

Feb. 8, 1949.

H. J. GRAMPP

2,461,209

WATERPROOF SHIPPING CONTAINER

Filed Dec. 10, 1946

2 Sheets-Sheet 1

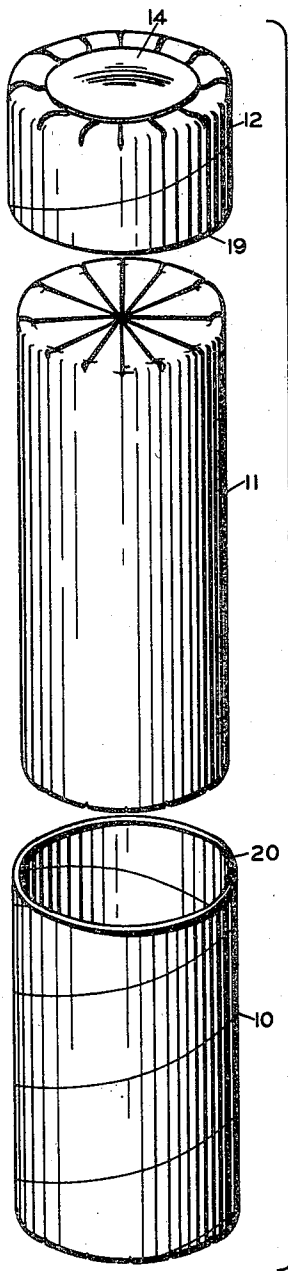


FIG. 1

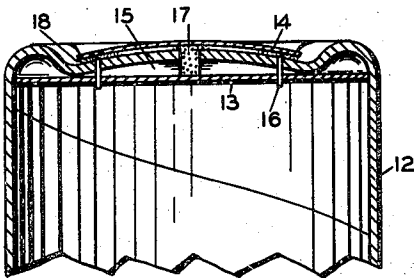


FIG. 3

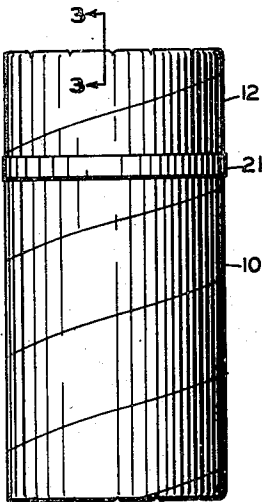


FIG. 2

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2 Sheets-Sheet 2

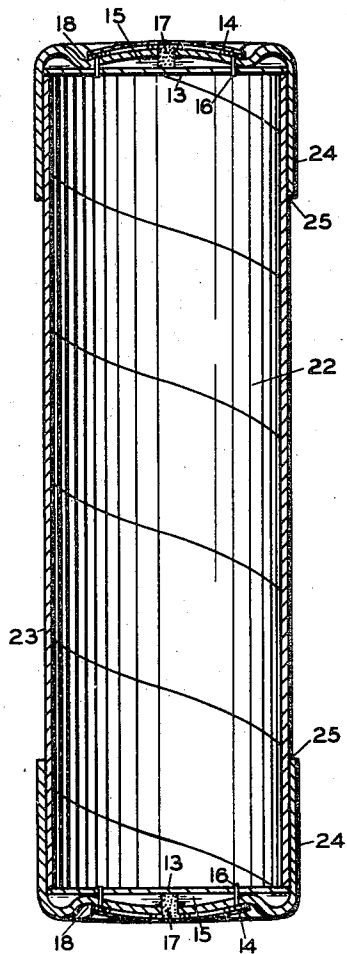


FIG. 4

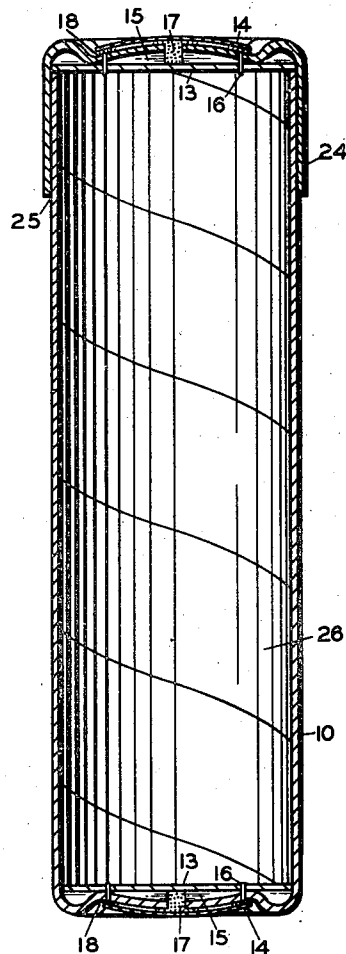


FIG. 5

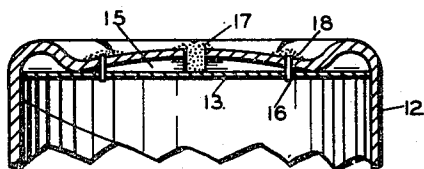


FIG. 6

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WATERPROOF SHIPPING CONTAINER

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18 Claims. (Cl. 229—5.5)

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This invention relates to a container and, more particularly, to a waterproof shipping container for explosive cartridges.

Large size explosive cartridges, of dimensional magnitude of 5 to 9 inches in diameter and 16 to 30 inches in length or more, have heretofore been shipped to their destination in rigidly constructed boxes of fiberboard or wood. A plurality of cartridges is usually packed in a rectangular box and the entire package made to conform with strict I. C. C. shipping regulations. The use of these rectangular boxes seriously increases the weight and volume occupied by a shipment of a given number of cartridges. When a shipment of explosive cartridges arrives at its destination, the cartridges must be removed from the box, which now no longer has utility, before being used for such purposes as rock quarrying, seismicographic work, and deep or oil well blasting. The disposal of the box becomes a sizable problem to a large consumer of explosives of this type.

It is an object of this invention to provide a shipping container for dynamite which will occupy the minimum amount of shipping space.

It is a further object of this invention to provide an integral shipping container which can be used in the shipment of dynamite.

It is a further object of this invention to provide a shipping container whose weight for a given volume of explosives may be kept extremely low.

It is a further object of this invention to provide a shipping container for explosives in which the container and the explosive may be lowered directly into a borehole without the necessity of removal of the explosive from the container.

It is a further object of this invention to provide a waterproof shipping container for explosives in which wicking of water through the side-walls is eliminated.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

Generally described, the present invention comprises a waterproof tubular receptacle adapted to receive an explosive cartridge, said receptacle having one end portion open and the other end portion closed by an inwardly crimped fluted end wall, an interior disc stapled to the fluted end wall, a waterproofing compound sealing said closed end portion, and a cover of like structure as the receptacle. An important feature of the invention resides in the end structure of the receptacle.

A preferred embodiment of this invention has

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been chosen for purposes of illustration and description and is shown in the accompanying drawing forming a part of the specification wherein like numbers refer to like parts wherever they occur.

Fig. 1 is a perspective view of the component parts of the invention before assembly with an explosive cartridge.

Fig. 2 is an elevational view of the assembled container.

Fig. 3 is an enlarged cross-sectional view of an end portion of the invention taken along line 3—3 of Fig. 2 with the cartridge removed.

Fig. 4 is a cross-sectional view of an alternative embodiment employing a cylinder with caps made in accordance with the invention.

Fig. 5 is a cross-sectional view of an alternative embodiment employing a cylinder having one end portion and cap for the open end thereof made in accordance with the invention.

Fig. 6 is an enlarged cross-sectional view of an alternative embodiment of an end portion of the invention illustrated by Fig. 3.

As shown in Fig. 1, the tubular receptacle 10, made of a laminated paper, fiber or like material, is adapted to receive an explosive cartridge 11. The cartridge 11 may be of the conventional convolutely or spirally wound type with a suitable end closure. The receptacle 10 is adapted to receive at least one-half of the total length of the explosive cartridge 11. A cover 12 is adapted to enclose the portion of the explosive cartridge which remains exposed after insertion of said cartridge into the receptacle 10. The length of the interior of the receptacle and its cover should preferably be equal to the total length of the explosive cartridge 11, so that said cartridge will be in abutment with the interior discs 13 of the cover and receptacle when assembled as shown in Fig. 2.

As shown in cross section in Fig. 3, the end structure or closure of the container and cover consists of an interior disc 13 and an exterior disc 14 made of laminated paper, heavy cardboard, fiber, or the like, with a fluted end wall 15 therebetween. The fluted end wall 15 is formed by crimping the tubular body portion of the receptacle 10 or the cover 12 inwardly to form the symmetrically fluted end wall 15, preferably having at least 8 flutes. Each flute produces a crease or fold which is substantially a chord to the periphery of the tubular body portion of the receptacle and consequently the number of flutes used without undue distortion of the periphery of the receptacle is commensurate with the diam-

eter of the receptacle. Securing the interior disc and the fluted end wall together with a plurality of stitching staples 16 arranged in a circle near the periphery of the interior disc compresses the flutes immediately surrounding the staples to give the exterior end portion an indented contour which aids materially in the cushioning effect afforded to the contents of the fluted container.

The central cavity formed by the ends of the flutes of the end wall 15 is filled with a waterproof, adhesive, and thermoplastic material 17 which effectively seals the ends of the flutes and thus prevents wicking of moisture through the side walls of the container. A sealing ring 18 of a waterproof adhesive material is placed over the circle of staples. The exterior disc 14 is applied to the end wall 15 and is held in place by the adhesive thermoplastic material 17 and the sealing ring 18.

After the explosive cartridge 11 is inserted in the receptacle 10 and the lower end surface 19 of the cover 12 is brought into abutment with the upper end surface 20 of the receptacle 10, a waterproof adhesive-coated tape 21 is applied to the joint thus formed.

The alternative embodiment shown in Fig. 4 illustrates a container 22 consisting of a tube 23 of laminated paper, fiber, or like material, each end of said tube being adapted to being closed by an end covering element or a cap 24. The cap 24 is in close fitting relationship to the exterior of the tube and rigidly attached thereto by a layer of waterproof glue 25 between the cap and tube. The cap is constructed in accordance with the end structure of the invention described with reference to Fig. 3.

In practice, one exterior end portion of the tube 23 may be coated with a suitable waterproof glue and covered by cap 24 retained in place by said glue and with the end of the tube in firm abutment with the interior disc 13. After being filled through the open end with the material to be contained therein, the tube is similarly closed at said open end by a cap constructed in accordance with the invention. The resultant container unit with its shock absorbing caps affords excellent protection to the contents from the destructive forces encountered in handling relatively heavy materials and in addition protects the contents from moisture.

The alternative embodiment shown in Fig. 5 illustrates a container 26 consisting of a receptacle 10 such as described with reference to Figs. 1 and 2, whose open end is closed by means of a cap 24 constructed and glued in place as described hereinabove after insertion of the contents either in bulk or package form.

The alternative embodiment of an end structure shown in Fig. 6 illustrates an alternative end structure or closure for a container and cover wherein the exterior disc 14 of the preferred embodiment is omitted although the other structural details are similar to and described hereinabove with reference to Fig. 3.

Containers for shipping cartridges approximately $7\frac{3}{4}$ inches in diameter by 24 inches long were constructed in accordance with the preferred embodiment of the invention and subjected to exhaustive tests to determine the ability of the containers to meet the requirements of the Interstate Commerce Commission. More specifically, these tests were conducted in accordance with specification 23G of the Interstate Commerce Commission as prescribed in its publication known as Title 49—Transportation

and Railroads, chapter I—Interstate Commerce Commission, parts 71–85, Transportation of Explosives.

The manufacture of the tubes for the body portion of the receptacles and covers was performed on a spiral-tube wrapping machine. The various plies were glued together with glue applied to the paper before wrapping. The completed tubes in suitable lengths for the receptacles and covers were then closed at one end with fluted crimps formed by a mechanical crimper. When the glue dried a snug fitting cardboard interior disc approximately 7.90 inches in diameter and 0.080 inch thick was inserted through the open end of the tube, placed in juxtaposition to the flutes, and both the disc and end wall were stapled together through the fluted crimp using a minimum of 8 staples.

The central space formed by the ends of the flutes was filled with a waterproof adhesive compound known as SHV 8 manufactured by the Kendall Refining Company. A sealing ring of this compound was also placed over the staples before application of an exterior disc approximately 4.90 inches outside diameter and 0.04 inch thick placed on the outside across the fluted end wall in juxtaposition to the flutes.

The above-mentioned tests indicated conclusively that the containers made in accordance with the preferred embodiment of this invention fully meet the I. C. C. requirements for containers used in the shipment of explosive materials. Similar tests were conducted using containers having end structures in accordance with the alternative embodiment illustrated in and described with reference to Fig. 6. This construction likewise fully met the I. C. C. requirements.

Numerous combinations of plies of chipboard, manila paper, kraft paper, and waterproof laminated stock, are possible in the construction of the tubular container or cap in accordance with this invention but the preferable structure is formed of 4 to 8 plies. Of these plies, the outer plies are preferably of a waterproof laminated paper over one or more plies of chipboard with the laminant being a waterproof adhesive binder such as asphalt, a resin, or a microcrystalline wax. The lining of the container or interior ply is preferably of kraft or manila paper. Suitable materials for the discs, such as fiberboard, cardboard, chipboard, etc., are numerous but cardboard approximately 0.04 to 0.080 inch thick has been found preferable.

The tape used to seal the abutting joint of the container and its cover preferably is a waterproofed cloth or paper tape coated with a waterproof pressure-sensitive adhesive.

The stitching staples are preferably of steel rendered nonsparking by copper coating, approximately $\frac{1}{8}$ inch wide and having a cross-sectional area of at least 0.0017 square inch.

The fluted end wall of this invention is of particular importance in obtaining a structure having a high impact strength and a cushioning effect on the contents of the container. It is preferable to use at least 8 flutes in the end wall to prevent undue distortion of the periphery of the receptacle, the number of flutes used being commensurate with the diameter of the container.

The compound used for filling the central cavity in the end wall and for the sealing ring may be any material which will be adhesive, tough, and hard at ordinary atmospheric temperatures and water-impervious. A suitable sealing compound

may be found in a number of commercially available resinous or wax-like products.

A waterproof shipping container as disclosed herein has been found to be exceedingly strong and to comply with the I. C. C. shipping regulations for containers used in the transport of explosive materials. When received by the consumer of such materials, the container may be left on the explosive cartridge, thereby forming an integral, unitary explosive device for use in blasting operations without detrimental effect upon the efficiency of the explosive. This invention eliminates the necessity of providing a waterproof interior container for the dynamite or using explosive materials relatively unaffected by the presence of moisture. If desired, the explosive cartridge may be readily removed by merely destroying the adhesive-coated tape and reversal of the assembly procedure.

What I claim and desire to protect by Letters Patent is:

1. A waterproof shipping container comprising in combination a waterproof tubular receptacle having one end portion open and the other end portion inwardly crimped to form a fluted end wall; an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; securing means to secure said interior element to said fluted end wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior element of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

2. A waterproof shipping container comprising in combination a waterproof tubular receptacle having one end portion open and the other end portion inwardly crimped to form at least an 8-fluted end wall; an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior element to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall and over said staples; an exterior element of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

3. A waterproof shipping container comprising

in combination a tubular receptacle of laminated paper, fiber, or like material having one end portion open and the other end portion inwardly crimped to form at least an 8-fluted end wall; an interior disc of heavy paper or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

4. A waterproof shipping container comprising in combination a tubular waterproof receptacle of laminated paper, fiber, or the like having one end portion open and the other end portion inwardly crimped to form at least an 8-fluted end wall; an interior disc of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples approximately $\frac{1}{16}$ inch wide and having a cross-sectional area of at least 0.0017 square inch to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment; and a waterproof, adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

5. A waterproof end structure for a tubular waterproof receptacle including an end portion of said tubular waterproof receptacle inwardly crimped to form a fluted end wall; an interior disc of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall and having approximately the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed im-

mediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall and over said staples; and an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material.

6. A waterproof end structure for a tubular waterproof receptacle including an end portion of said tubular receptacle inwardly crimped to form at least an 8-fluted end wall; an interior disc of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall and over said staples; and an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material.

7. A waterproof end structure for a tubular waterproof receptacle including an end portion of said tubular receptacle inwardly crimped to form at least an 8-fluted end wall; a interior disc of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples approximately $\frac{1}{8}$ inch wide and having a cross-sectional area of at least 0.0017 square inch to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall and over said staples; and an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material.

8. A waterproof shipping container comprising in combination a tubular waterproof receptacle including a spirally-wrapped paper tube of at least one interior ply of manila paper, at least one ply of chipboard superimposed on said interior ply, and at least one ply of asphaltic laminated kraft paper superimposed on said chipboard and having one end portion open and the other end portion inwardly crimped to form a fluted end wall; an interior disc of heavy paper or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an ad-

hesive sealing ring placed exteriorly to said fluted end wall; an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

9. A waterproof explosive device comprising in combination a cylindrical cartridge of heavy paper or the like containing an explosive material; a waterproof tubular receptacle having one end portion open and adapted to receive said cartridge and the other end portion inwardly crimped to form a fluted end wall; an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; securing means to secure said interior element to said fluted end wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior element of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment about said cartridge; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

10. A waterproof explosive device comprising in combination a cylindrical cartridge of heavy paper or the like containing an explosive material; a waterproof tubular receptacle having one end portion open and adapted to receive said cartridge and the other end portion inwardly crimped to form at least an 8-fluted end wall; an interior disc of heavy paper or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment about said cartridge; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

11. A waterproof explosive device comprising in combination a cylindrical cartridge of heavy paper or the like containing an explosive material; a waterproof tubular receptacle of laminated

paper, fiber, or the like having one end portion open and adapted to receive said cartridge and the other end portion inwardly crimped to form at least an 8-fluted end wall; an interior disc of heavy paper or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment about said cartridge; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

12. A waterproof explosive device comprising in combination a cylindrical cartridge of heavy paper or the like containing an explosive material; a waterproof tubular receptacle of laminated paper, fiber, or the like having one end portion open and adapted to receive said cartridge and the other end portion inwardly crimped to form at least an 8-fluted end wall; an interior disc of heavy paper or the like in juxtaposition to the interior surface of said fluted end wall and having substantially the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples approximately $\frac{1}{8}$ inch wide and having a cross-sectional area of at least 0.0017 square inch to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior disc of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; an end cover of like structure as the waterproof tubular receptacle and the open end portions of the receptacle and cover being adapted to being brought into abutment about said cartridge; and a waterproof adhesive-coated tape adapted to seal the joint formed by the abutment of said receptacle and cover and said tape adapted to be removed to permit disassembly of the container.

13. A waterproof shipping container comprising in combination a tubular waterproof receptacle having one end portion open and the other end portion inwardly crimped to form a fluted end wall; an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior element to said fluted end wall, said staples

being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior element of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; and a cap of like structure as said tubular receptacle adapted to be brought into close-fitting telescopic engagement with and glued to the said open end of said receptacle.

14. A waterproof explosive device comprising in combination a tubular waterproof receptacle containing an explosive material and having one end portion open and adapted to receive said material and the other end portion inwardly crimped to form a fluted end wall; an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior element to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall; an exterior element of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; and a cap of like structure as said tubular receptacle adapted to be brought into close-fitting telescopic engagement with and glued to the said open end of said receptacle.

15. A waterproof shipping container comprising in combination a waterproof tube having both ends open; a waterproof cap for each end of said tube and each of said caps having a waterproof tubular wall with one end portion open and adapted to telescopically engage an exterior end portion of said tube and the other end portion inwardly crimped to form a fluted end wall; an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior element to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall and over said staples; an exterior element of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; and telescopic engagement of a cap with each end of said tube, said engagement being sealed with a waterproof, adhesive material.

16. A waterproof shipping container comprising in combination a waterproof tubular body portion having one end portion open and the other end portion closed by a waterproof enclosure element including a fluted end wall, an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined

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by the fluted end wall; a plurality of stitching staples to secure said interior element to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; an adhesive sealing ring placed exteriorly to said fluted end wall and over said staples; an exterior element of heavy cardboard or the like in juxtaposition to the exterior surface of said fluted end wall and retained in place by said sealing ring and said thermoplastic material; and an end covering element having a like enclosure element as said body portion adapted to be brought into close-fitting engagement with and rigidly attached to an open end portion of said tubular body portion.

17. A waterproof end structure for a tubular waterproof receptacle having an end portion of said tubular waterproof receptacle inwardly crimped to form a fluted end wall; an interior disc of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall and having approximately the inside diameter of said receptacle; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior disc to said fluted end wall, said staples being arranged near the periphery of the interior disc whereby said fluted end wall is compressed immediately surrounding the staples to effect an indented contour to said wall; and an adhesive sealing ring

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placed exteriorly to said fluted end wall and over said staples.

18. A waterproof shipping container having in combination a waterproof tubular body portion having one end portion open and the other end portion closed by a waterproof closure element including a fluted end wall, an interior element of heavy cardboard or the like in juxtaposition to the interior surface of said fluted end wall; a waterproof, adhesive, and thermoplastic material substantially filling a central cavity defined by the fluted end wall; a plurality of stitching staples to secure said interior element to said fluted end wall; an adhesive sealing ring placed exteriorly to said fluted end wall and over said staples; and an end covering element having a like enclosure element as said body portion adapted to be brought into close fitting engagement with and rigidly attached to an open end portion of said tubular body portion.

HAROLD J. GRAMPP.

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