

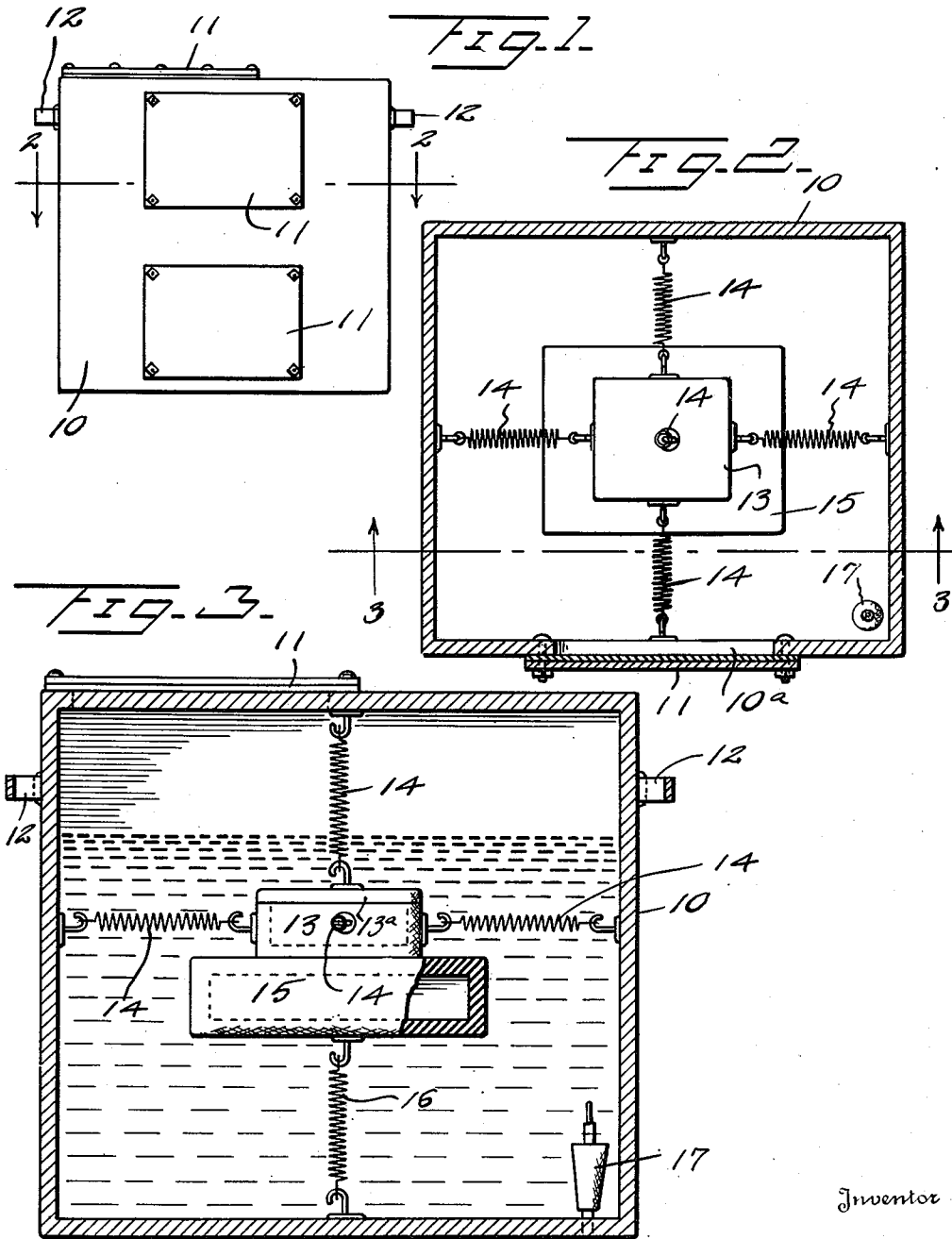
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SAFETY CARRIERS FOR NITRO-GLYCERINE OR OTHER EXPLOSIVES

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SAFETY CARRIER FOR NITROGLYCERIN
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5 Claims. (Cl. 102—7)

This invention relates to improvements in safety carriers for nitroglycerin or other explosives. In service, the carrier may be employed simply as a means for providing safe transportation of the explosive overland; it may form a portion of a depth-bomb assembly, or it may serve as a part of a mine assembly for land or sea military service, the invention herein being considered on the basis of the carrier per se, this forming the main essential of the various assemblages referred to.

Because of its extreme vulnerability to the effects of shocks and the like, the transportation or the storage of nitroglycerin in warfare assemblages such as indicated, becomes a matter of major concern, since potential danger of explosion at unexpected and undesired points, is always present; many of the other explosives have this same characteristic. Many efforts have been made to provide carriers offering reasonable safety characteristics, and accidental detonations have thereby been reduced to low percentages, due to extreme care in handling. But the potentialities are always present, and because of this, constant efforts are made to increase the safety factor and thus decrease the percentage of accidents. The present invention is designed to produce this result and to reduce accidents to a minimum.

The present invention relates to the type of such devices in which the explosive charge is supporting by a spring suspension, but differs in certain respects therefrom although retaining the spring suspension feature with certain modifications. As a result, the possibility of shock development has been largely reduced over the prior forms of such suspension, and, at the same time, the safety of the charge in other respects is increased.

To these and other ends, therefore, the nature of which will be more clearly indicated as the invention is hereinafter disclosed, said invention consists in the improved constructions and combinations of parts particularly disclosed in the following specification, illustrated in the accompanying drawing, and more particularly pointed out in the appended claims.

In the accompanying drawing, in which similar reference characters indicate similar parts in each of the views—

Figure 1 is a side elevation of a carrier of the present invention.

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1, and

Fig. 3 is a vertical section taken on line 3—3 of Fig. 2.

In the present invention, an underlying feature is the provision of a supporting buoyant element of greater area than the explosive container and on which the latter is seated, the element having a spring connection with the bottom of the casing, while the explosive container is spring supported from the top and the sides of the casing. The buoyant element is in the form of a hollow rubber bag or other form of container for air. Hence, the effects of jars upon the carrier are not only damped with rapidity, but contact of the explosive container with its supporting element is made under cushioning conditions, so that the jars are practically kept from application on the explosive container, regardless of the direction in which they are applied.

In the drawing, 10 indicates the casing, formed of metal and provided with openings 10a at suitable points on its top and on one of its sides, the openings being of sufficient dimensions to permit ready access to the interior. Suitable covers 11 are provided for these openings. The casing also carries a pair of gripping elements 12—one at each end—which permit the casing and its content to be carried about or be supported by a suitable carrying sling, not shown.

13 indicates the container for the explosive, such as nitroglycerin, for instance, this being formed preferable with walls of rubber, and having its upper wall removable to permit insertion of the explosive. The dimensions of the container are relatively small as compared with those of the casing, and is arranged to be supported by a plurality of springs 14, one extending from the top of the casing and a spring leading inward from each of the sides and ends of the casing, the casing and container carrying securing means 14a (which may be in the form of hooks) for mounting the ends of the springs. Since the cover 13a of the container is firmly secured to the container after the explosive has been inserted, it is apparent that the container has somewhat of a cradle-like mounting, with the container movable in different directions by always having the movement resisted yieldably by one or more of the springs 14, so far as the sides and ends are concerned.

15 indicates a buoyant element, formed of rubber and hollow, and the internal content of which is air. In dimension, the element is somewhat larger in area at its top than the area of the bottom of the container 13, and with the depth of the element sufficient to provide an air content sufficient to provide a positive buoyancy value to the element. A spring 16 connects the

element with the bottom of the casing. In service, the explosive container rests upon the buoyant element; in service, the casing is filled, to approximately the level shown in Fig. 3, with a fluid such as water, this level being some distance above the positioned container.

As is apparent, the tethered element 15, with its positive buoyancy value, will tend to rise within the fluid content, thus tending to place spring 16 under slight tension, the vertical movement of the element in the upward direction under buoyancy always causing it to follow the container in that direction whenever jar effects may tend to move the container upward. However, the element movements tend to be sluggish, due to the presence of spring 16 and the fact that the exposed surface of the top of the element must pass upwardly within the fluid content; the fact that the top surface of the container must move upward through the fluid tends to dampen the jar effect of a container movement in the upward direction—together with the fact that such movement will tend to increase the tension of the side and end springs. Hence, while the jar effect in this direction may tend to bodily shift the container and its content upwardly, these conditions tend to damp the movement and limit its extent, while the damping effect on element 15 will tend to make recontact with the container take place under conditions of gentle contact and with no material shock characteristic.

On jars tending to move the container downwardly, the movement is opposed by the top spring 14 and the increase in tension of the side and end springs; in addition, however, it is opposed by the need for moving element 15 bodily downward within the fluid—the buoyancy of the element is an effective agency in developing such resistance. Hence, the movement of the container in the downward direction—the direction most commonly encountered—is definitely damped by this combination of resistance factors, and therefore is more or less limited, even in presence of severe jars. In addition, the fact that the container wall is preferably of rubber, as is the walls of the element 15, and the position of the container on the element places it directly above the hollow portion of the element, ensures that the development of shock during the initial period of the jar will be practically prevented, since the sudden pressure application will be made applicable on a semi-yieldable wall of the element, and thus take place without shock.

On jars tending to shift the container in a lateral direction, the movement is damped through the resistance of at least some of the springs, as well as by the fact that both the container and element must be moved bodily through the fluid—the contact of container and element is not materially affected by such movements since the element has but the single connection with the casing, and its positive buoyancy causes it to maintain contact and to move with the container during the movement.

As a result the charge of explosive being carried is free to move in presence of jars applied to the casing, regardless of the direction of direct application, but in each direction of movement the movement is damped to an extent such as will prevent its reaching the walls of the casing. In addition, the charge is not only supported by the springs of its cradle, but additionally by the buoyant element 15, with the latter so formed that should there be a temporary loss of contact be-

tween them, the restoration of contact is without any jar effect. These, plus the fact that the area dimensions of the buoyant element are such as to increase materially the damping action of container movement downwardly—the direction of movement most likely during overland transportation, for instance—provides for added safety.

Where the carrier is being used as a part of a military offensive structure—such as a depth bomb or a mine—the casing will be additionally provided with a container 17 formed of rubber and which may carry, internally, any suitable timing mechanism, the container having a lead-coated wire leading from its upper end and carried to the content of container 13; the stiffness of the connecting coated wire will permit its being positioned within the casing in such manner as to not affect the movements of the container and element and to move with the container due to the ductile form of the connection. For instance, the content of the container 17 may include a circuit make and break device of an electric circuit connected up to a battery external of the casing 10 with the circuit make and break device normally open but brought to a closed position in suitable manner as by the seepage of fluid—this being a well-known form of control for depth bomb service. As is apparent, a depth bomb equipped with a carrier of this type would explode only by completion of the circuit; other types of content would render the bomb active by contact of the normal outer bomb casing with the object, such contact operating a sensitive make and break device. In each type the safety of the carrier so reduces the chances of accidental explosion as to render the carrier ideal for such services. The details of the timing structure are not shown since they may be of any of the well-known forms and the assembly is used only where the carrier is installed as a part of the military offensive structure, the present invention pertaining more particularly to the safety carrier per se.

As is apparent, the carrier structure thus disclosed provides for safety to an adequate degree by eliminating the possibility of producing jarring effects on the explosive container content in presence of movements of such container during transportation or service. The fluid content not only serves to prevent access of flame to the explosive, but, additionally acts as a damping medium for movements of the container and element. Hence, its presence, together with the yielding connections and the buoyant element, sets up an arrangement which does not prevent movement of the explosive container—thus eliminating direct jarring effects from the casing—but becoming active as damping agencies in limiting the extent of such movements, and thus prevent the creation of jarring effects as a reaction to the jarring action on the casing. Obviously, the fact that the explosive container is submerged will provide for further safety in the event of damage to the container such as will permit the fluid to enter the container and thereby dampen the explosive content.

While I have herein disclosed a specific form of the safety carrier and indicate its various characteristics, it will be readily understood that changes and modifications therein may be found desirable or essential in meeting the various forms of service for which it is applicable, and I desire to be understood as reserving the right to make any and all such changes or modifications therein as may be found essential or desir-

able in meeting the exigencies of the service conditions, insofar as the same may fall within the spirit and scope of the invention as presented in the accompanying claims when broadly construed.

What is claimed as new is:

1. A safety carrier for high explosives and the like comprising a fluid-containing casing, an explosive container of materially less external dimensions than the internal dimensions of the casing, said container having a yieldable connection with the top of the casing and a similar connection with the lateral side and end walls of the casing, the connections combinedly producing a cradle-like support for the container, the top level of the fluid content of the casing being spaced from the top of the casing and located a material distance above the explosive container, and a buoyant element of positive buoyancy value yieldingly tethered to the bottom of the casing and normally positioned to provide a seat for the explosive container, whereby movements of the container due to jarring of the casing are permitted but with the movements damped to prevent jarring effect transmission to the container and its content.

2. A carrier as in claim 1 characterized in that the buoyant element is in the form of a hollow rubber member having an air content and having the dimensions of its upper face materially greater than the similar dimensions of the lower face of the explosive container, the tethering connection of the element being with the lower face of the member, whereby downward movement of the container will be additionally damped by the requirement of bodily movement of the member within the fluid content and in direction opposing the buoyancy effect.

3. A carrier as in claim 1 characterized in that

the buoyant element is in the form of a hollow rubber member having an air content and having the dimensions of its upper face materially greater than the similar dimensions of the lower face of the explosive container, the tethering connection of the element being with the lower face of the member, whereby movement of the container downwardly will be additionally damped by the requirement of bodily movement of the member within the fluid content and in direction opposing the buoyancy effect, any separation of container and element during the reaction movement of the container to such downward movement being dissipated by the element "follow-up" movement provided by such buoyancy effect and action, the seating relationship between container and element being restored without jar to the container and its content due to the resilient nature of the rubber walls of the element and the damping effect of the need for re-tracing the path through the fluid content.

4. A carrier as in claim 1 characterized in that the container and element each have the walls of their contacting faces formed with a rubber content of elastic characteristics to thereby prevent jarring effect on the container content in presence of relative movements of container and element in providing seating contact of the container on the element.

5. A carrier as in claim 1 characterized in that the bottom of the casing also carries a fixedly-positioned rubber container for a timing-detonation content, with such container having an operative connection with the content of the explosive container to thereby render the carrier serviceable as the detonating charge of a warfare munitions assemblage.

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