Feb. 7, 1967 D. J. SHEEHAN 3,302,843

CONTAINER FOR SPHERICAL OBJECTS AND BLANK FOR FORMING SAME

Filed Oct. 19, 1965 2 Sheets-Sheet 1

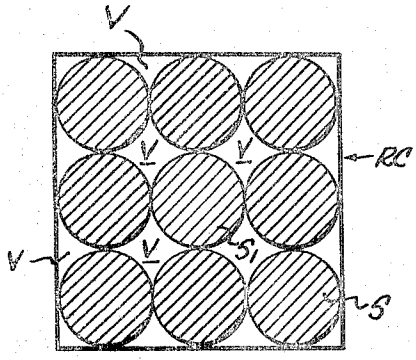

Fig. 1.

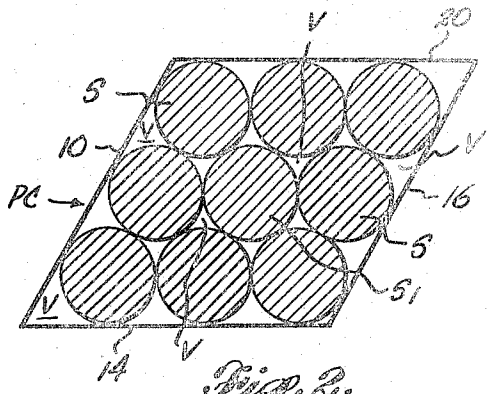

Fig. 2.

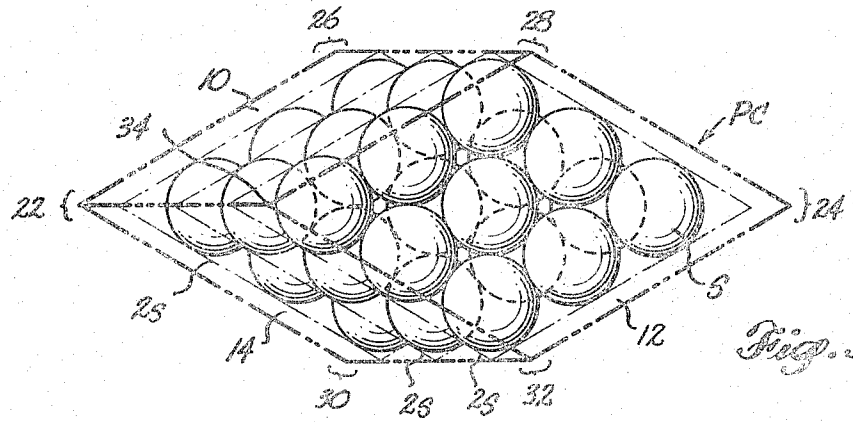

Fig. 3.

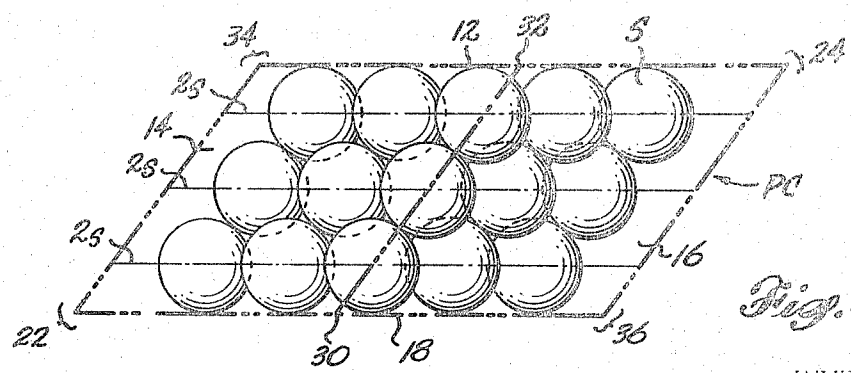

Fig. 4.

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CONTAINER FOR SPHERICAL OBJECTS AND BLANK FOR FORMING SAME

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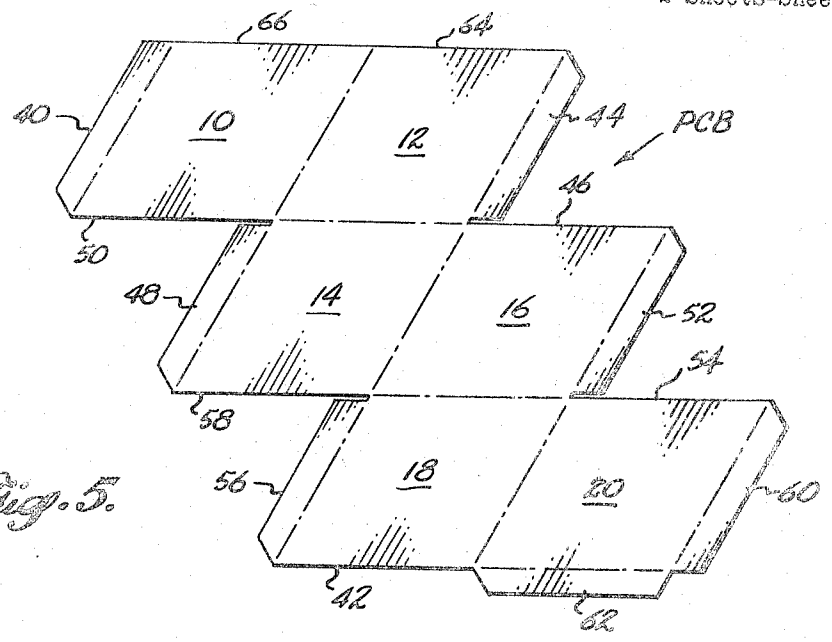

Fig. 5.

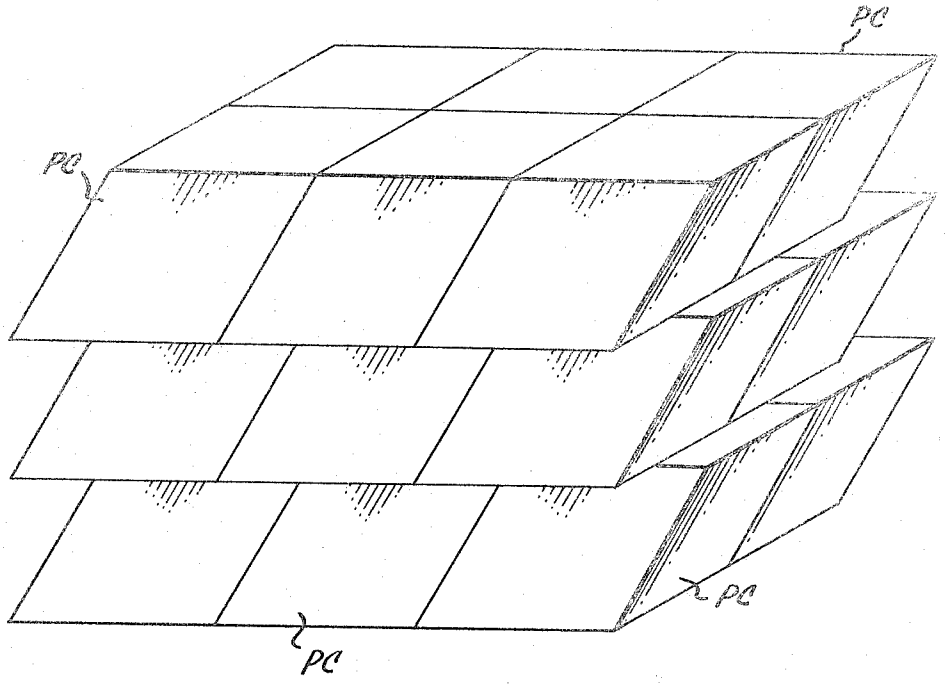

Fig. 6.

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CONTAINER FOR SPHERICAL OBJECTS AND BLANK FOR FORMING SAME

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This invention relates to containers for packaging of like spherical objects in an orderly and space saving manner. More particularly, the invention relates to containers, and blanks for forming same, wherein the containers are easily handled, can be stacked in an interlocking fashion, and are especially adapted to enclose a multiplicity of like spherical objects with a minimum of void or interspace between the objects.

Containers characteristic of the invention are configured to have six interconnected, essentially planar sides, with each of the sides occupying a plane oriented at an angle of substantially 60° with respect to the planes of the connecting sides. The invention is applicable to the packaging of any of a wide variety of like spherical objects, such as oranges, marbles or ball bearings, simply by way of typical example. Any multiple number of such like spherical objects can be thus packaged. However, for maximum utilization of the space saving feature of the invention, the number of like spherical objects thus packaged should be a multiple of three integers wherein each integer represents the number of objects in line along each dimension of the package. In these respects, and for simplicity of illustration of the present invention, a package has been selected which involves the arrangement of three such objects in a row along each dimension of the package, i.e. wherein the total number of objects contained is 33 or 27.

In connection with the following description of a typical embodiment of the invention, reference is to be made to the accompanying drawing, wherein like letters and numbers refer to like parts, and wherein:

FIG. 1 is a cross-sectional view showing the arrangement of like spherical objects in a conventional container of rectangular form;

FIG. 2 is a cross-sectional view showing the arrangement of spherical objects in a container according to the present invention;

FIG. 3 is a cabinet view of an arrangement of spherical objects in a container according to the present invention, with the edges of the sides of the container being shown by dash and double dotted lines and certain cross-sectional planes through the container and the spherical objects being shown by broken single dotted lines, for clarity of illustration;

FIG. 4 is a view in side elevation of the objects and container shown in FIG. 3;

FIG. 5 is a top plan view of a blank from which a container of the type shown in FIGS. 2–4 is made; and

FIG. 6 is an isometric view showing a multiplicity of containers according to the present invention, arranged in an interlocking, stacked manner.

Most containers in use today are rectangular in configuration, and like spherical objects cannot be arranged therein in a closely packed fashion without considerable wastage of empty interspace or "void" volume. This inherent disadvantage in rectangular packaging is illustrated somewhat diagrammatically in FIG. 1, wherein like spherical objects such as ball bearings, certain of which are designated S, are contained in rectangular container RC. As will be observed in FIG. 1, the empty interspace V between the various objects S is inherently substantial. As will also be apparent from a three-dimensional visualization, the inner spherical object S1 not in contact with a side of the container RC contacts but six other objects.

In contrast to the relatively large amount of empty interspace V in the conventional rectangular packaging shown in FIG. 1, FIG. 2 by cross-sectional view, shows an arrangement of spherical objects according to the present invention, wherein the objects, certain of which are designated S, are arranged in the container PC so that the empty interspace or void V between objects is considerably smaller because, as will be three-dimensionally visualized, the inner object of S1 contacts a total of twelve other objects. To achieve this result, the container PC (as shown collectively by FIGS. 2, 3, and 4, as well as the container forming blank shown in FIG. 5) comprises six interconnected sides **10**, **12**, **14**, **16**, **18**, **20**, with each of said sides being essentially planar and in the configuration of a parallelogram with two oppositely related included angles of substantially 60° and two oppositely related included angles of substantially 120°. Stated otherwise, each parallelogrammic side of the container PC is of diamond shape, with the edges of the side oriented to define alternate included angles of 60° and 120°. Stated in yet another manner, the container PC is characterized by having six symmetrical sides, each in a configuration of a parallelogram, with two opposed corners **22**, **24** of the container being defined by connected corners of three sides (sides **10**, **14**, **18** in the case of corner **22**, and sides **12**, **16**, **20** in the case of corner **24**), each having an included angle of substantially 60°, and the remaining corners **26**, **28**, **30**, **32**, **34**, **36** being defined by connected corners of the adjacent sides, two of which latter corners have an included angle of 120°, and one of which has an included angle of 60°.

As will be seen in FIGS. 3 and 4, each of the broken lines 2S represents an imaginary plane through a layer of the objects S within the container PC, and the cross-sectional view of the objects S and container PC occupied by planes 2S are each identical to the cross-sectional view shown at FIG. 2.

FIG. 5 shows in plan view a blank PCB from which the container PC is suitably formed. This blank PCB is cut from a flat sheet of cardboard or the like, and configured to have six diamond-shaped panels respectively forming the sides **10**, **12**, **14**, **16**, **18**, **20** of the container PC and designated with like numbers in FIG. 5, with each panel having but one common edge with another panel, and with each panel having at least one foldable flap along a bonding edge thereof for interconnection with another panel when the blank is folded to form said container PC. Thus, as shown at FIG. 5, panel **10** is provided with a flap **40** which, on folding of the blank along the interpanel edges (shown at broken lines in FIG. 5), overlaps and is joined to the edge **42** of panel **18**, as by being adhesively bonded or stapled thereto. In like manner, flap **44** on panel **12** is joined to edge **46** on panel **16**, flap **48** on panel **14** is joined to edge **50** of panel **10**, flap **52** on panel **16** is joined to edge **54** of panel **20**, flap **56** of panel **18** is joined to edge **58** of panel **14**, and flaps **60**, **62** on panel **20** are respectively joined to or frictionally fit within edges **64**, **66** of panels **12** and **10**, depending on whether side **20** of the container is sealed or is reopenable.

One of the important advantages of a container of the type provided by the present invention is that the container not only arranges the spherical objects S closer together in the sense of being less empty interspace therebetween, but also tends to be completely filled more readily, i.e. the spheres readily fall into proper place as the container is filled, which is not the case with a rectangular type container such as shown in FIG. 1 in

that in the FIG. 1 container each sphere above the lower layer of spheres must contact only one lower sphere, which is a condition of instability unless other spheres are also in proper place beside it. In contrast, each sphere above the lower layer in the container PC of the invention, as shown at FIG. 2, has a state of rest involving support by either three lower spheres, or two lower spheres and the side of the container, which is a condition of stability regardless of the presence or absence of other spheres in the same layer.

A further advantage of the container PC is that, although the container will rest stably on any one of its sides, it can easily be rotated to a new base by pressing down in the area of the intermediate overhanging corner (e.g. corner **32** in FIG. 4). By repetition of this procedure, the container can be readily "rolled." When all edges of the container are of equal length, the container will "roll" equally from any base.

To manually lift the container PC, one can simply press downwardly on the overhanging end corner (e.g. corner **24** of FIG. 4) with one hand and slip the other hand under the other end corner (e.g. corner **22** in FIG. 4), then lift the container. As will be apparent this manner of manipulation of the container to get proper hand holds for lifting thereof is manifestly easier than the manipulation necessary to get one or both hands under a rectangular container.

A further advantage of the container PC is that, instead of catching on an obstruction when sliding, the sloped faces and corner (e.g. corner **36** in FIG. 4) facilitates sliding of the container over the obstruction.

Yet another advantage of the container PC is that its configuration at either end corner (corners **22**, **24** in FIGS. 3 and 4) provides a ready made spout to facilitate emptying of the container.

A further advantage of the container PC is found in its stacking characteristics, as seen in FIG. 6. When stacked in multiple levels the containers of each upper level overlap the containers of the next lower level with each interiorly placed container resting on as many as four lower containers, thus effectively interlocking the containers of the stack. As will be understood, when a large number of containers are stacked together as in a truck or box car, and when the stack is also restrained from above (as from the ceiling of the storage area or by strapping to a pallet), the only wastage of space is around the outside of the stack and the stack becomes a very stable entity; more so than if a multiplicity of rectangular containers of comparable volume when stacked one upon another.

Although it is preferable to have all edges of the container PC of equal length, as shown, it will be understood the edges can be of various lengths consistent with the basic parallelepipedal form shown. As will also be apparent, for certain usages, the container can be open topped, in which case one side or panel (e.g. side **20**) can be dispensed with. Likewise evident will be the proposition that in certain instances the edges and corners of the container can be rounded if desired.

As will also be understood, while the container has been discussed with respect to the packaging of like spherical objects, the container form also has utility for packaging of objects of any form or for packaging simply granular or particulate material (e.g. sugar or flour, for example), in that the advantages as to handling of the container and as to its interlocking characteristics when stacked pertain regardless of the nature of the contents.

These and other modifications, adaptations and variations characteristic of the invention will be understood to be within the scope of the present invention as defined by the following claims.

What is claimed is:

1. A container capable of stably resting on any side yet readily rollable, and capable of being stacked in an interlocking fashion, said container comprising six interconnected sides, each of said sides being essentially planar and the configuration of a parallelogram with two oppositely related included angles of substantially 60° and two oppositely related included angles of substantially 120°.

2. A container for snugly enclosing a multiplicity of like spherical objects with a minimum of interspace between the objects, said container comprising six interconnected, essentially planar sides, at least five of which are closed, with each of said sides occupying a plane oriented at an angle of substantially 60° with respect to the planes of the sides connected therewith.

3. A container of parallelepipedal form for congruent spherical objects, said container comprising six interconnected sides, at least five of which are closed, each of said sides being essentially planar and in the configuration of a parallelogram with two oppositely related included angles of substantially 60° and two oppositely related included angles of substantially 120°.

4. An article of commerce comprising a closed container of parallelepipedal form, having six symmetrical sides each in the configuration of a parallelogram, with two opposed corners of said container being defined by connected corners of three sides each having an included angle of 60° and the remaining corners of said container being defined by connected corners of said sides, two of which latter corners have an included angle of 120° and one of which has an included angle of 60°.

5 An article of commerce comprising a closed container of parallelepipedal form, snugly filled with like spherical objects, said container having six symmetrical sides each in the configuration of a parallelogram, with two opposed corners of said container being defined by connected corners of three sides each having an included angle of 60° and the remaining corners of said container being defined by connected corners of said sides, two of which latter corners have an included angle of 120° and one of which has an included angle of 60°.

6. An article of commerce comprising a container-forming blank from which a six sided container of parallelepipedal shape is formable, said blank being cut from a flat sheet of cardboard or the like, and configured to have six diamond shaped panels with each panel having but one common edge with another panel, and with each panel having at least one foldable flap along a bounding edge thereof for interconnection with another panel when the blank is folded to form said container.

7. An article of commerce according to claim **6**, wherein each edge of said diamond shaped panel lies at an angle of substantially 60° with one adjacent side and lies at an angle of substantially 120° with the other adjacent side thereof.

References Cited by the Examiner

UNITED STATES PATENTS

D. 29,644	11/1898	Davidson.	
1,322,637	11/1919	Smith	229—22 X
1,413,108	4/1922	Dyer	206—46
2,936,939	5/1960	Lundquist	229—8
3,125,302	3/1964	Henricot.	

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