

July 1, 1952

L. N. DARBYSHIRE

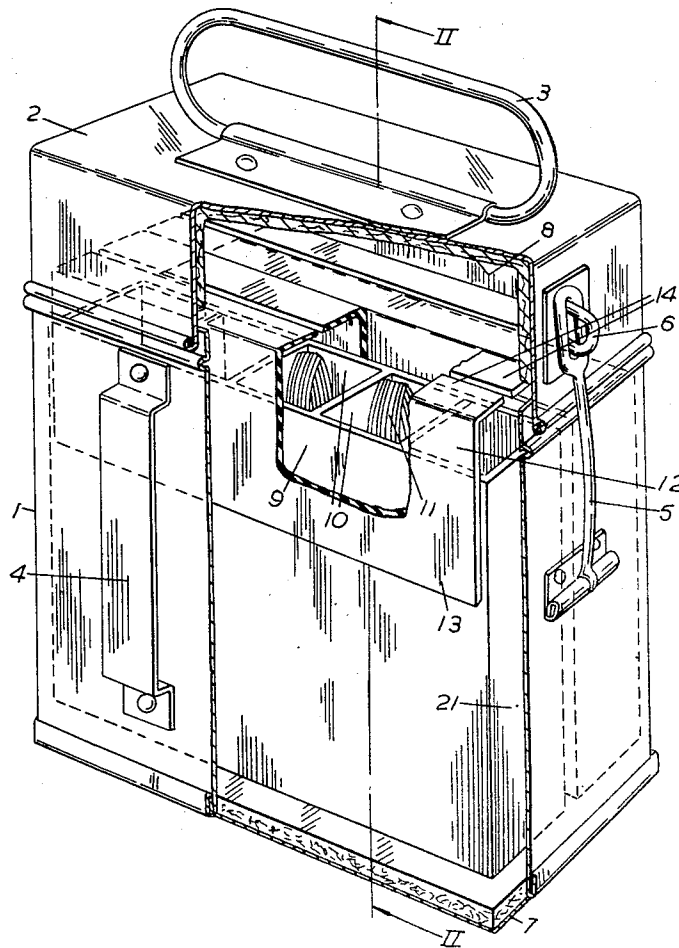
2,601,919

PACKING OF ARTICLES SUSCEPTIBLE TO DAMAGE

Filed April 4, 1950

3 Sheets-Sheet 1

FIG. 1.



Inventor

Leslie Noel Darbyshire

By

Lucas & Co.

July 1, 1952

L. N. DARBYSHIRE

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FIG. 2.

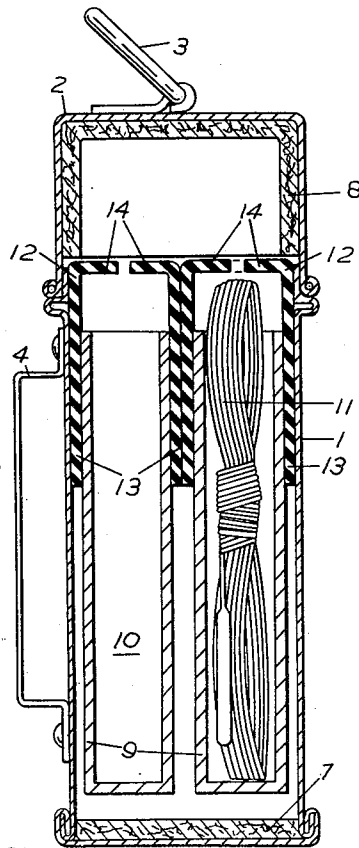
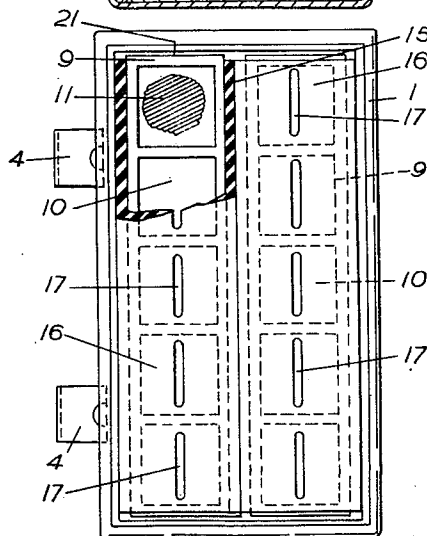


FIG. 3.



Inventor

L. N. Darbyshire  
By  
[Signature]

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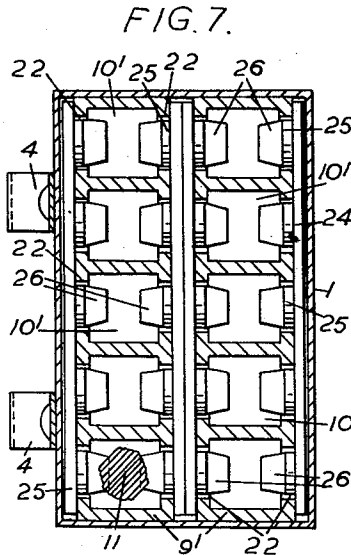
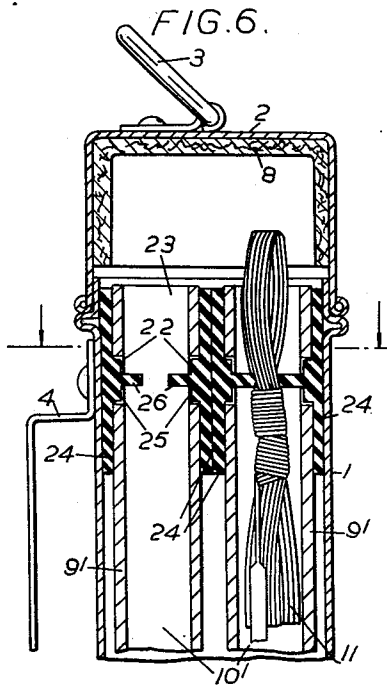
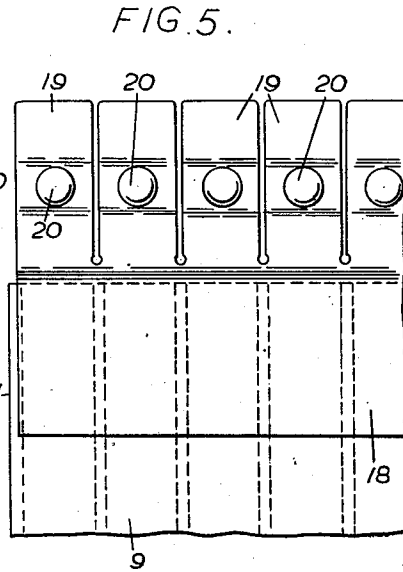
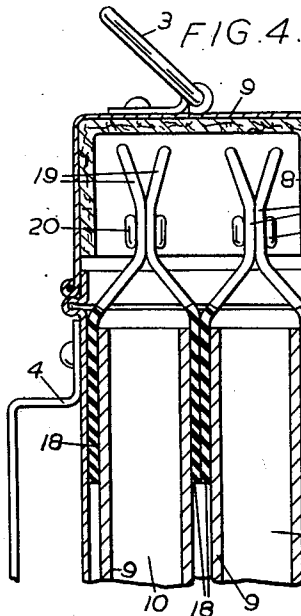
L. N. DARBYSHIRE

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PACKING OF ARTICLES SUSCEPTIBLE TO DAMAGE

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Inventor

*L. N. Darbyshire*  
By *Edward J. [Signature]*

## UNITED STATES PATENT OFFICE

2,601,919

PACKING OF ARTICLES SUSCEPTIBLE  
TO DAMAGELeslie Noel Darbyshire, Woodclose,  
Ripley, EnglandApplication April 4, 1950, Serial No. 153,919  
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16 Claims. (Cl. 206—3)

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This invention relates to the packing for transport of articles susceptible to damage by impact, as by a blow or fall, or by mishandling.

The invention is thus applicable to the packing of fragile or otherwise damageable or breakable articles.

A particular object of the invention is to provide packing means enabling a hitherto unattained standard of safety in the transport and handling of electric detonators as used in blasting and like operations in connection with explosive materials. Such detonators commonly consist of the detonator proper, which is a small cylindrical object containing the detonating charge, and attached thereto a long electrical lead or cable which for convenience of handling before use is bundled in the form of a hank tied round its middle as by the free end of the lead, so as to afford a long bundle of relatively small cross-section.

Such detonators are usually carried by shot-firers in mines and quarries and like workings in boxes which hold a number of the detonators. These have to be handled in difficult and arduous conditions, often in poor light, and it is a disadvantage of the boxes hitherto employed that in the removal of one detonator it is possible for another to be inadvertently displaced or withdrawn, with evident dangerous possibilities. Moreover, having regard to the conditions in the workings, insufficient protection has heretofore been provided against the possibility of detonators being damaged or exploded by the boxes being dropped or knocked against hard objects by inadvertence of or accident to a man carrying them.

For the avoidance of these disadvantages, the invention provides improved packing means for such susceptible articles, and particularly for detonators as aforesaid, comprising a container subdivided into compartments, each compartment being adapted to hold one article and having means for retaining said article against accidental displacement.

From another aspect the invention provides retaining means of flexible or resilient material for such susceptible articles, which means serve to retain the articles individually and jointly against accidental displacement in or from a compartmented container, and as insulation against shock for such container within an outer casing or box.

The retaining means may include at least one resilient projection disposable transversely across or partly across the open end or within and adjacent the open end of a compartment in a con-

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tainer for substantially enclosing and/or gripping an article housed within the compartment.

Such means may comprise a pair of inverted L-section members having each a vertical web adapted to be disposed against the upper part of one of two opposite walls of a container, and a transverse or horizontal web disposed to extend towards the like web of the other member across the open mouth of a compartment or the open mouths of a row of compartments.

Alternatively, the retaining means may comprise a cap or cover member for a compartment or a plurality of compartments in a container, said member having two vertical webs adapted to be disposed against the upper parts of two opposite walls of the container and a pair of tongues or a plurality of pairs of tongues disposed to project towards one another over the mouth of the rows or each compartment. The cover member may be made of natural or synthetic rubber or other resilient material. The tongues may be moulded or otherwise formed or affixed to project transversely by their own resilience across the open end of a compartment, so as to be deformable only by substantial force, as with the fingers, for the insertion or removal of an article into or from a compartment.

In substitution for tongues as last described, the cap or cover member may be provided with a slot or slots in register with said mouth or one with each of said mouths, through which slot or each of which slots the underlying compartment is individually accessible.

In yet another alternative, the tongues may be such as normally to extend upwards substantially in the planes of said webs, each of an opposed pair of tongues carrying one of two mutually engageable elements of a fastening device such as a press stud, so that the tongues may be secured together over an article inserted into a compartment and the article may thereafter be removed or displaced only when the tongues are deliberately separated upon release of the fastening device.

In another form, retaining means may be adapted to project inwardly, through an aperture in one wall of a compartment, or through apertures in opposite walls of a compartment, from pads, plates, strips, bands or the like disposable outside said walls, the projection or projections being such as to grip resiliently an article inserted in the compartment.

In each form of the retaining means as above mentioned, said vertical webs or said last-mentioned pads, plates, strips or the like, may serve

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as insulation against impact shock between a container, to which such member or members is or are applied, and an outer casing or box, or between two such containers juxtaposed in a casing or box.

The invention further provides the combination of retaining means as aforesaid with a container, having a compartment or a plurality of compartments for or each for one susceptible article, with retaining and shock-insulating means as aforesaid.

From another aspect, the invention provides the combination of an outer casing or box, one or more of such compartmented containers, and means as aforesaid for retaining susceptible articles one within each of the compartments and for insulating the container or containers against shock within the casing or box.

In order that the foregoing and other features of the invention may be more fully understood, some embodiments thereof will be described by way of example with reference to the accompanying drawings wherein:

Figure 1 is a perspective view of a detonator box and cover, partly broken away,

Figure 2 is a vertical section on the line II—II of Figure 1,

Figure 3 is a plan of a box with cover removed and with modified retaining means,

Figure 4 is a fragmentary vertical section corresponding to the upper part of Figure 2 and showing another embodiment,

Figure 5 is an elevation of the retaining means shown in Figure 4, with the box and cover removed.

Figure 6 is a fragmentary vertical section, similar to Figure 4, of yet another embodiment, and

Figure 7 is a plan view of the box shown in Figure 6, with its cover removed.

In each of the embodiments, a casing for the carrying of blasting detonators comprises a box 1, e. g. of tinsplate, rubber, alloy or other suitable material, fitted with a lid 2 which has a carrying handle 3 of suitable form and with belt loops 4 through which a man's belt may be passed to enable the carrying of the box in a manner which leaves a man's hands free. Any suitable means may be provided for locking the lid to the box by co-operating parts fixed to the box and lid respectively, and in one convenient arrangement, as illustrated, the box and the lid are provided externally with a hasp 5 and a staple 6 to enable the box to be padlocked. The bottom of the box may be fitted internally with a resilient or soft pad 7, e. g. of felt, and the lid also may have resilient or soft lining 8, which again may be of felt.

In one embodiment, there may be disposed within such outer box at least one, or as shown in Figure 1, preferably two, inner containers 9 divided into a plurality of deep compartments 10 of relatively small cross section, open at the top, each intended to hold one detonator such as 11. In the illustrated typical form, the box is provided with two inner containers 9, each of which has a single rank of compartments 10, e. g. five, the two containers being disposed side by side (although containers may be disposed end to end, or otherwise). There may of course be more than two containers and each container may have any desired number of compartments.

Over the upper part of each container as shown in Figure 1 are disposed retaining means which comprise a pair of inverted L-section members 12

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having each a relatively deep vertical web 13 adapted to be disposed against the lateral surfaces of the upper parts of the container walls, and a transverse or horizontal web 14, these webs of each pair being disposed to extend across the open mouths or tops of one row of the compartments 10. Such retaining members are desirably to be made of a resilient material such as rubber, and so that the transverse webs 14 maintain their normal position by their own resilience.

The transverse webs 14 of each pair extend towards one another so that their free edges almost touch. Thus, for the insertion of a detonator into any of the compartments of a container it is necessary deliberately to displace or deform the overlying pair of webs. A similar deformation or displacement is also necessary, as with the fingers, in order to grip and withdraw a detonator from any of the compartments, and it will be appreciated that in the course of such withdrawal the possibility of disturbance or displacement of a detonator or detonators in any of the adjacent compartments is made practically impossible. Moreover, since the walls of the containers are abutted by the resilient vertical webs 13, upon the insertion of the containers 9 into the outer box 1 with the retaining members 12 disposed as shown, the containers are insulated from such box, the only contact with the interior of the box walls being through the vertical webs of the retainer members at the upper parts of the containers, and lower parts of the containers having a certain degree of freedom for swinging under shock applied to the box. Further, the two containers are themselves separated by the double thickness of the interposed vertical webs of the two retainer members as will be clearly seen in Figure 2, so that the possibility of their being caused to knock against one another is practically completely prevented.

Under a modification of the retaining means as above described, in place of the provision of separate members as shown in Figures 1 and 2, there may be provided a unitary retaining member 15 (Figure 3) having a transverse portion 16 of suitable resilient material extending entirely over the container and having a plurality of slots 17 disposed each to afford access to one of the compartments in the container.

In another embodiment as shown in Figures 4 and 5, having a similar outer casing or box 1 to hold two containers 9 each affording a single rank of compartments 10, retaining means for the detonators is in the form of pairs of strips 18 adapted to be disposed and to afford shock insulation between the upper parts of the walls of each of the containers and the box, and between the containers themselves, as shown, each strip having a plurality of tongues 19 extending upwards, each member of an opposed pair of tongues carrying one element of a press stud 20 and each pair of tongues being disposed so that on deformation to fasten the stud the tongues are brought together over one of the compartments in a container. Thus, when detonators have been individually inserted in the compartments 10, they may be secured therein by fastening the associated pairs of tongues 19 over the compartments, and can then be withdrawn individually only by deliberate unfastening of the tongues. It will thus be evident that a single detonator may be withdrawn while the possibility of accidental disturbance or withdrawal of another detonator is completely prevented by the positive enclosure

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of such other detonator within its own compartment.

In any of the three embodiments above described the vertically extending portions 13 (Figures 1 and 2) or 15 (Figure 3) or 18 (Figures 4 and 5) of the retaining means may be extended round the end walls 21 of the containers so as to traverse said ends wholly or partly. Further, the upper part of the container may be inserted into a continuous resilient flange or band of retaining means, which may present a pair of horizontal opposed webs such as 14 (Figures 1 and 2) or a transverse portion 16 with slots 17 (Figure 3) or tongues such as 19 with press studs 20 (Figures 4 and 5) as may be desirable or convenient. Thereby the fitting of the containers and the retaining means into box 1 may be facilitated, and furthermore additional shock insulation is afforded between the end walls respectively of the containers 9 and the box 1.

In yet another embodiment as shown in Figures 6 and 7 having two slightly modified containers 9' each affording a single rank of compartments 10' and disposed side by side within an outer box 1, the longer side walls of the containers are provided with opposed apertures 22 adjacent the upper ends of the deep and narrow compartments, that is, near the open mouths or tops 23 of the compartments. There is then applied to each of said longer walls a strip or plate 24 of resilient material such as rubber, having bosses 25 adapted to engage within the apertures in the container walls, and tongues 26 projecting inwardly from these bosses so as to extend towards one another in pairs transversely in each compartment 10'. When a detonator such as 11 is inserted in any compartment, it has to be pushed towards the bottom of the compartment between the resilient tongues 26 and its upper part is gripped within the compartment by the tongues as can be seen in Figure 6 so as to retain it against accidental displacement. Evidently, when any one detonator is withdrawn, the tongues 26 have to be forcibly deformed, and the possibility of accidental dislodgment or withdrawal of another detonator housed within an adjacent compartment is prevented.

This embodiment has the further advantage that the number of detonators in the box is clearly visible, without need to touch or displace the retaining means.

The aforesaid strips or plates 24 of resilient material disposed one on each side of a container may be substituted by a band disposable around the upper part of the container, with bosses and tongues as required. Alternatively, at least one boss and tongue assembly may be attached to a separate pad. Where a pad, plate or strip such as 24, or an equivalent band carries a plurality of bosses 25, these and the co-operating apertures 22 in the container walls may for convenience be circular, but when a pad carries a single boss, this and the co-operating aperture is desirably polygonal, e. g. rectangular, for retaining the tongue 26 in suitable transverse attitude.

A container fitted with such pads, plates, strips or band, when inserted in a box, as previously described, is insulated resiliently from shocks received by the box, and a plurality of containers so inserted are likewise insulated from one another.

The inner containers may be made as desirable or convenient from any suitable material, e. g., metal in cast, welded, riveted or beaded form, or

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wood, or plastic or hard or semi-hard rubber or other moulded material.

The invention clearly affords a hitherto unattained, high standard of safety in the packing, carrying and handling of detonators. It is also with comparable advantages applicable as stated to the packing of susceptible articles other than detonators. Modifications may be made as necessary or desirable in the containers, the retaining means, or the outer casing or box with regard to the nature or form of such articles, or otherwise.

I claim:

1. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising a container, means dividing said container into a plurality of compartments, the compartments presenting each an open end at one surface of the container, and retaining means having elements disposed along the exterior of the container and resilient projections on said elements extending at least partly across said open ends of the compartments for serving to retain an article in each of the compartments.

2. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising a cuboid container, means dividing said container into a rank of compartments, the compartments presenting each an open mouth at the top of the container, and retaining means having elements extending along and in frictional contacts with the exteriors of at least the upper parts of an opposed pair of side walls of the container and resilient elements disposed at least partly across the mouths of the compartments to retain articles singly in each compartment while enabling access to each compartment individually with the fingers.

3. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising an outer casing, at least one container within said casing, means dividing said container into a plurality of compartments, the compartments presenting each an open end at one surface of the container, retaining means having resilient webs disposed between the exteriors of an opposed pair of side walls of the container and the interior of corresponding sides of the casing, and resilient projections on said webs extending at least partly across said open ends of the compartments to serve to retain an article in each of the compartments.

4. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising an outer cuboid casing, at least one cuboid container within said casing, means dividing said container into a rank of compartments, the compartments presenting each an open mouth at the top of the container, and retaining means having resilient elements extending between the interior of the casing and the upper parts of an opposed pair of side walls of the container and resilient elements disposed at least partly across the mouths of the compartments to retain articles singly in each compartment while enabling access to each compartment individually with the fingers.

5. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising a cuboid container, means dividing said container into at least one rank of compartments presenting each an open end at the top of the container, and retaining means consisting of a pair of inverted L-section mem-

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bers, the vertical webs of said members disposed each against the exterior of the upper part of one of a pair of opposite walls of the container, and the horizontal webs extending resiliently towards one another across said open ends of the compartments for retaining an article in each of the compartments.

6. Packing means according to claim 5, wherein the ends of vertical webs of the L-section members are joined by webs disposed each against the exteriors of the upper parts of the other pair of walls of the container, to form a continuous band surrounding the container.

7. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising an outer cuboid casing, at least one cuboid container within said casing, means dividing said container into at least one rank of compartments presenting each an open end at the top of the container, and retaining means consisting of a pair of inverted L-section members, the vertical webs of said members disposed each between the exterior of the upper part of one of two opposite walls of the container and the interior of the casing, and the horizontal webs extending resiliently towards one another across said open ends of the compartment for retaining an article in each of the compartments.

8. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising a cuboid container, means dividing the container into at least one rank of compartments presenting each an open end at the top of the container, and retaining means consisting of an inverted U-section member, the vertical webs of said member disposed each against the exterior of the upper part of one of two opposite walls of the container, a resilient horizontal web of said member extending across said open ends of the compartments for retaining an article in each of the compartments, and slots in said horizontal web one over each of the open ends of the compartments for access individual to said compartments.

9. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising a cuboid container, means dividing said container into a rank of compartments, the compartments presenting each an open mouth at the top of the container, and retaining means having elements extending along and in frictional contact with the exteriors of at least the upper parts of an opposed pair of side walls of the container, resilient tongues on said elements disposed to extend towards one another in pairs across the mouths of the compartments and mutually engageable fastening devices on said pairs of tongues to retain articles singly in each compartment, said fastening devices being disengageable to enable access to each compartment individually with the fingers.

10. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising an outer cuboid casing, at least one cuboid container within said casing, means dividing said container into a rank of compartments, the compartments presenting each an open mouth at the top of the container, and retaining means having resilient elements extending between the interior of the casing and the upper parts of an opposed pair of side walls of the container, resilient tongues on said elements disposed to extend towards one another in pairs across the mouths of the compartments and mu-

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tually engageable fastening devices on said pairs of tongues to retain articles singly in each compartment, said fastening devices being disengageable to enable access to each compartment individually with the fingers.

11. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising a cuboid container, one opposed pair of walls of said container having each a series of apertures at their upper parts, partitions extending transversely intermediate said apertures to divide said container into a rank of compartments, the compartments presenting each an open mouth at the top of the container, and retaining means having laminar elements bearing upon the exteriors of at least the upper parts of said opposed pair of side walls and resilient tongues on said elements projecting through said apertures and towards one another across the mouths of the compartments to retain articles singly in each compartment while enabling access to each compartment individually with the fingers.

12. Packing means according to claim 11, wherein said elements of the retaining means are united and extended around the other pair of side walls of the container to form a continuous band.

13. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising an outer cuboid casing, at least one cuboid container within said casing, one opposite pair of side walls of said container having each a series of apertures at their upper parts, partitions extending transversely intermediate said apertures to divide said container into at least one rank of compartments presenting each an open end at the top of the container, retaining means having resilient vertical webs disposed each between the interior of the casing and the exterior of the upper part of said opposite walls of the container, and resilient tongues on said vertical webs projecting through said apertures and towards one another across the mouths of the compartments to retain articles singly in each compartment.

14. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising an outer casing, two adjacent cuboid containers within said casing, means dividing each of said containers into one rank of compartments, the compartments presenting each an open end at one surface of the container, retaining means having resilient webs disposed between the exteriors of the upper parts of adjacent walls of the two containers and between the interior of the casing and that wall of each container opposite one of said adjacent walls, and resilient projections on said resilient webs extending each at least partly across the open ends of the compartments to serve to retain an article in each of the compartments.

15. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising an outer casing, two adjacent cuboid containers within the casing, means dividing each container into at least one rank of compartments, the compartments presenting each an open mouth at the top of the container, retaining means consisting of two pairs of resilient, inverted, L-section members, the vertical webs of two of said members disposed between the exteriors of upper parts of adjacent walls of the two containers, and the vertical webs of the other two members disposed between the interior

of the casing and that wall of each container opposite one of said adjacent walls, and the horizontal resilient webs of said members extending towards one another across said open mouths of the compartments to serve to retain an article in each of the compartments.

16. Packing means for articles susceptible to damage by impact, and particularly for blasting detonators, comprising a cuboid container, means dividing said container into at least one rank of compartments presenting each an open end at the top of the container, a plurality of retaining means each including a flat pad bearing against the exterior of the upper part of one of two opposite walls of the container, and horizontal bosses one on each of said flat pads, seatings disposed in

pairs each traversing one of said opposite walls in each compartment of the container, said bosses engaging in said seatings, and resilient tongues on said bosses projecting through said apertures and towards one another across the open end of each compartment to retain an article in the compartment.

LESLIE NOEL DARBYSHIRE.

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