110) having a common high portion at the respective nose (112, 114) which is 90° out of phase with the current orientation in train of the gun turret (10) and respective low portions one of which is in phase and the other of which is 180° out of phase with said current orientation;

whereby each carrier and round assembly conveyed into said orientation means (24), other than an assembly already in phase or 180° out of phase with the current orientation, is engaged by one or other of the cam surfaces of one or other of the said cams (108, 110) and is cammed thereby about its respective pivot (30) respectively clockwise or anti-clockwise through no more than 90° into either the current orientation or into an orientation 180° out of phase with the current orientation in train of the gun turret (10); and

additional cam means (120, 122) for receiving carrier and round assemblies from said cylinder (104), for passing an in-phase assembly without changing its orientation and for camming an out-of-phase assembly through 180° about its respective pivot (30) into phase with the current orientation.

3. An ammunition conveyor according to claim 2 characterised in that said additional cam means comprises an additional hollow cylinder (120) having a first guide surface (126) therein for engaging the carrier (20) of an in-phase assembly and a second guide surface (128) therein for engaging the carrier of an out-of-phase assembly.

4. An ammunition conveyor according to any one of claims 1 to 3 characterised by a plate (60, 102) disposed across the discharged end of said hollow cylinder (62, 104) and having an elongate cut-out (66, 106) therein for passage therethrough of an assembly of a round and a carrier, said cut-out (66, 106) having a longitudinal axis aligned with the current orientation in train of the gun turret (10).

5. An ammunition conveyor according to any one of claims 1 to 4 characterised in that said cam surfaces of said cams (68; 108, 110) are positioned to engage and cam the projectile portion of each round (54) of each engaged assembly of a round (54) and a carrier (20).

6. An ammunition conveyor according to any one of claims 1 to 5 characterised in that the or each said high portion at the nose of a said cam (68; 108, 110) is provided with a mobile surface (80; 112, 113) which is in continual dither oscillation through the plane of symmetry of the respective cam surfaces either side of that nose portion.

7. An ammunition conveyor according to claim 6 characterised in that said mobile surface is provided by a roller (80) journaled on an end of a lever arm (82) which is mounted by a pivot (83) to said hollow cylinder (62, 104) and which lever is oscillated about said pivot.

8. An ammunition conveyor according to claim 7 characterised in that said roller (80) is shock mounted with respect to said pivot (83).

Patentansprüche

1. Patronenzuführeinrichtung zur Lieferung von Patronen von einer stationären Versorgung (16) zu einem Geschütz (12) in einem Panzerturm (10), der eine unbegrenzte Drehung in einem Zuge um eine Achse (64) aufweist,

wobei die Zuführeinrichtung aufweist:

eine Kette (18) von Patronenträgern (20), die Patronen von der Versorgung tragen können, wobei jeder Träger mit dem nächstbenachbarten Träger durch eine Schwenkverbindung (30), die für eine unbegrenzte Drehung ausgelegt ist, verbunden ist und jeder Träger (20) eine entsprechende Patrone trägt, und eine Richteinrichtung (24), die einen hohlen Zylinder (62), der koaxial zu der Kettenachse (64) angeordnet und um die Kettenachse drehbar ist, und Eingriffsmittel (68) aufweist, die in dem Zylinder (62) angeordnet sind, um an jeder Anordnung aus Träger (20) und entsprechender Patrone anzugreifen und diese zu richten durch Drehung um ihre entsprechende Schwenkverbindung (30) in eine aufeinanderfolgende Orientierung, die durch die laufende Orientierung in einem Zuge des Panzerturms

(10) bestimmt ist,

dadurch gekennzeichnet, daß

der drehbare, hohle Zylinder (62) an dem Panzerturm (10) für eine Rotation in einem Zuge mit dem Panzerturm befestigt ist, und

die Eingriffsmittel (68) einen eine einzelne Nase aufweisenden Kurvenkörper aufweisen, der zwei symmetrische Nasennockenflächen (68) besitzt, eine auf jeder Seite einer Nase (80), und mit einem Einschnitt durch den Zylinder (62) entlang einer im wesentlichen diagonalen Ebene versehen ist, wobei die Nockenflächen (68) einen gemeinsamen hohen Abschnitt an der Nase (80), der 180° phasenverschoben zu der laufenden Orientierung in einem Zuge des Panzerturms angeordnet ist, und entsprechende tiefe Abschnitte aufweisen, die jeweils gleichphasig mit der laufenden Orientierung sind,

wobei jede Träger- und Patronenanordnung, die in die Richteinrichtung transportiert ist und keine Anordnung ist, die bereits gleichphasig mit der laufenden Orientierung ist, durch eine oder andere der Nockenflächen (68) ergriffen und dadurch um ihre entsprechende Schwenkverbindung (30) in Uhrzeigerrichtung bzw. Gegen-Uhrzeigerrichtung über nicht mehr als 180° in die laufende Orientierung des in einem Zuge umlaufenden Geschützturms gekämmt wird.

2. Patronenzuführeinrichtung zur Lieferung von Patronen von einer stationären Versorgung (16) zu einem Geschütz (12) in einem Panzerturm (10), der eine unbegrenzte Drehung in einem Zuge um eine Achse (64) aufweist,

wobei die Zuführeinrichtung aufweist:

eine Kette (18) von Patronenträgern (20), die Patronen von dem Vorrat tragen können, wobei jeder Träger mit dem nächstbenachbarten Träger durch eine Schwenkverbindung (30), die für eine unbegrenzte Drehung ausgelegt ist, verbunden ist und jeder Träger (20) eine entsprechende Patrone trägt, und eine Richteinrichtung (100), die einen hohlen Zylinder (104), der coaxial zu der Kettenachse (64) angeordnet und um die Kettenachse drehbar ist, und Eingriffsmittel (108, 110) aufweist, die in dem Zylinder (104) angeordnet sind, um an jeder Anordnung aus Träger und entsprechender Patrone anzugreifen und diese zu richten durch Drehung um ihre entsprechende Schwenkverbindung (30) in eine aufeinanderfolgende Orientierung, die durch die laufende Orientierung in einem Zuge des Panzerturms (10) bestimmt ist,

dadurch gekennzeichnet, daß

der drehbare, hohle Zylinder (104) an dem Panzerturm (10) für eine Rotation in einem Zuge mit dem Panzerturm befestigt ist, und

die Eingriffsmittel (108, 110) erste und zweite eine einzelne Nase aufweisende Kurvenkörper (108, 110) aufweisen, die jeweils zwei symmetrische Nockenflächen, eine auf jeder Seite der entsprechenden Nase (112, 114), aufweisen und zusammen durch zwei Einschnitte durch den Zylinder (104) entlang zwei im wesentlichen diagonalen, sich gegenseitig schneidenden Ebenen gebildet sind, wobei die zwei Nockenflächen von je-

dem Kurvenkörper (108, 110) einen gemeinsamen hohen Abschnitt an der entsprechenden Nase (112, 114), der 90° phasenverschoben ist zu der laufenden Orientierung in einem Zuge des Geschützturms (10), und entsprechende tiefe Abschnitte aufweisen, von denen der eine gleichphasig mit und der andere 180° phasenverschoben ist zu der laufenden Orientierung,

wobei jede Träger- und Patronenanordnung, die in die Orientierungseinrichtung (24) transportiert ist und keine Anordnung ist, die bereits gleichphasig oder 180° phasenverschoben ist zu der laufenden Orientierung, durch die eine oder andere der Nockenflächen von dem einen oder anderen Kurvenkörper (108, 110) ergriffen und dadurch um ihre entsprechende Schwenkverbindung (30) in Uhrzeigerrichtung bzw. Gegen-Uhrzeigerrichtung um nicht mehr als 90° in entweder die laufende Orientierung oder in eine 180° phasenverschobene Orientierung in Bezug auf die laufende Orientierung in einem Zuge des Geschützturms (10) gekämmt wird, und

zusätzliche Nockenmittel (120, 122) vorgesehen sind zum Aufnehmen der Träger- und Patronenanordnung aus dem Zylinder (104) zum Durchlassen einer gleichphasigen Anordnung ohne Änderung ihrer Orientierung und zum Kämmen einer phasenverschobenen Anordnung um 180° um ihre entsprechende Schwenkverbindung (30) in eine gleiche Phase mit der laufenden Orientierung.

3. Patronenzuführeinrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die zusätzlichen Nockenmittel einen zusätzlichen hohlen Zylinder (120) aufweisen, der eine erste Führungsfläche (126) zum Ergreifen des Trägers (20) einer gleichphasigen Anordnung und eine zweite Führungsfläche (128) zum Ergreifen des Trägers einer phasenverschobenen Anordnung aufweist.

4. Patronenzuführeinrichtung nach einem der Ansprüche 1 bis 3, gekennzeichnet durch

eine Platte (16, 102), die über dem Auslassende des hohlen Zylinders (62, 104) angeordnet ist und darin einen langgestreckten Ausschnitt (66, 106) aufweist zum Durchlassen einer Anordnung aus einer Patrone und einem Träger, wobei der Ausschnitt (66, 106) eine Längsachse besitzt, die mit der laufenden Orientierung in einem Zuge des Geschützturms (10) ausgerichtet ist.

5. Patronenzuführeinrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Nockenflächen der Kurvenkörper (68; 108, 110) so angeordnet sind, daß sie den Projektilabschnitt von jeder Patrone (54) von jeder ergriffenen Anordnung aus einer Patrone (54) und einem Träger (20) angreifen und mit diesem kämmen.

6. Patronenzuführeinrichtung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß der oder jeder hohe Abschnitt an der Nase eines Kurvenkörpers (68; 108, 110) mit einer mobilen Oberfläche (80; 112, 114) versehen ist, die in einer kontinuierlichen Zitterschwingung durch die Symmetrieebene der entsprechenden Nockenflächen auf jeder Seite des Nasenabschnitts ist.

7. Patronenzuführeinrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die mobile Oberfläche mit einer Rolle (80) versehen ist, die auf einem Ende eines Hebelarms (62) gelagert ist, der durch eine Schwenkverbindung (83) an dem hohlen Zylinder (62, 104) angebracht ist und um die Schwenkverbindung schwenkbar ist.

8. Patronenzuführeinrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Rolle (80) in bezug auf die Schwenkverbindung (83) stoßgedämpft angebracht ist.

Revendications

1. Un convoyeur de munitions destiné à transporter des munitions d'un magasin fixe (16) vers un canon (12) dans une tourelle (10) qui est capable d'effectuer une rotation illimitée en azimut autour d'un axe (64);

ce convoyeur comprenant:

un train (18) de porte-munitions (20) conçus de façon à transporter des munitions à partir du magasin, chaque porte-munition étant accouplé au porte-munition immédiatement adjacent par un pivot (30) permettant une rotation illimitée, et chaque porte-munition (20) portant une munition respective; et

des moyens d'orientation (24) comprenant un cylindre creux (62) disposé de façon que son axe coïncide avec l'axe de rotation en azimut (64) et pouvant tourner autour de cet axe d'azimut, et des moyens de contact (68) disposés à l'intérieur du cylindre (62) pour venir en contact avec chaque ensemble formé par un porte-munition (20) et la munition respective, et pour orienter cet ensemble par rotation autour de son pivot respectif (30) de façon à lui donner une orientation en azimut qui est déterminée par l'orientation en azimut courante de la tourelle de canon (10);

caractérisé en ce que:

le cylindre creux tournant (62) est fixé à la tourelle de canon (10) pour tourner en azimut avec cette tourelle de canon; et

les moyens de contact (68) comprennent une came comportant un seul nez et définissant deux surfaces de came à nez symétriques (68) situées de part et d'autre d'un nez (80) et formées par une coupure traversant le cylindre (62) selon un plan pratiquement diagonal, ces surfaces de came (68) ayant une partie haute commune au niveau du nez (80) qui est déphasée de 180° par rapport à l'orientation en azimut courante de la tourelle de canon, et des parties basses respectives qui sont chacune en phase avec cette orientation courante;

grâce à quoi chaque ensemble formé par un porte-munition et une munition qui est amené dans les moyens d'orientation (24), autre qu'un ensemble déjà en phase avec l'orientation courante, vient en contact avec l'une ou l'autre des surfaces de came (68) et est ainsi mis en rotation autour de son pivot respectif (30), respectivement en sens d'horloge ou en sens inverse d'horloge, sur un angle ne dépassant pas 180°, pour prendre l'orientation en azimut courante de la tourelle de canon.

2. Un convoyeur de munitions destiné à transporter des munitions d'un magasin fixe (16) vers un canon (12) dans une tourelle (10) qui peut effectuer une rotation en azimut illimitée autour d'un axe (64);

ce convoyeur comprenant:

un train (18) de porte-munitions (20) conçus pour transporter des munitions à partir du magasin, chaque porte-munition étant accouplé au porte-munition immédiatement adjacent par un pivot (30) permettant une rotation illimitée, et chaque porte-munition (20) portant une munition respective; et

des moyens d'orientation (100) comprenant un cylindre creux (104) disposé de façon que son axe coïncide avec l'axe d'azimut (64) et pouvant tourner autour de cet axe d'azimut, et des moyens de contact (108, 110) disposés à l'intérieur du cylindre (104) pour venir en contact avec chaque ensemble formé par porte-munition et une munition respective, et pour orienter cet ensemble par rotation autour de son pivot respectif (30) de façon à lui donner une orientation en azimut déterminée par l'orientation en azimut courante de la tourelle de canon (10);

caractérisé en ce que:

le cylindre creux tournant (104) est fixé à la tourelle de canon (10) pour tourner en azimut avec cette tourelle de canon; et

les moyens de contact (108, 110) comprennent des première et seconde cames à un seul nez (108, 110), chacune d'elles définissant deux surfaces de came symétriques situées de part et d'autre du nez respectif (112, 114), et les deux cames étant formées conjointement par deux coupures traversant le cylindre (104) selon deux plans pratiquement diagonaux qui se coupent mutuellement, les deux surfaces de came de chaque came (108, 110) ayant une partie haute commune au niveau du nez respectif (112, 114) qui est déphasée de 90° par rapport à l'orientation en azimut courante de la tourelle de canon (10), et des parties basses respectives dont l'une est en phase avec ladite orientation courante tandis que l'autre est déphasée de 180° par rapport à elle;

grâce à quoi chaque ensemble formé par un porte-munition et une munition qui est introduit dans les moyens d'orientation (24), autre qu'un ensemble déjà en phase ou déphasé de 180° par rapport à l'orientation courante, vient en contact avec l'une ou l'autre des surfaces de came de l'une ou l'autre des cames (108, 110), et est ainsi mis en rotation autour de son pivot respectif (30), respectivement en sens d'horloge ou en sens inverse d'horloge, sur un angle ne dépassant pas 90°, pour être amené soit dans l'orientation courante soit dans une orientation déphasée de 180° par rapport à l'orientation en azimut courante de la tourelle de canon (10); et

une structure de came supplémentaire (120, 122) est destinée à recevoir des ensembles formés par un porte-munition et une munition qui proviennent du cylindre (104), pour transmettre un ensemble en phase sans changer son orientation, et pour faire tourner de 180° autour de son pivot

respectif (30) un ensemble déphasé, afin de l'amener en phase avec l'orientation courante.

3. Un convoyeur de munitions selon la revendication 2, caractérisé en ce que la structure de came supplémentaire comprend un cylindre creux supplémentaire (120) comportant une première surface de guidage (126) destinée à venir en contact avec le porte-munition (20) d'un ensemble en phase, et une seconde surface de guidage (128) destinée à venir en contact avec le porte-munition d'un ensemble déphasé.

4. Un convoyeur de munitions selon l'une quelconque des revendications 1 à 3, caractérisé par une plaque (60, 102) disposée transversalement à l'extrémité de sortie du cylindre creux (62, 104) et comportant une ouverture allongée (66, 106) prévue pour être traversée par un ensemble formé par une munition et un porte-munition, cette ouverture (66, 106) ayant un axe longitudinal aligné avec l'orientation en azimuth courante de la tourelle de canon (10).

5. Un convoyeur de munitions selon l'une quelconque des revendications 1 à 4, caractérisé en ce que les surfaces de came des comes (68; 108, 110)

sont placées de façon à venir en contact avec la partie de projectile de chaque munition (54) de chaque ensemble formé par une munition (54) et un porte-munition (20), et à faire tourner cette partie de projectile par une action de came.

6. Un convoyeur de munitions selon l'une quelconque des revendications 1 à 5, caractérisé en ce que la partie haute ou chaque partie haute se trouvant au niveau du nez de la came (68; 108, 110) est équipée d'une surface mobile (80; 112, 114) qui oscille continuellement en traversant le plan de symétrie des surfaces de came respectives, de part et d'autre de la partie de nez considérée.

7. Un convoyeur de munitions selon la revendication 6, caractérisé en ce que la surface mobile est équipée d'un galet (80) monté de façon tournante sur une extrémité d'un levier (82) qui est monté sur le cylindre creux (62, 104) au moyen d'un pivot (83), et ce levier oscille autour du pivot.

8. Un convoyeur de munitions selon la revendication 7, caractérisé en ce le galet (80) est accouplé au pivot (83) par un montage à ressort.

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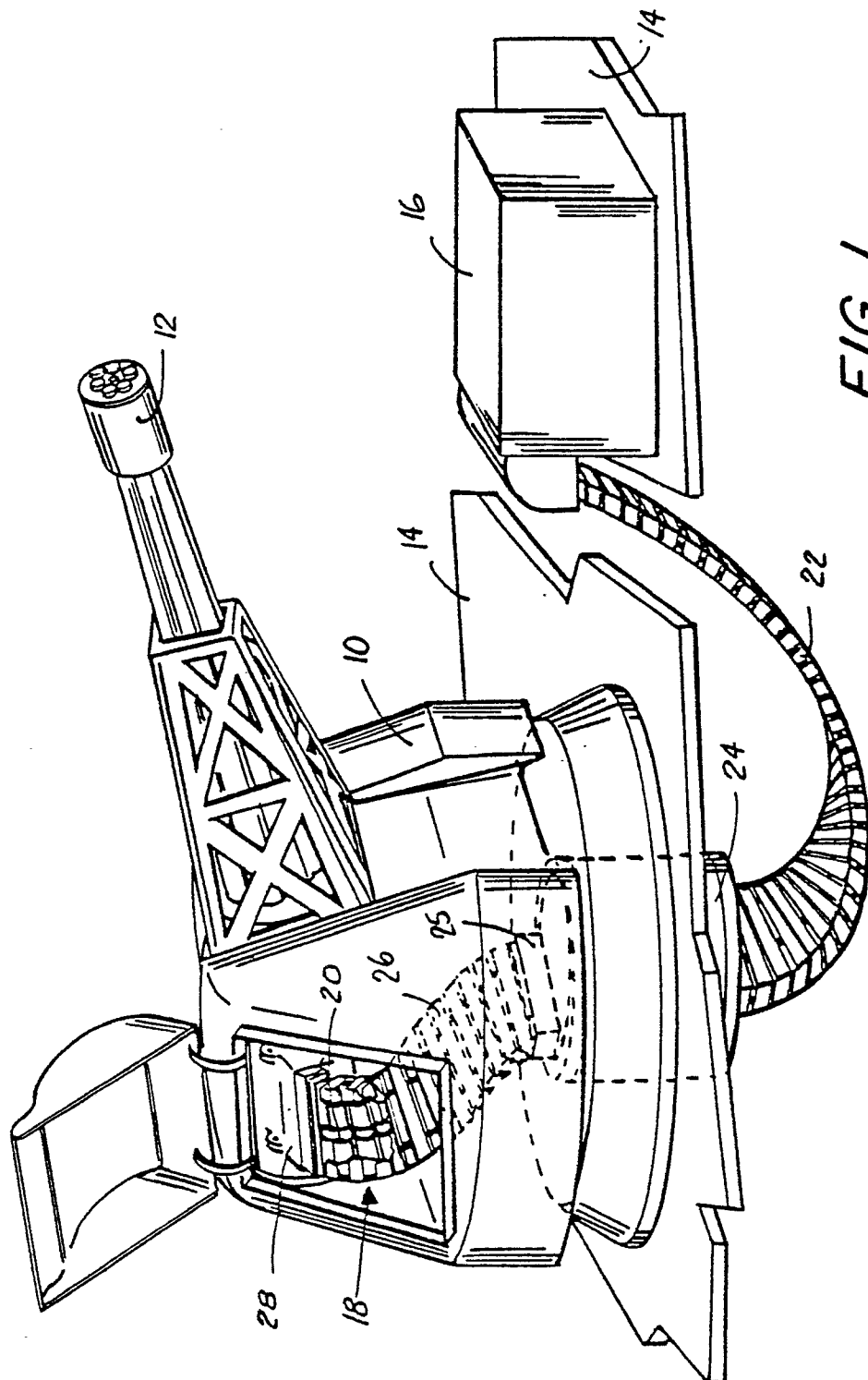
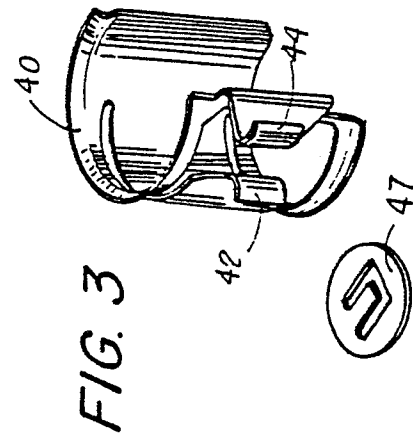
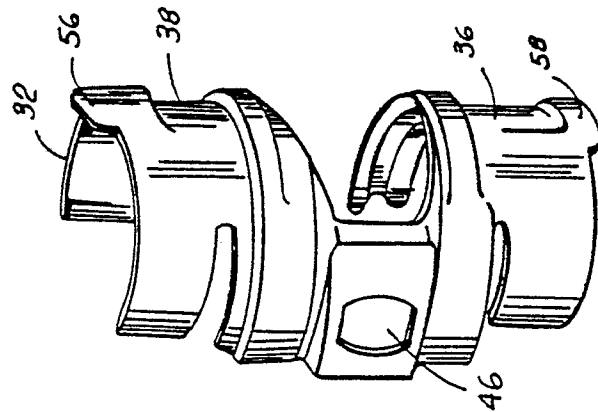
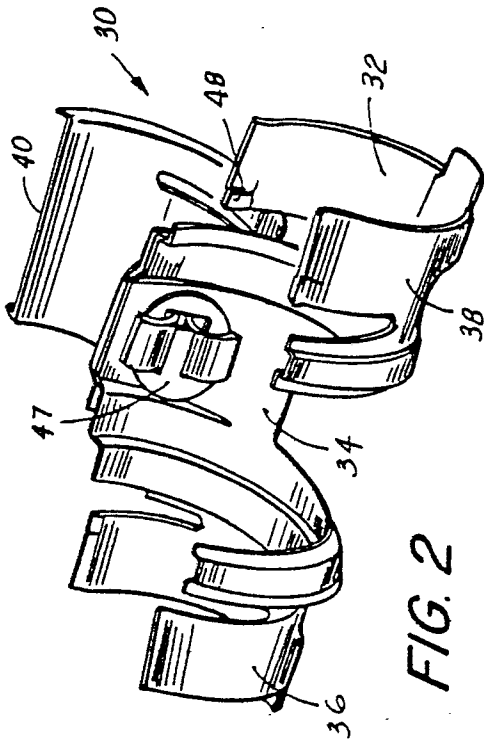
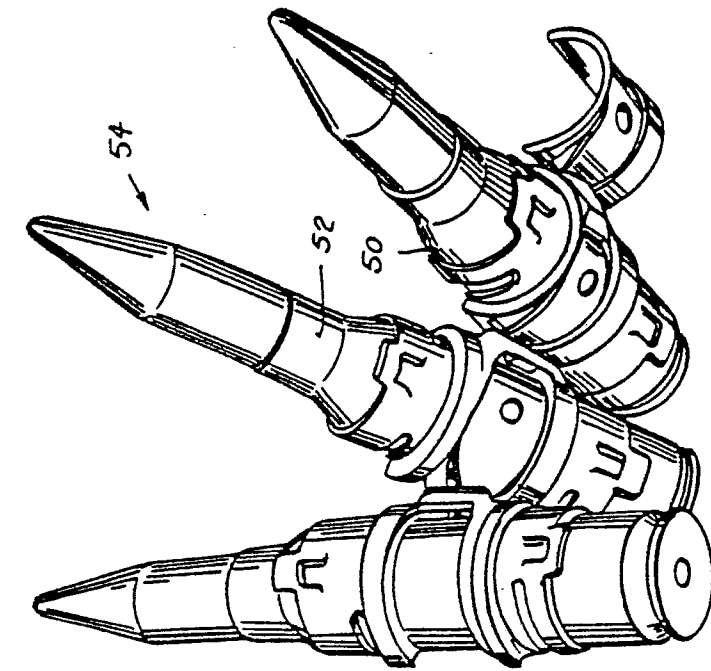
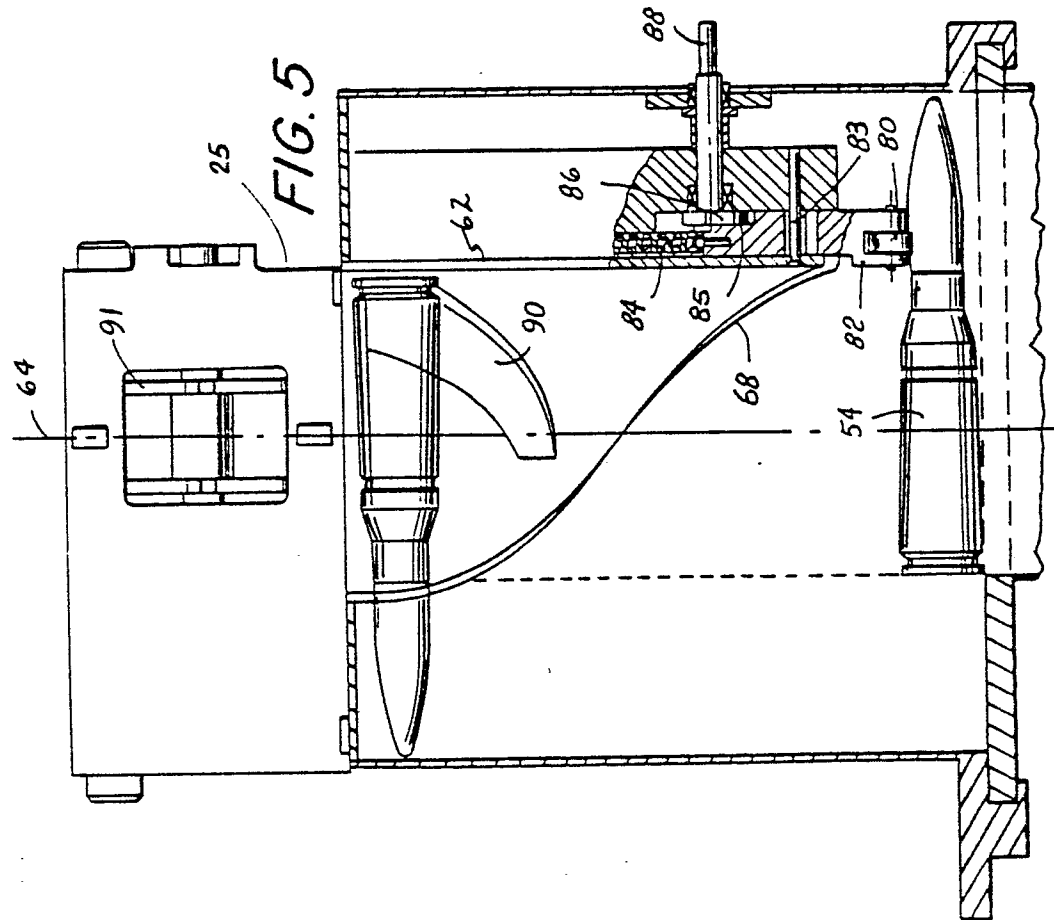
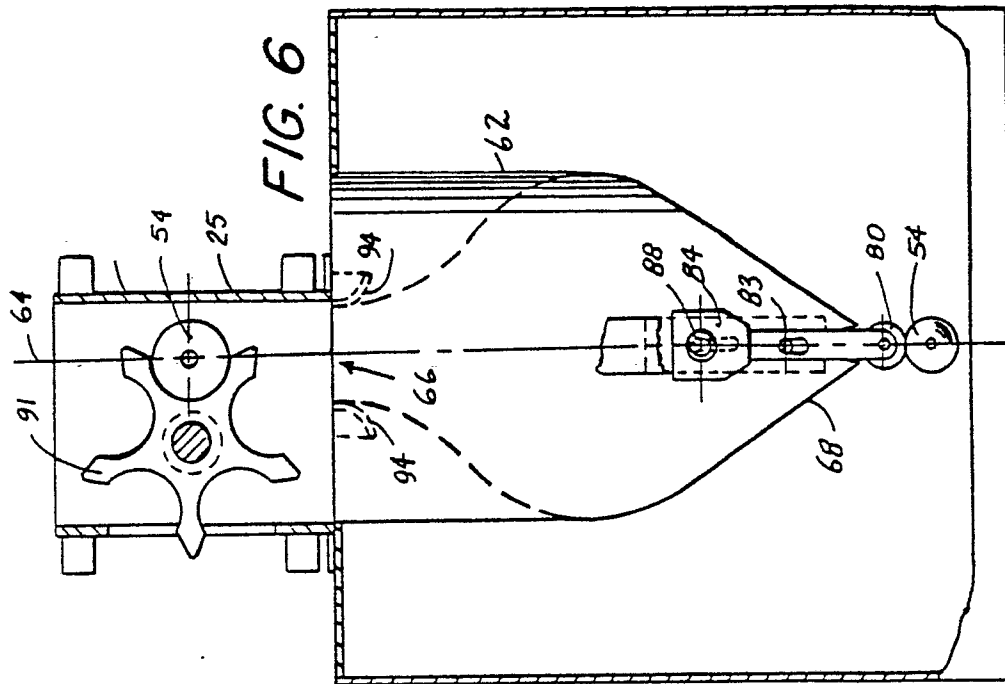


FIG. 1





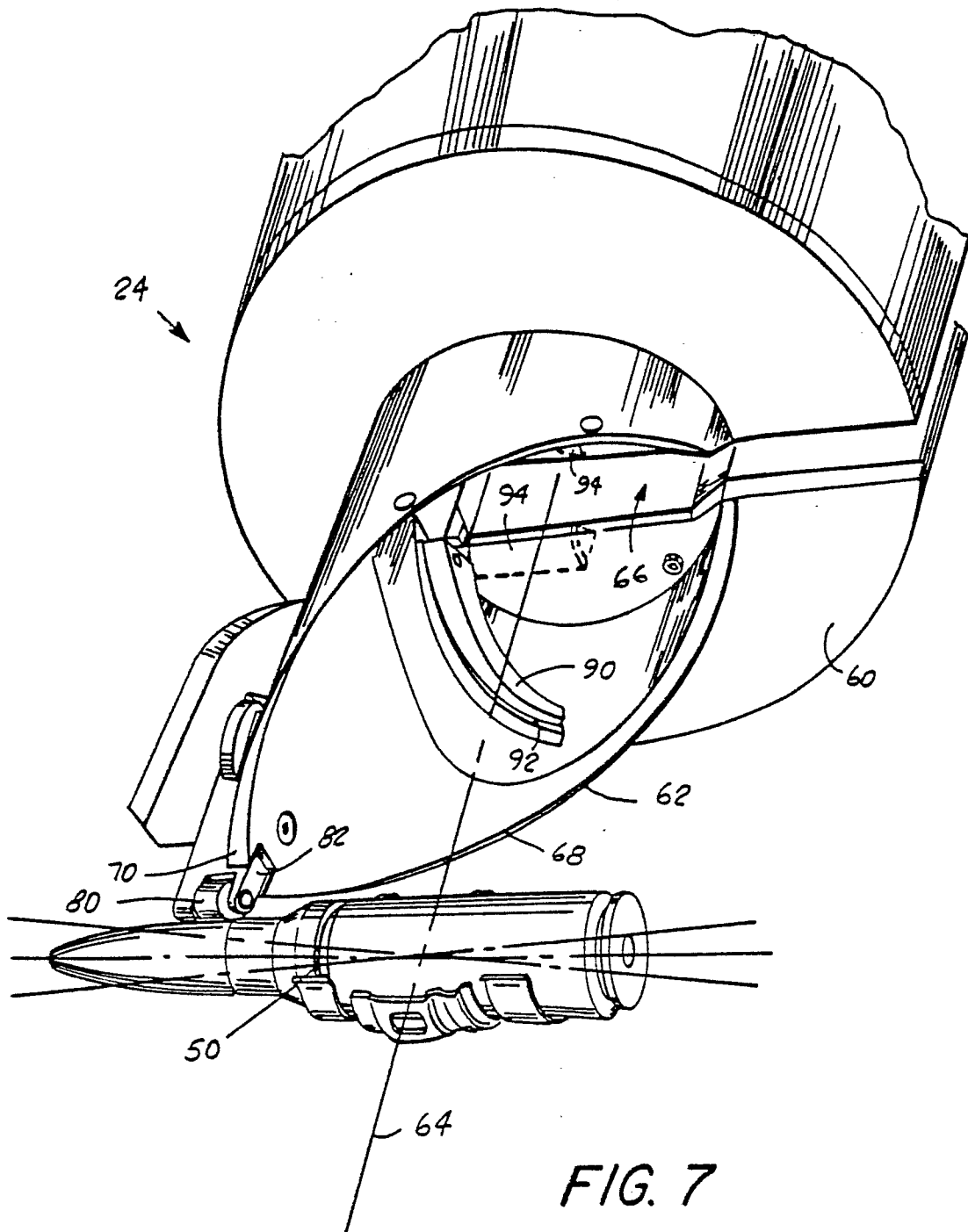


FIG. 7

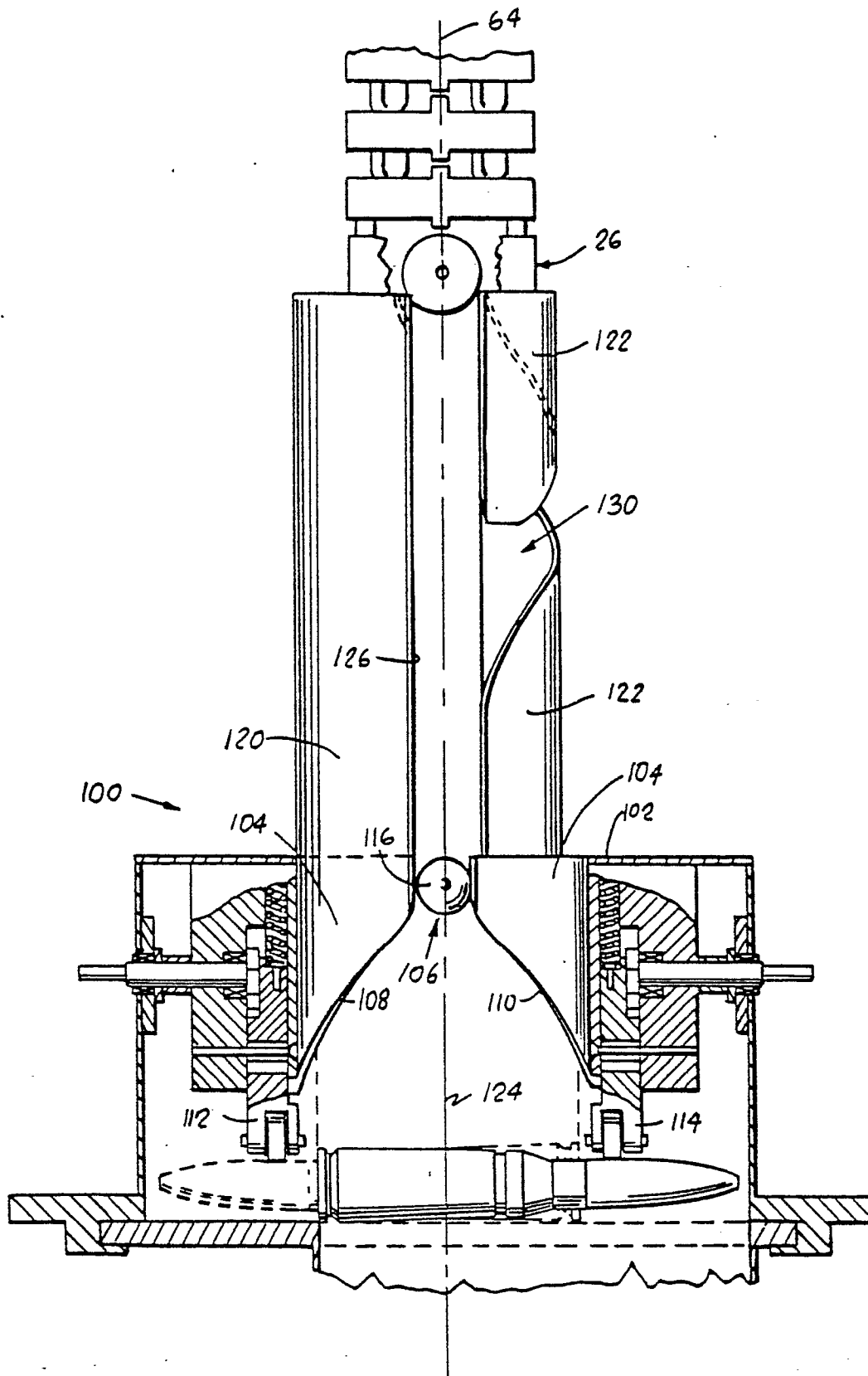
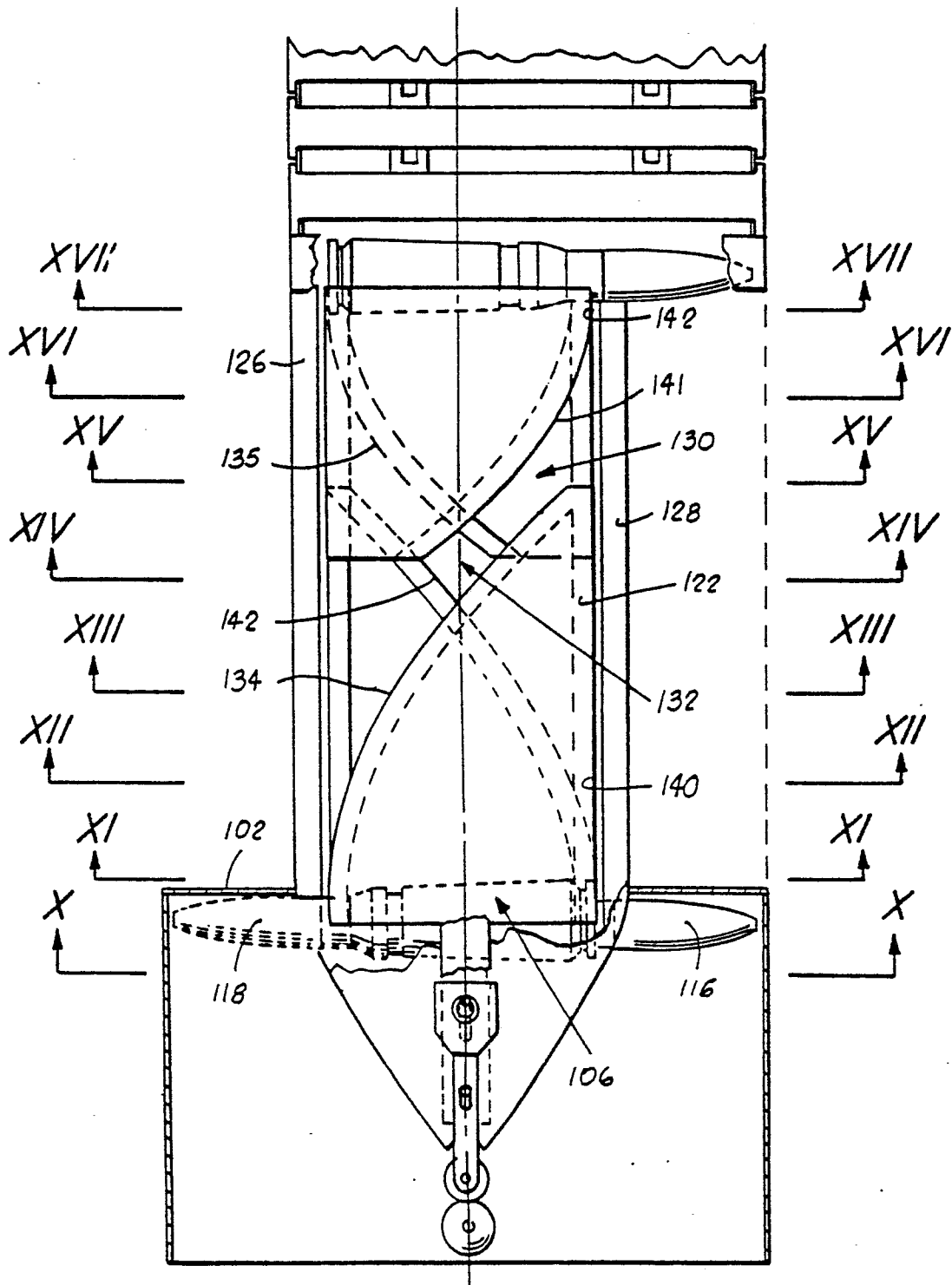


FIG. 9



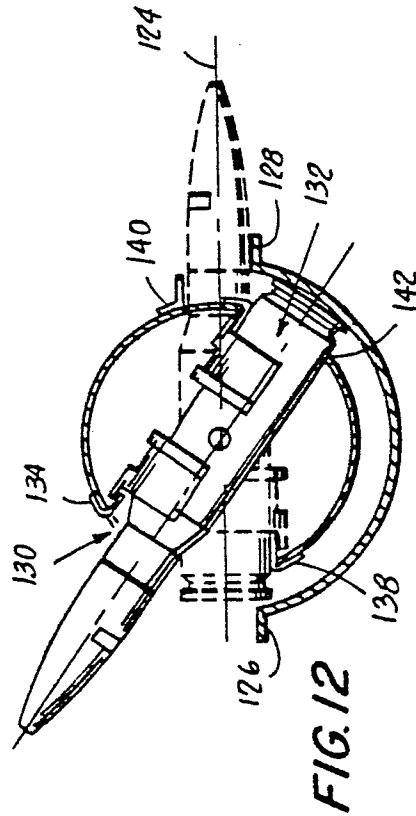
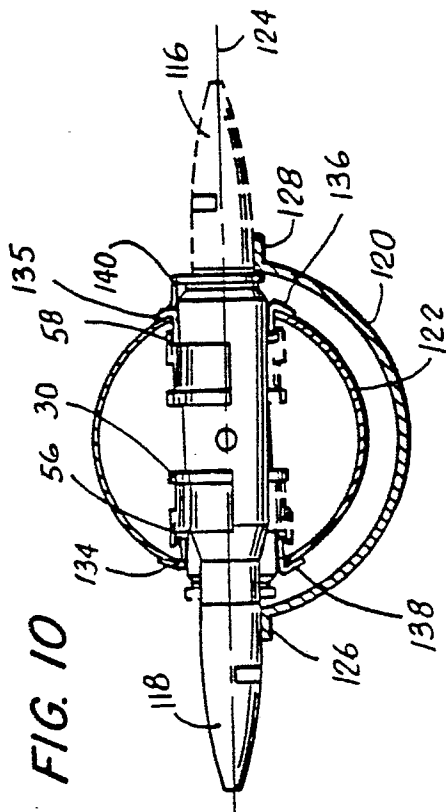
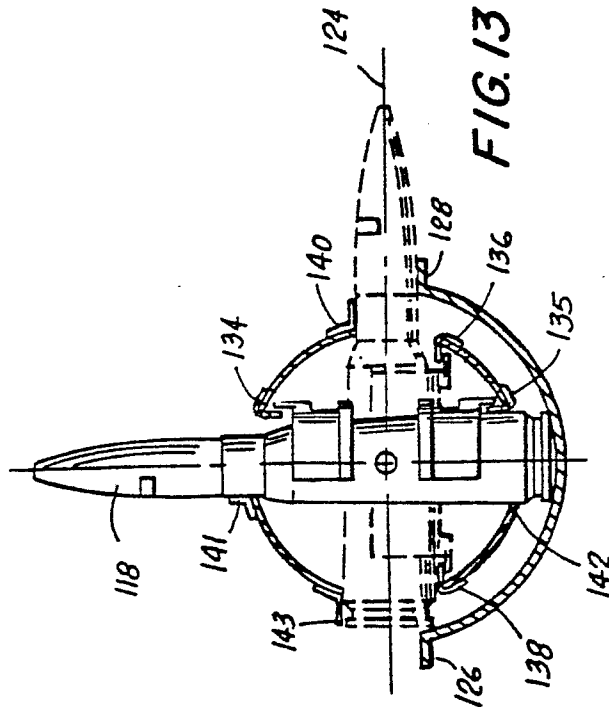
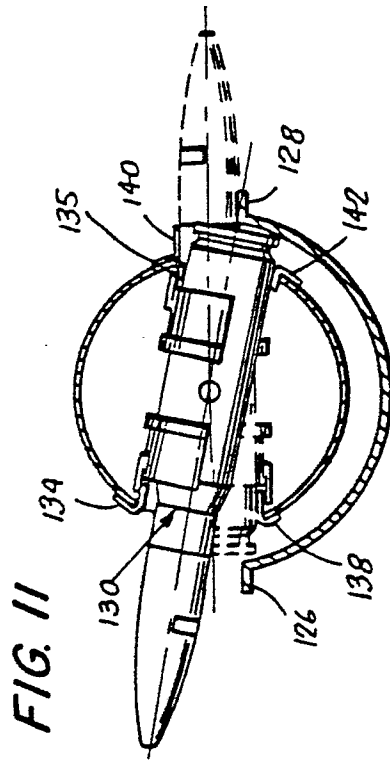


FIG. 15

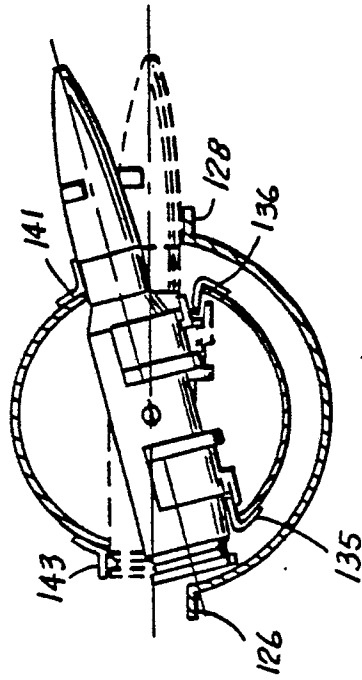


FIG. 17

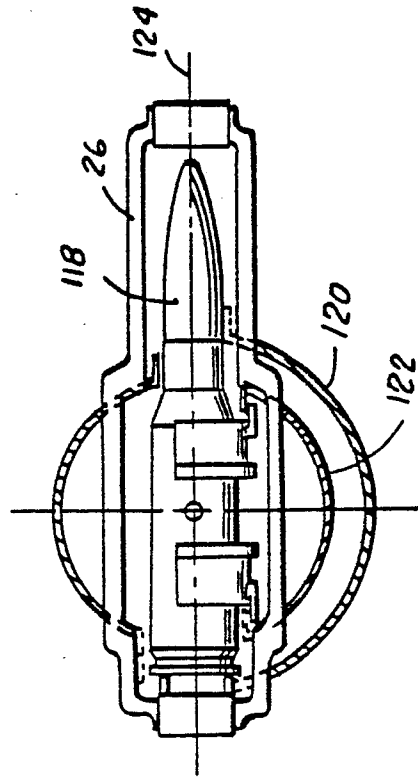


FIG. 14

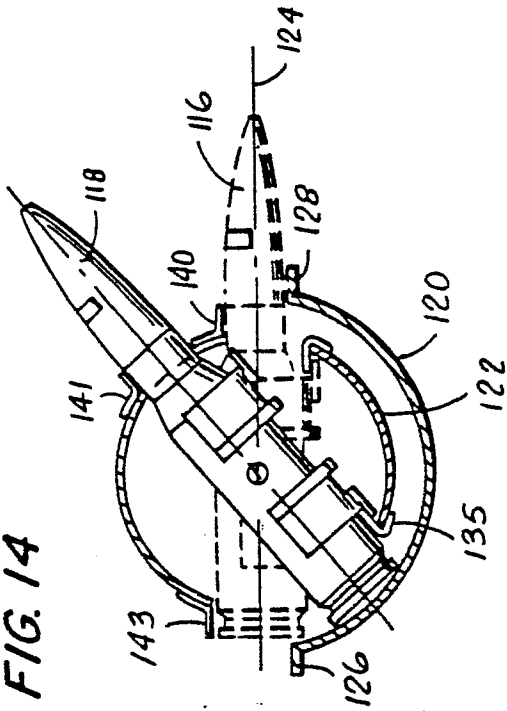


FIG. 16

