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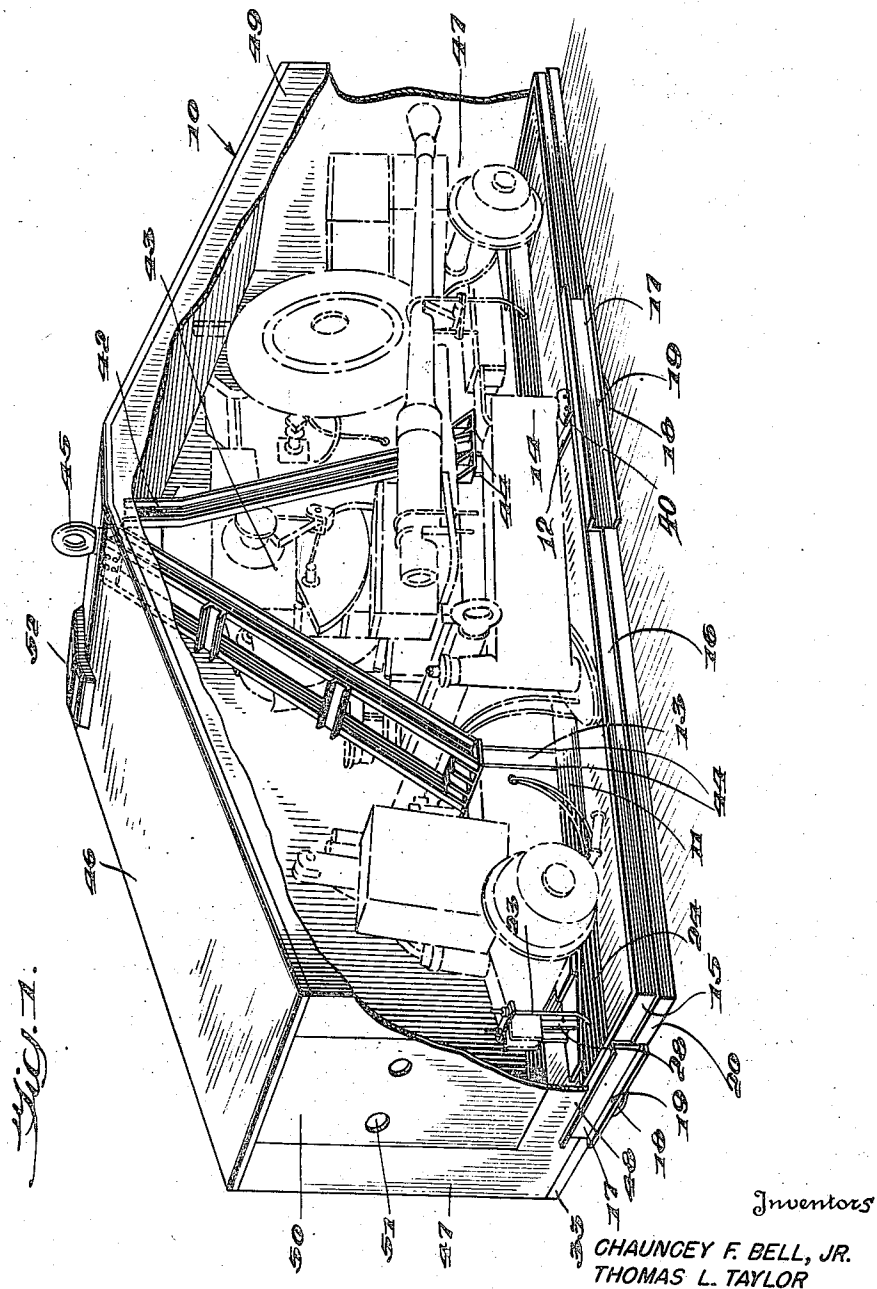
C. F. BELL, JR., ET AL

2,463,674

ORDNANCE BARRIER

Filed May 29, 1946

3 Sheets-Sheet 1



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Fig. 2.

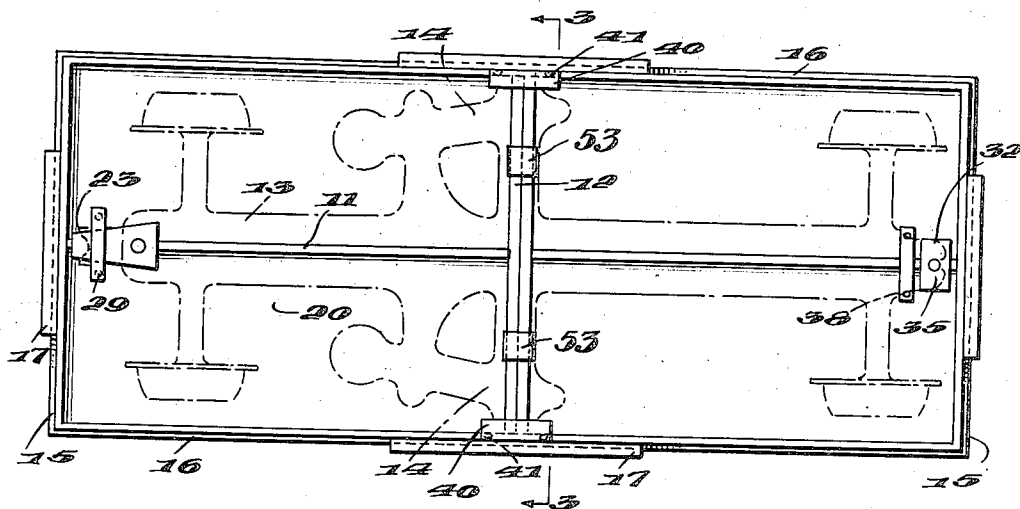
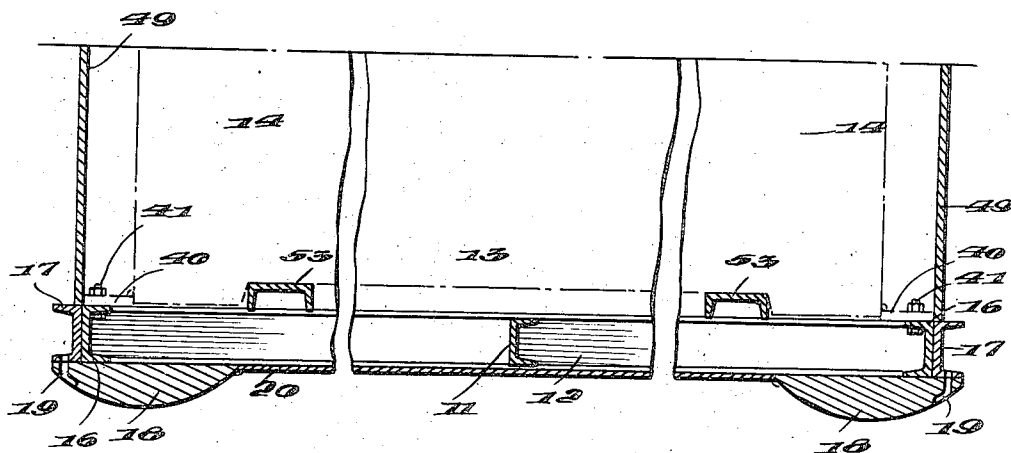


Fig. 3.



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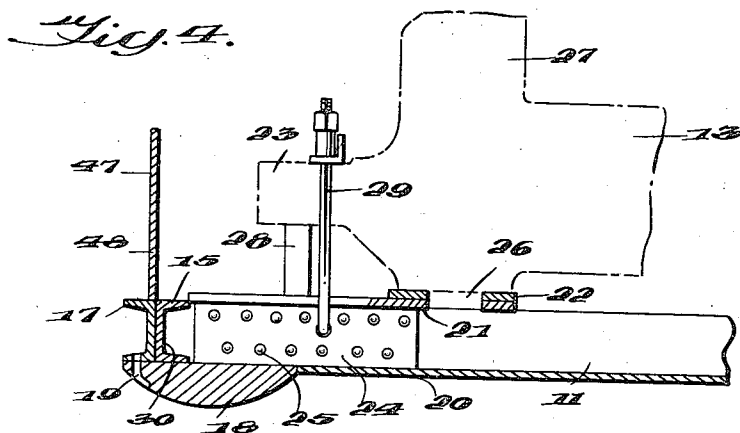
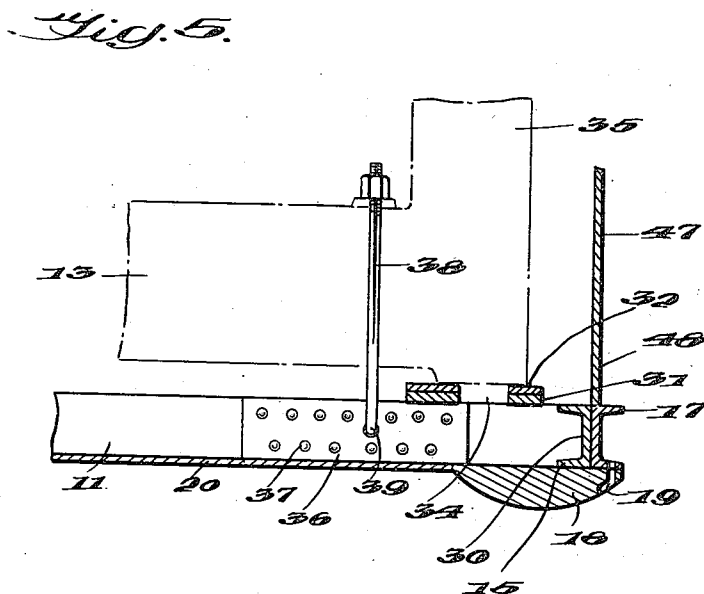
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ORDNANCE BARRIER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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ORDNANCE BARRIER

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6 Claims. (Cl. 294—67)

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Our invention relates to a balanced pressure gun barrier and more particularly to a light metal sealed container for the storage and preservation of ordnance wherein handling aids are formed as integral parts of the container through which external forces may be transmitted to the rigid base of an enclosed gun.

In the storage and preservation of ordnance it is highly desirable that the container not only provide protection against corrosion over indefinite periods of time but be capable of ready handling. The problem of handling heavy ordnance such as anti-aircraft guns is a serious one due to the fact that the container must be of sufficient strength to withstand great lifting and pushing forces without affecting its sealed-in qualities and yet be sufficiently light in weight to be practicable. The strategic value of such equipment depends greatly on its ability to be made available for immediate use when and where needed. Prior to this time, one of the recognized methods of storing such items was to disassemble the unit, coat the metallic parts with a heavy protecting grease and box as many of the parts as possible in wooden boxes leaving the larger units, such as the gun barrel, to be wrapped with water-proof fabric material, all of which involved laborious, time consuming processing when it was desired to reassemble the parts for use. None of the aforementioned coverings provided lasting protection against damage caused by handling or corrosion. Further, the susceptibility of the wood to decay when subjected to ordinary climatic conditions makes it necessary for the boxing to be replaced after a comparatively short time if storage is to be continued. Boxing of the entire unit has also proved impractical due to the tendency of the unit to shift and break out of the box, which made transportation over long distances, particularly under tropical weather conditions, a difficult undertaking. Furthermore, a container of the conventional form provides no protection against the admission of fungus growths which are extremely hard to control and do great damage to mechanisms of this type.

Our invention provides a novel container and method for protecting heavy ordnance articles such as an anti-aircraft gun equipped with support pads during transportation and storage wherein a moisture-proof barrier of corrosion resistant sheet metal is formed around a heavy ordnance gun centered relative to an A structure and stringers extended outwardly from the load enclosed to provide support for an externally mounted hoist-eye, bumpers and skids posi-

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tioned outside of the enclosure so as to convey lifting and pushing loads exerted thereon to the gun frame. When installed around a relatively large mobile gun, such as a 40 millimeter cannon which weighs approximately 5500 pounds, such a barrier adds comparatively little weight to the unit due to the fact that the rigidity of the gun structure is utilized to support the barrier as a free riding canopy. Very little disassembly is required when storing a gun, other than the dismounting of the wheels and gun barrel, these items being very readily affixed to the gun carriage. The enveloping covering is of the same alloy metal as the stringers and frame members which allows for welding at all of the lap joints established between the sheets fitted adjacent the side frame members so as to effect an outside seal at the time of assemblage. The jacket is provided with a conventional type of breathing unit such as a solar radiation breather provided with a desiccant material such as silica gel through which air may pass in either direction. This allows for maintenance of balanced atmospheric pressures between the inside and outside of the container as the air expands and contracts due to changes in temperature or barometric conditions. A breather of this type provides for control of the humidity inside of the barrier of less than 30%, thus preventing rust and corrosion of the metallic parts of the gun parts and accompanying equipment.

It is among the objects of our invention to provide a light weight metallic container in which to preserve and protect ordnance equipment, such as a mobile gun unit, wherein the structural strength of the unit is utilized to provide rigidity to a frame structure through which lifting, pulling, and pushing forces may be transmitted to the gun frame without affecting the preservative qualities of the container.

Another object is to provide a barrier to protect an anti-aircraft gun, or like equipment, against deterioration due to corrosion or the admission of fungi, or other foreign matter, during shipment and/or storage.

A further object is to provide a metal container for preservation for anti-aircraft guns, or like equipment, in such condition as to be ready for instantaneous assembly and use upon removal therefrom and wherein the container construction facilitates removal of the gun without damage to the gun parts.

A still further object is to provide an inexpensive light weight metal container that facilitates the handling of ordnance equipment and con-

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serves the space required for the storing of such equipment.

Other objects of our invention will become apparent from the following description when considered in conjunction with the accompanying drawings in which like numerals refer to like parts in different views.

In the drawings:

Figure 1 is a perspective view of the article of our invention with the side walls cut away to show an anti-aircraft gun arranged and mounted for storage.

Figure 2 is a plan view of the base of the article showing the positioning of the anti-aircraft gun stored therein relative to the stringers and side members.

Figure 3 is a sectional view on the line 3—3 of Figure 2.

Figure 4 is an enlarged sectional view of the front end assembly adapted to secure the front of the anti-aircraft gun frame with the jack pad plunger slightly extended.

Figure 5 is a detailed sectional view of the rear assembly adapted to secure the rear of the anti-aircraft gun frame with the jack pad plunger slightly extended.

Referring more particularly to the drawings, Figure 1 illustrates our invention in its preferred form as a barrier 10 enclosing an anti-aircraft gun placed therein in a semi-dismantled condition for storage. The barrier 10 consists of a closed metallic container constructed almost entirely of aluminum alloy, or a like corrosion-resistant material, with covering sheets supported by a base composed of stringers and side members of sufficient length and width to completely encircle the ordnance piece to be stored therein with sufficient surrounding space allowed so that the ordnance piece may be placed within the container entirely free from direct contact with the aluminum sheet covering. The supporting base of the barrier 10 is provided with a centered stringer 11 and a transverse stringer 12 adapted and positioned to act as an outrigger member relative to the center of the gun base 13. This novel arrangement of the stringers not only provides a strong load supporting structure but positions the members for use as connecting bars capable of transmitting pushing and pulling forces exerted at points outside of the enclosure to the gun frame. In this manner the ability of the gun structure to bear these loads is fully utilized.

The transverse stringer 12 is formed of two channelled members placed back to back. This structural arrangement allows for ready weld attachment of the two sections of the center stringer 11 abutted into said channels of stringer 12 as shown in Figures 2 and 3.

End members 15 and side members 16 are positioned at the ends of the center stringer 11 and transverse stringer 12 to form a rectangular frame welded at the four corners to encompass the gun assembly. Channelled members of aluminum alloy are placed and affixed laterally to each end member 15 and side member 16 to form bumpers 17 positioned to form protecting areas extending outwardly and to each side of the ends of center stringer 11 and transverse stringer 12. These bumpers are securely attached to the end 15 and side 16 members by welding or similar method so as to establish a suitable means of conveying lifting and pushing forces to the gun frame. The frame formed by the end 15 and side 16 members is raised above a plane common to their under surfaces by skids 18 formed of alumi-

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num alloy, or like non-corrosive material, as inverted domes to present a rounded surface capable of being skidded over a concrete or wood floor surface. These skids 18 are positioned under the ends of center stringer 11 and transverse stringer 12 so as to extend to the outer edge of bumpers 17 as shown in Figures 3, 4 and 5. Attachment of skids 18 is made to the stringer and frame members and bumpers 17 by welding, which prevents any corrosive action that might otherwise develop between these members. An aperture 19 is formed through the bumper 17 channel and the skid 18 as a suitable means of attaching a lifting or pulling cable thereto. A rectangular sheet of aluminum alloy material is formed as an under sealing sheet 20 and fitted to the under surfaces of the frame members and around the skids 18 with edges cut out around the bumpers 17 and overlapping approximately half way up over the exposed sides of the ends 15 and the sides 16 (Fig. 1).

An apertured top plate 21 with an apertured elevation plate 22 is positioned at the front end of center stringer 11 to receive the front end 23 of the gun base 13 (Fig. 4). Top plate 21 is held in place on the center stringer 11 by a side plate 24 welded to the top plate 21 to form a depending plate adjacent to and adapted for securing to the side of the center stringer 11 by bolts 25. The side plate 24 also serves as a reinforcing member acting in conjunction with the center stringer 11 to convey the gun load to the skid 18. This arrangement of the apertured plates 21 and 22 on top of the center stringer 11 is designed to prevent side movement of the gun assembly placed thereon for storage with the extendable plunger 26 of the gun jack pad operating mechanism 27 inserted through aligned apertures in plates 21 and 22 with the weight of the gun end resting on the plates around the periphery of said apertures. An additional support 28 of sufficient length to fill the gap between plate 21 and end 23 of the gun base 13 is provided as an additional support block for the gun end. When in position for storage, the end 23 of the gun base 13 is tied down by a U-bolt 29 inserted through the end of center stringer 11 and reinforcing side plate 24. The ends of the center stringer 11 are weld-secured in the channels of the end members 15 to form joints 30 under which the skids are positioned to receive the load of the gun mechanism. The arrangement of the tow line aperture 19 is such that forces applied thereto are transmitted to both the frame and skid simultaneously, greatly facilitating handling without danger of breaking the sealed position of the surrounding barrier assembly. The form of anchorage arrangement provided for the rear end of the gun is of a similar character as for the front end and is shown in detail in Figure 5. Support plate 31 and clearance plate 32 are formed with aligned apertures to receive plunger 34 of the rear jack pad mechanism 35 with the gun base 13 aligned on center stringer 11. Support plate 31 and clearance plate 32 are of sufficient width to provide a substantial mooring platform for the rear end of the gun base formed by the jack pad mechanism 35 substantially centered over the skid 18. The plates 31 and 32 are welded to the center stringer which is reinforced at this point by a reinforcing plate 36 secured in place by bolts 37. The gun base 13 is tied down and secured against upward movement by a U-bolt 38 inserted through an aperture 39 extending through plate 36 and stringer 11.

Rigidity of the transverse stringer 12, as well as even distribution of lifting forces, is assured by the novel arrangement of the anchorage of the side extensions 14 of the gun to the side members 16 as shown in Figures 2 and 3. Side plates 40 are formed of sufficient width to be bolted to side members 16 with bolts 41 and welded to the side extensions 14 of the gun base 13. These side extensions are common to all guns of this type, their function being to provide extended moorings for the side jack pad extensions so as to increase the stability of the gun when in firing position. Any tendency of the gun to tip sideways is overcome by the provision of base blocks 53 consisting of short sections of channelled stock positioned on and welded to the transverse stringer 12 to receive the gun base adjacent the side extensions 14.

Provision is made for overhead hoisting of the assemblage by the arrangement of an A-frame 42 (Fig. 1) comprised of channelled members formed to straddle the firing mechanism 43 of the gun and be affixed to the gun base 13 by a plurality of U-bolts 44 of sufficient length to extend under the gun base. The A-frame 42 is centered relative to the entire load to be lifted and topped with a hoist eye 45 made readily accessible outside of the barrier for the insertion of a hoist cable, not shown.

It is customary practice in the handling and storage of ordnance of this type to disassemble the tires, gun barrel, etc., and attach these parts to the gun base as shown in Figure 1, however, it is not intended that such an arrangement of the gun parts constitutes any part of this invention.

The end, side walls, and top of the barrier 10 are formed of aluminum alloy sheet stock joined together to form a canopy-like structure capable of being lowered over the assemblage with the hoist eye 45 protruding therefrom as shown in Figure 1. This type of construction allows for the top sheet 46 to be welded to the base of the hoist eye 45 to form a sealed fit therewith. The bottom of the end walls of the barrier 10 are formed to fit around the longitudinal form of the bumpers 17 so that the bottom edges 48 of the end walls 47 are brought to bear upon the top of the end bumpers 17 approximately on a line common to this member and end member 15 where they are welded in position to form a sealed joint with end members 15 as best illustrated in Figures 4 and 5. The balance of the edges 48 are extended downwardly to form a lap joint 33 with the under sheet 20 as shown in Figure 1. This type of construction is common to both end and sides of the barrier where the walls of the container would otherwise overlap the bumper members formed at each end and each side of the barrier. The under sheet 20 is positioned under the base stringers with cut-outs positioned to surround the dome skids 18 to provide a sealed joint therewith as shown in Figures 3, 4 and 5. The adjacent portions of under sheet 20 are extended upwardly over the edge of the end members 15 and side members 16 to join with the end walls 47 and side walls 49 of the container to provide a hermetically sealed joint along the base of the container. Similar joints are provided at the top of the container where the same end walls and side walls are joined with the sheets of the top sheet 46. A means of entry into the barrier for purposes of inspection and tests is provided by a sealable door 50 provided with peep holes 51 (Fig. 1). This provision for inspection and access is

utilized to check the moisture content of the air inside of the barrier from time to time to determine that the contents of the barrier are assured against corrosion. In order to provide for "breathing" of air out of and into the barrier during changing climatic conditions as well as the removal of excess moisture existing in the air surrounding the mechanism at the time of original enclosure, a solar radiation breather 52 is provided in the top of the barrier 10. The function of this breather is to balance the pressure in the barrier and dry the air to the desired relative humidity. The air inside of the container is readily influenced by changes in temperature barometric pressure and the breather is designed to permit passage of the air to and from the container as affected by changes of temperature or barometric pressures which enables the barrier to properly function over indefinite periods of time and while subjected to a wide range of climatic conditions. The breather contains a desiccant material (not shown) such as silica gel which is capable of removing the excess moisture in the atmosphere admitted to the barrier so that a relative humidity below 30% is maintained inside the barrier 10 and thereby stops any tendency of the mechanical parts of the mechanism to rust or corrode. The breather 52 is the customary type of solar radiation breather well-known in the art and it is not intended that it form a part of this invention.

It will be obvious that when enclosed in the barrier of our invention, the gun assembly is spaced free from the walls and rests on the base of the container supported above a given plane by four skid points spaced inwardly from the ends and sides with force conveying members extending to the exterior free of the enclosing walls. These force conveying members are positioned to provide a ready means of towing, hoisting, or tying down of the gun mechanism without placing undue strain on the light weight sealed enclosure and thereby eliminate the possibility of rupture of said seal which would destroy the barrier's capacity to preserve ordnance material in corrosion-free condition over a long protracted period of time. Removal of the gun assembly from the barrier may be readily accomplished by cutting the light weight wall sheets away from the base with an axe or similar cutting instrument, after which the gun assembly can be readily released and assembled for immediate use.

Although our invention has been shown and described in considerable detail, it will be appreciated that certain changes, alterations, modifications and substitutions may be made without departing from the spirit and scope of the appended claims.

We claim as our invention:

1. A gun barrier for a gun having jack pad support points comprising a metal base having stringers extending transversely of each other terminating at the sides thereof and covered with a metal sheet, a rounded skid secured to the underside of the ends of the stringers with a portion of the skid projecting beyond the base, a bumper bar secured to the projecting portion of the skid and the base, said stringers arranged with respect to each other and the gun jack pad support points so as to transmit the weight of the gun to the skids, an A-frame structure centered over and lift-connected to the gun so that lift forces applied to the A-frame are transmitted to the gun.
2. A gun barrier for a gun having jack pad sup-

port points comprising a rectangular sheet metal base having stringers extending transversely of each other terminating at the sides of the base, a metal bottom sheet placed under the base with edges extending upwardly of said sides, a rounded skid secured to the underside of the ends of the stringers with a portion of the skid projecting beyond the base, said stringers arranged with respect to each other and the gun jack pad support points so as to transmit the weight of the gun to the skids and to transmit the forces incident to horizontal barrier movement to the gun free of the metal bottom sheet covering the under surface of the base, an A-frame structure centered over and provided with lift-connecting means attached to the gun so that lift forces applied to the A-frame are transmitted to the gun, an enclosing canopy having side walls and a top formed of sheet metal as an integral unit with a surrounding base edge adapted for supported attachment to the sides of the base in sealable contact with the bottom sheet, the top of said canopy being provided with a sealable aperture, an A-frame structure having a top portion formed with a hoist eye and a bottom portion having extended feet adapted for connection to the gun, said hoist eye being arranged to protrude through the sealable aperture in said top sheet so as to provide a lift means by which lift forces applied to said hoist eye are transmitted to the gun free of the enclosing canopy.

3. A gun barrier for a gun having jack pad support points comprising a rectangular sheet metal base having stringers extending transversely of each other terminating at the sides of the base, a metal bottom sheet associated with the base with edges extending upwardly of the sides of said base, a rounded skid secured to the underside of the ends of stringers terminating midway of each side with a portion of the skid projecting beyond the base, a bumper bar positioned at each side of the base and secured to the projecting portion of the skid and the base, said stringers arranged with respect to each other and the gun jack pad support points so as to transmit the weight of the gun to the skids free of the metal bottom sheet, an enclosing canopy having side walls and a top formed of sheet metal as an integral unit with a surrounding base edge adapted for attachment to the sides of the base in sealable contact with the bottom sheet, said canopy being provided with pressure control means for equalizing the air pressure inside of the enclosure relative to the atmospheric pressure, the top of

said canopy being formed with a sealable aperture, an A-frame structure having a top portion formed with a hoist eye and a bottom portion having extended feet adapted for connection to the gun, the hoist eye being arranged to extend through the sealable aperture free of the enclosing canopy to provide for the transmission of lift forces to the gun.

4. A gun barrier for a gun having support points comprising a metal base having surrounding edges and a metal bottom sheet, a plurality of rounded skid points supporting the base and protruding beyond the edges of the base, reinforcing bumpers placed adjacent said edges and secured to the skids, said skids being positioned with respect to the gun support points so as to receive the weight of the gun, an upwardly extending structure surmounted by a hoist eye centered for lift connection to the gun, an enclosing canopy supported by the base free of the gun and apertured for protrusion of the hoist eye so that lift forces applied to the hoist eye are transmitted to the gun.

5. In a barrier of the kind described for enclosing a gun comprising a base attached to the gun, skids positioned under the base to support the gun, a lift structure centered over, attached to and extended upwardly from said gun, and an enclosing structure sealably associated with the base and lift structure so that lift forces incident to movement of the barrier are transmitted to the gun.

6. A barrier for enclosing a rigid object comprising a rectangular base adapted for attachment to the object, a plurality of inverted dome-like support points positioned to support the object above a given plane, a lift structure centered over and connected to the object, and an enclosure of sheet metal supported by the base and sealably arranged around the lift means and skids so that forces applied to the object through said lift means and skids are transmitted directly to the object.

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