This invention relates to the prepackaging of soda lime for utilization in the breathing circuit of anesthesia apparatus and is particularly concerned with containers for use in such a prepackaging, with packages filled with soda lime and with the methods of making such packages and utilizing the same.

In an anesthesia apparatus it is common practice for a breathing circuit to be established from and back to the patient so that the patient exhales through an absorber which takes out the carbon dioxide from the exhaled gas but permits the gas being employed for anesthesia to pass through and be returned to the patient along with such air or oxygen and anesthesia gas as may be desired to maintain the patient anesthetized. If this were not done, the patient would exhale a substantial proportion of the anesthesia gas which would be wasted into the atmosphere and make it necessary to continuously supply a substantial quantity of anesthesia gas to maintain the patient anesthetized during the course of an operation.

Granules of soda lime packed into a suitable transparent walled canister have heretofore been employed in the type of breathing circuit here referred to for absorbing the CO₂ from the breath exhaled by the patient. The body of soda lime granules is by no means permanent, however, for it loses its effectiveness as it absorbs the CO₂ from the patient and eventually becomes wholly ineffective which can be determined by observing the color change of it through the transparent wall. Assuming then that an anesthetist is about to prepare for anesthetizing a patient for an operation, the following procedure has heretofore been followed.

First the previously used soda lime must be emptied from the canister containing it which forms part of the breathing circuit. The canister must be thoroughly cleaned of remaining soda lime particles, then it must be filled with a new charge of soda lime. This charge will come from a bulk supply of soda lime granules, from which the anesthetist must pour the required quantity of the granules in loose form into the canister. Obviously getting the canister sufficiently filled without spilling any of it and creating a mess that would have to be cleaned up involves special care. Care and skill is also required to fill the canister uniformly while pouring.

Once the canister is fully recharged with new granules it is still necessary to distribute them properly and pack them as fully as possible in the canister. Otherwise air flow may be uneven, channels may form through which the exhaled breath may pass preferentially with insufficient absorption of the carbon dioxide, since the CO₂ absorptive capacity of the soda lime particles bordering the channels will soon become exhausted while the flow will still follow the channels. Thus accepted procedures require that tapping, shock, motion or pressure, or various combinations of these actions be brought to bear upon the contents of the canister so that the soda lime granules will become more uniformly distributed and packed as fully and as evenly as possible in the container. Many doctors and nurses are not as skillful as others in doing this packing, and regardless of their skill the process is time consuming.

Once the packing of the canister is completed, a screen or perforated plastic or metal disc is placed over the top surface of the soda lime granules and locked into place there. This operation results in breaking down some of the soda lime granules into undesirable soda lime dust which the patient might inhale. In fact, the packing procedures just referred to are also likely to create a certain amount of dust, thus good practice requires that, after the screen is applied to the top of the canister, gas is blown through the granular body within the canister to purge it of dust particles before the equipment is put to use. This is the best that can be done under prior art practices, but it falls short of the ideal of providing a dust free soda lime charge.

The canister when packed and blown with gas as just described is reintroduced into the absorber apparatus and is suitably clamped in place therein so that the passage through the interior of the canister now becomes a part of the breathing circuit.

To avoid contagion of disease from a previous patient to the next one, ideally the contents of the canister should be dumped and replaced by new fresh soda lime for each operation. Unfortunately however, when doctors are heavily pressed for time and when the color of the soda lime in the canister indicates that it would need more for considerable additional time, a charge of soda lime that has been partly used up in operating on one patient is frequently also used for the next one. This may not harm the second patient but there is always the risk that if the first patient exhaled anything at all infectious, of which tuberculosis is an example, into the soda lime, such infection could well be taken up by the second patient.

The invention eliminates the foregoing and other undesirable and time consuming aspects of prior art practices in the activity discussed. It does so by providing suitably prepackaged quantities of soda lime, which packages merely need to have the seals overlying their end perforations removed to ready them for placing into already existing canisters of anesthesia apparatus. Once the packages are seated in the canister and it is clamped in place in the absorber, the absorber is ready for use. The package of the invention is effectively filled and packed under pressure by the supplier of it, then it is subjected to a vacuum action to remove any dust present in the prepacked soda lime. Finally, sealing members, such as adhesive backed wax paper discs, are applied over the perforated portions of the ends of the package to seal the contents thereof ready for use by the doctor. When the operation on the patient is completed, the package, or packages as the case may be, are merely removed from the canister, thrown away, and if the anesthesia apparatus is to be used again right away, a new package, or packages, are placed in the canister. The time and effort involved in this phase of preparing for anesthetizing a patient are practically nothing as contrasted with the twenty minutes or more frequently required under prior art practices. In fact, the canister does not even need to be cleaned, for the patient exhales through opposed packages mounted in the canister wherein the walls of the packages isolate the soda lime from the canister. Thus there is nothing to come into contact with or collect on the walls of the canister which will render the cleaning of it really necessary.

It is, accordingly, the principal object of the invention to improve upon the employment of soda lime in the breathing circuit of anesthesia apparatus.

Another object is to provide packages of soda lime for use directly in the breathing circuits of anesthesia apparatus.

Still another object is to provide such packages which have the soda lime contained therein properly packed, free of dust and sealed ready for use.

Still another object is to provide such packages which are so constructed as to maintain the soda lime therein
properly packed, even though the package be stored some time before it is put to use.

Still another object is to provide such packages which though of the utmost simplicity and economy are fully effective for the intended purpose.

A further object is to provide methods for the forming of such packages.

A still further object is to provide methods for placing the contents of such packages under pressure in the course of completion of the packages so that the contents packed will remain under pressure during the life of the package and will be precluded from relative movement of the granules such as would produce dust from the soda lime.

A still further object is to provide for the initial elimination of soda lime dust from such packages.

A still further object is to provide a novel method for introducing the soda lime charge into the absorber of the patient's circuit of an anesthesia apparatus.

Still further and more detailed objects will be obvious and in part be pointed out as the description of the invention, taken in conjunction with the accompanying drawing proceeds.

In the accompanying drawings wherein illustrative embodiments of the invention are shown without limiting the generality of the same, like parts are designated by like reference characters throughout. The container of the invention, all of whose parts are included in the exploded view of FIG. 1, consists of a container body, generally indicated at 1, an overfill collar, generally indicated at 2, a cover, generally indicated at 3, and top and bottom seals 4 and 5. The container generally indicated at 1 is preferably formed of a suitable thin walled resilient plastic material whose side wall 10 is horizontally corrugated throughout, as indicated at 11. The bottom 12 of the container is disc-like and has a center concentrically formed with a substantial number of small perforations therethrough in order to provide a screen, as best shown in FIGS. 2, 5 and 8. The upper end of the side wall 10 terminates in a straight cylindrical portion 14, and is flanged outwardly around that cylindrical portion in a laterally extending annular flange 15. An annular resilient gasket member 16 is secured to the underside of the flange 15 and extends from the exterior of the wall portion 14 to the periphery of the flange 15.

The overfill collar, generally indicated at 2, is merely a short cylindrical member whose outer surface 20 just fits within the cylindrical portion 14 forming the mouth of the container 1 in relatively tight slideable engagement with the inner surface 21 of that mouth. Thus the overfill collar 2 may be pushed part way into the mouth of the container, but due to its tight sliding engagement with the surface 21, it will remain in the position in which it is placed. The engagement here should be merely sufficient to keep the collar 20 in position while the container and the collar are filled with granules of soda lime, as illustrated in FIG. 3. As an example, about one-quarter of the length of the overfill collar, when engaged with the surface 21, should be sufficient to hold the collar in place until pressure is applied to it to push it down, as will appear hereinafter. Advantageously, the portion of the overfill collar permitted to extend above the top of the flange 15 should have substantially the same extent as the longitudinal extension or expansion imparted to the side wall 10 of the container wall when the overfilled contents thereof are placed under pressure to force them down into the container, as appears in FIG. 4. Furthermore, the vertical extent of the surface 21 should be such as to receive the full height of the collar 2, and the wall thickness of that collar 2 should be such that it not be such that the interior 23 of the collar extends inwardly of the inward extent of the corrugations 11 when the container wall is extended as illustrated in FIG. 4.

With the overfill collar seated in its initial position, as seen in FIG. 2, the container is then completely filled, and so is the overfill collar 2, with granules 25 of soda lime. Here, care should be taken to see that the soda lime takes up all the space in the container and in the collar 2 without leaving any substantial voids, or channels, through the mass. The next step then, as illustrated in FIG. 4, is to apply the cover 3 to the filled container and do so under sufficient pressure to expand the container to elute it.

It is to be noted that the cover 3 has a disc like top 27 of the same diameter as that of the flange 15 around the upper end of the container. Thus, when the cover and the flange are brought together their peripheries will coincide. To assure their concentricity, however, and assist in the positioning of the cover, a downwardly extending locating ring, 28, is formed on the undersurface thereof. The ring 28 is concentric with respect to the top 27 of the cover and has an outer diameter substantially the same as the diameter of the interior 23 of the overfill collar 2.

Hence when the cover is pressed downwardly, the ring 28 will slide interiorly of the collar 2 but with sufficient closeness of fit to locate them accurately with respect to each other and to prevent any material from coming between them. The central portion of the cover top 27, like the container bottom 12, is formed as a screen by having con-
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centric rings of perforations 30 formed therethrough extending outwardly from the center of the cover. The perforated area of the cover, however, is not limited to the holes 30, extends out further from the center than is the case of the perforated portion 13 of the container bottom 12. Thus a portion of the gas flowing in through the top perforations 30 will not be able to flow directly out through the edge of the cover 13 of the bottom. Instead, a certain portion of the gas will be turned back through the soda lime mass by the unperforated part of the bottom 12 before it can escape through the perforated portion 13. Contact of gas and soda lime is, accordingly, enhanced.

With the container 1 suitably supported beneath its flange, the cover 3 is brought into position over the filled container and overfill collar, as seen in FIG. 3. The cover is then pressed downwardly with sufficient force to press the collar 2 down along the surface 21 until the upper end of the collar 2 becomes flush with the upper surface of the flange 15. At the same time, the ring 28 will have slid down along the interior surface 23 of the collar 2 and the peripheral portion 31 of the cover top 27 will have come down into engagement with the upper surface of the flange 15. In order to enable the cover to be applied and brought to the position, as seen in FIG. 4, something will have to be added to give way for room for all of the granules 25, even those nearest to the surface of the cover 3. This is done by surrounding the granules more tightly together. What happens is that the corrugations 11 are flattened out, as seen at 11a in FIG. 4, which not only partially straightens out the side wall 10 of the container but, of course, increases the length of it. This increase in length accommodates the excess volume of granules confined within the overfilling collar, the increase being equivalent to substantially three-quarters of the height of the overfill collar 2 which is pressed down into the container. The importance of this increase in length is not merely that it makes sufficient room for the granules; the real significance of it is that, inasmuch as the container is formed of a resilient plastic, it will have the tendency to return to the form of FIG. 1-3 and thus will hold the granules tightly packed within it. This tight holding action will continue through the shelf life of the finished package and of course through the life of the dam.

Once the package has been formed by forcing the cover 3 into place, the cover is sealed in that position by securing its peripheral portion 31 to the upper surface of the flange 15 of the container. This securing is effected by a heat sealing band, by cementing, or in other suitable manner. As an alternative to expanding the container longitudinally by forcing down on the granules contained therein and in the overfill collar, the top flange 15 of the container is supported from beneath, the exterior of the bottom of the container is held by means of a annular vacuum chuck surrounding the perforated area and then by pulling the top and bottom away from each other, the bellows type side wall is extended the desired amount. While the side wall is held in this extended position against its natural resilience, the container is filled with granules and the top is applied and secured in place. On the release of the extending force of the container will tend to return to its original length and hence will hold the contents thereof tightly.

Another important factor to keep in mind in the proper extension of the side wall of the container and consequent flattening of the corrugations 11c, is that the greatest outer diameter of the side wall 10 should be the same as that of the finished package to be slid into the container to receive it. The outer portion of the side wall 10a and the inner surface of the receiving canister need not, however, be in contact.

Once the package, as illustrated in FIG. 4, is completed by the sealing of the top 27 of the cover 3 to the flange 15, the contents of the package are subjected to a vacuum action whereby air or a suitable gas is drawn through the container past the granules.

in the handling and the pressure packing is removed. After this is done the likelihood of any dust forming is greatly reduced, since the side wall 10 will constantly tend to return to its original position so will maintain a pressure on the granules within the package, preventing them from shifting about and thus generating further dust. Furthermore, the keeping of the granules tightly packed will assure against the gases forming channels as they flow through the mass of granules while the package is in the breathing circuit. All paths through the mass of granules will tend to be equal.

For the sake of convenience, the completed package of FIGS. 4 and 5 will hereinafter be generally indicated by the reference character 35. To apply a vacuum to one end of the package 35, FIG. 5 any suitable means may be employed. In this instance, a suction box 36 is shown which overlies the whole of the perforated portion 40 and has a conduit 37 in communication therewith attached to a vacuum pump or other source of negative pressure.

Preferably the conduit 37 would be provided with a suitable trap for catching any dust drawn off. The bottom 12 of the package would, of course, have its perforated area 13 exposed to air or suitable gas to be drawn through the passages in the mass of granules 25. Preferably the suction is drawn in the direction of the arrows shown, i.e., in through the bottom of the package up through the mass and out through the top 27, though this direction of flow could be reversed if desired. Also, of course, the gas could be blown through the package instead of being sucked through it, though normally better results are attainable by the suction action or vacuum cleaning.

As soon as the vacuum chamber 39 has been completely filled, it is sealed up so it will stay clean and be preserved in its cleaned pressure packed condition until the anesthetist takes it from the shelf and puts it to use. This sealing is achieved by merely applying the disc-like sealing members over the perforated area 30 in the cover 3, being secured by an annulus 38c outside of the perforated area. These seals may be of any suitable material forming a barrier against atmospheric effects and against contamination by foreign substances which might accidentally be brought into contact with, or actually adjacent to, the package.

Normally the absorber apparatus, as seen in FIGS. 9 and 10, merely has a Lucite or other transparent plastic cylinder 65, hereinafter referred to as the canister, received between the top and bottom caps 45 and 46, which canister under prior art practices receives the soda lime granules poured thereinto from the suitable supply container of soda lime in bulk as explained above. The canister when filled by pouring in soda lime granules would normally have screens at top and bottom and often one at an intermediate position to assist in providing even flow of gas through the entire mass of granules. That is not needed in the invention assembly as will appear. By suitable gasketing the canister 65 is in tight sealing engagement around its ends with the interiors of the bases of the caps 45 and 46. It is thus apparent that the canister 65 can be applied and removed between the caps 45 and 46 merely by tightening down on or retracting the collar jack 62 which, when withdrawn, causes the cap 45 to move down or up with respect to the cap 46. This movement results from the riding of the collar jack on the cross support 53 which is fixed in place at 56 at the head of the rod 48 and at 56 on the tube 57. The tube 60 is slidable up and down through the support 53 and has a fast thread engagement with the collar 62 to effect this movement. The cap 45 besides being moved by the tube 60 is slidably mounted at 52 with respect to the rod 48. The bottom cap 46 is fixed in position between the bottom end of the rod 48 at 50 and with respect to the tube 57 with the intention of which it is in communication through the fitting 71.

The package of the invention by no means obsoletes this commonly existing equipment. Instead, it very much
simplifies the use of it. In the first place, the completed packages 35 are so dimensioned that the canister 65 will take two of them. Thus assuming the canister to be empty, it is placed on a table and on its end so that the first package 35 is slid down into it from the top thereof. The exterior dimension of the side wall 10a of the package is preferably such that it fits the interior wall 66 of the canister with sufficient contact to preclude the package from dropping out when the canister is next turned upside down for the introduction of another similar package from the other end. Furthermore, this fit of the outer wall of the package and the interior of the canister has had due regard to the free flow of any gas between these walls is precluded. The periphery of the flange 15 of the package and that, 31, of the package cover, jointly indicated at 67 in FIG. 9, line up with the outer side wall of the canister 65. The gasket 16 underlining the flange 15 of the package seats and seals on the end face of the canister. The same relationships are true with respect to the package introduced from the other end of the canister. The total length of the packages with respect to the length of the canister is such that their bottoms 12 substantially come together to form the subdevice of the canister. Thus, there is no need for the bottoms to seat or seal against each other, however, for the gaskets 16 form seals at both ends and any gas which tends to flow between the package walls 10a and the interior of the canister must eventually flow out through a package interior. In setting up for anesthetizing the doctor or nurse having on hand packages 35 in accordance with the invention, merely takes them from the shelf or wherever else they are stored, removes the top and bottom seals 38 and 39, seats one package in the canister 65 from one end, then turns the canister upside down and seals the next package therein from the other end. Then the operator merely places the canister in the opened up absorber as seen in FIG. 9, seating the cover 3 of the bottom package down into the lower cap 46. Then the upper cap 45 is brought down by turning the collar 62 by means of the spokes 61 until that upper cap 45 is in snug engagement with the cover 3 of the upper package. In this situation not only will seals be formed effectively by the gaskets 16 against the ends of the cylindrical canister 65, but also 0 rings seated in the caps 45 and 46 will sealingly engage the exterior of the cover of the opposed packages adjacent their peripheries. As the patient exhales through the normal mask tube his breath will pass through the dome valve 70 down through the hollow jack screw 66, thus through the end of the cap 45 into the upper one of the packages 35. The exhaled breath will then flow down through the packages losing its carbon dioxide to the soda lime and will then pass out through the bottom cap 46 into the fitting 71 and eventually, subject to the action of the breathing bag 72, will pass up the tube 57 through the valve 72 and be returned to the patient fortified if necessary with additional air, or oxygen and anesthetizing gas. After the operation all the nurse or anesthetist needs to do is to back up on the screw collar 62 thereby raising the cap 45 to sufficient extent to remove the canister 65 wherein the packages can be disposed of and new ones put in place of them. A somewhat modified form of container for use in making up the package of the invention is illustrated in FIGS. 11 and 12. Here the container, generally indicated at 75, has a bottom 76 formed with a perforated screen 77, similar in form to the FIG. 1 container. The side wall 78, however, is corrugated or fluted vertically, as seen at 79 in FIG. 11. At its upper end the side wall 78 has a short cylindrical portion 86 like the cylindrical portion 21 in FIG. 2. Above that it continues in an outwardly extending flange 80 like the flange 15 of the FIG. 1 package. When the package of FIGS. 11 and 12 is overfilled and pressure is applied to force the soda lime into it, the side wall 78 will bulge out horizontally due to the corrugations 79 instead of extending vertically as in the case of FIGS. 3 and 4. The expansion here will take place between the bottom 76 and the cylindrical portion 86, but the dimensions of the wall 78 are so chosen that, when expanded, the lateral pressure for effecting the package of the granules, the package will fit a canister, such as 65, in generally the same manner as does the package 35. Also the flange 80 with a suitable underlying gasket will lie over the end of the canister in the same manner. FIG. 13 shows a further modification of container, the side wall 81 of that sort of waffle formino imparted to it as shown at 82. The bottom 83 is similar to the bottom 12 of the form of FIGS. 1-8 and is similarly perforated to provide a screen. At its upper end the side wall 81 is finished off cylindrically, as seen at 84, which cylinder provides an internal seat for the reception of an overfill collar as shown at FIG. 2. The top flange 85 is likewise the same as the flange 15 on the package 35. The container shown in FIG. 14 has its side wall 87 formed with helical corrugations 88 but is in other respects the same as FIG. 1 container. The bottom 89 is the same as the bottom 12, while inside the mouth at the upper end a seat 90 is provided for the reception of an overfill collar. The flange 91 extends out from that seat the same as the flange 15. The modification in FIGS. 13 and 14 are to be employed in the same manner as the container of FIGS. 1 and 2. In other words, they are intended to be overfilled by use of an overfill collar and to have the soda lime pressed down into them to expand the side walls 81 and 87 when the cover, comparable to the cover 3, is pressed into place on them. An important modification of the invention is illustrated in the fragmentary showing of FIG. 15. Here the portion of the package shown is similar to that of FIG. 5. The soda lime particles 95 here are spheres instead of non-uniform granules. A greatly enlarged showing of one of these spheres is seen in FIG. 16. These spheres are made up of small granules 96 of soda lime bound together at spaced positions, such as 97, by their natural capability for joining directly to each other or by the use of suitable binding material while leaving a multitude of passages within the spheres so that the exhaled gases can flow through and be absorbed by contact with the faces of the soda lime granules making up the spheres. Lump sugar is a non-limiting example of a structure simulating that of these spheres. Though spheres made up of variously spaced granules leaving passages to enable gas to engage their surfaces have been here illustrated in FIGS. 15 and 16, and though they do provide for the most uniform packing throughout the total mass of lime granules, other forms than spheres may nevertheless be made up out of the soda lime particles. It is, accordingly, to be understood that the particular form here shown is shown for illustrative and not for limiting purposes. Expansion of resilient package walls serves admirably for retaining the granules within tightly packed and immobilized. Other manners of achieving the same retention with or without utilizing resilient walls would readily suggest themselves to those skilled in the art without departing from the spirit and scope of the invention. Furthermore, variations in the construction of the container, whether for use in a different form of absorber apparatus or other place might also suggest themselves to those skilled in the art without departing from the spirit and scope of the invention. Speaking generally, then, since certain changes in the construction set forth and in carrying out the above method and different embodiments of the invention may be made without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in
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the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A container formed of a resilient plastic material in generally the shape of a cup having a side wall and a bottom, said side wall being formed for expansion against the resilience of the material thereof by means including corrugations therein, and a cover, said cover being in the form of a first disc-like member formed to overlie the open upper end of said container, said disc-like member having a portion thereof formed with a multiplicity of perforations therethrough, said bottom being a second disc-like member having a portion thereof formed with a multiplicity of small perforations therethrough.

2. A container as in claim 1, said side wall having a portion thereof adjacent the upper end thereof formed internally with a cylindrical sleeve surface, a short cylindrical member having its exterior surface formed for slidable engagement with said cylindrical surface, said cover being formed on its under surface with a downwardly extending annular rib, the outer surface of said rib being formed for slidable engagement with the inner surface of said cylindrical member.

3. The method of tightly packing granular material in a container, having an upwardly opening mouth and formed with an expandable side wall, to retain said material in tightly packed condition, which comprises, overfilling said container with said granules with a quantity of the same extending up outwardly of said open mouth over substantially the entire area of said mouth, containing said outwardly extending quantity and pressing said material over substantially its entire area into said container while expanding the side wall thereof to receive all of said granular material within said container.

4. The method as in claim 3 and expanding said side wall of said container by extending the same laterwise.

5. The method of packaging granular material in a container having generally the form of a cup with an open mouth, and with a resiliently expandable side wall, said side wall having a short cylindrical portion adjacent the open mouth thereof, which comprises, seating a short cylindrical ring within said cylindrical portion, with a portion of said cylindrical ring extending upwardly above the top of said container, filling said container and said ring with granular material and expanding the wall of said container against the resilience thereof to receive all of said material while pressing said ring down into said cylindrical portion, applying a cover across the open mouth of said container and across the upper end of said ring and sealing said cover in place over the upper end of said container.

6. The method as in claim 5 and forcing said granular material into said container by pressing said cover down onto the same while pressing down on said ring.

7. The method of packaging soda lime for use in anesthesia which comprises, providing a container generally in the form of a cup having a resiliently expandable side wall and a bottom formed with a multiplicity of small perforations therethrough, overfilling said container with granules of soda lime so that said soda lime extends up above the opening of said container, containing said upwardly extending portion of soda lime against spilling, expanding the side wall of said container against its normal resilience to receive all of said soda lime within the body of said container, applying a cover formed with a multiplicity of small perforations therethrough across the open end of said container to retain said soda lime therein, securing said cover to said container and passing a gas in through the perforations at one end of said container through said body of soda lime in the container and out through the perforations at the other end to evacuate any dust present in said body of soda lime.

8. A package of granular material which comprises a container in the form of a cup having a resiliently expandable side wall, a charge of granules within said container, a cover secured in place over the open mouth of said container, and a bottom in the form of a disc-like member having a portion thereof formed with a multiplicity of small perforations therethrough, said side wall of said container being stretched against the resilience thereof to accommodate said granules and thereby retain the same in tight packed condition due to the tendency of said side wall to return to its initial state.

9. A package as in claim 8, said side wall of said container being corrugated to facilitate resilient expansion thereof.

10. A package of granular soda lime for use in anesthesia which comprises, a container generally in the form of a cup having a bottom, a side wall and an open mouth at the end of said side wall opposite said bottom, a cover extending across and closing said open mouth, granules of soda lime substantially free of soda lime dust tightly packed within said container to substantially preclude movement of said granules with respect to each other, groups of said soda lime granules being secured together substantially in the form of spheres, and said bottom and said cover formed with perforations therethrough about the centers thereof.

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