May 23, 1933. Z. MINCOVSKY 1,910,033

OBTURATING DEVICE

Filed June 23, 1931 3 Sheets-Sheet 1

Fig. 1

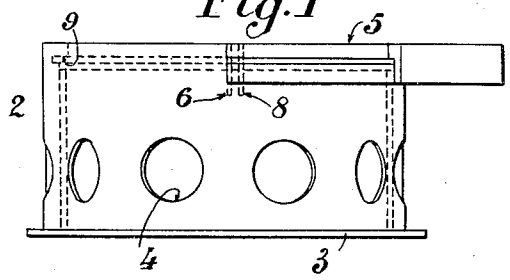


Fig. 2

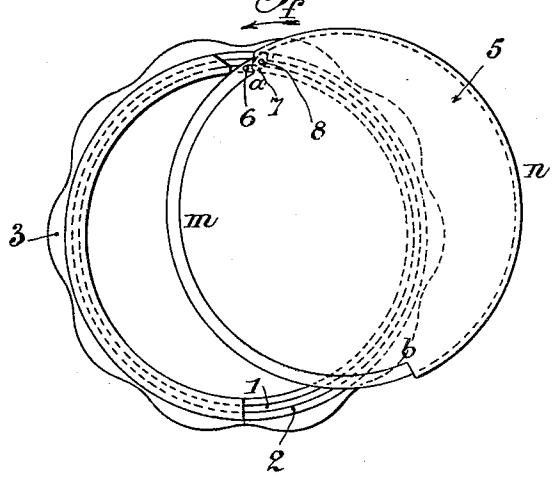
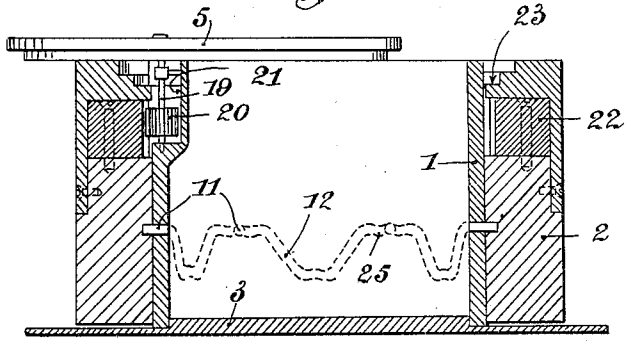


Fig. 8



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May 23, 1933. Z. MINCOVSKY 1,910,033

OBTURATING DEVICE

Filed June 23, 1931 3 Sheets-Sheet 2

Fig. 3

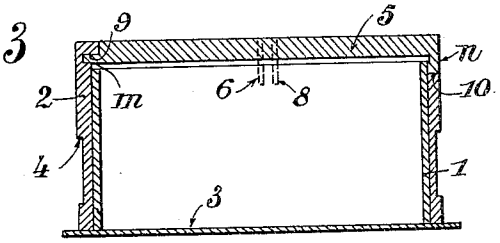


Fig. 5

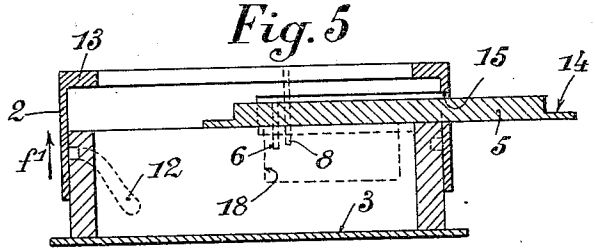


Fig. 6

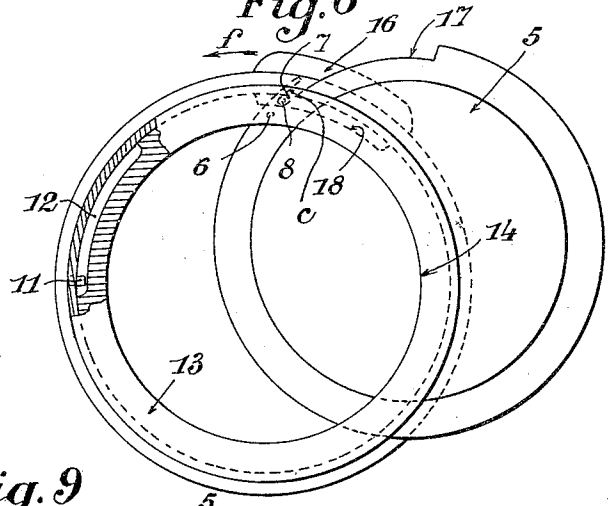
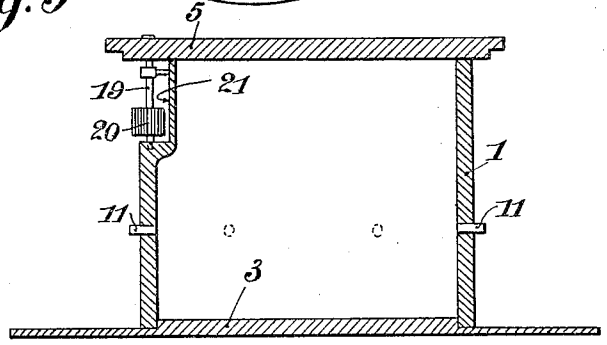


Fig. 9



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May 23, 1933. Z. MINCOVSKY 1,910,033

OBTURATING DEVICE

Filed June 23, 1931 3 Sheets-Sheet 3

Fig. 4

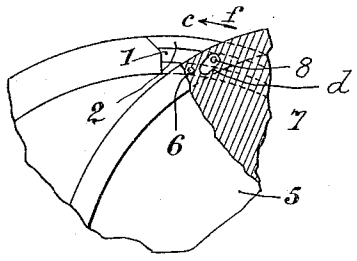


Fig. 7

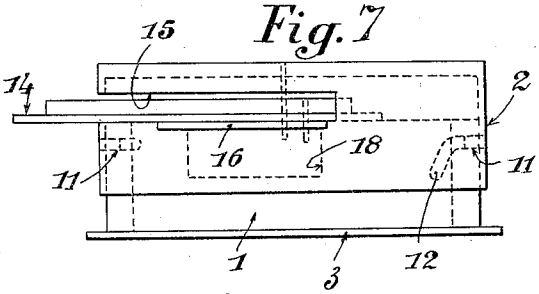


Fig. 11

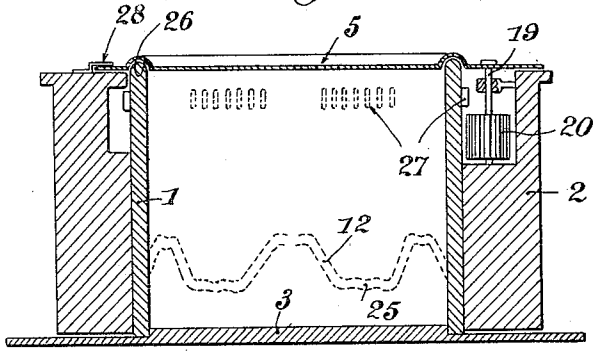
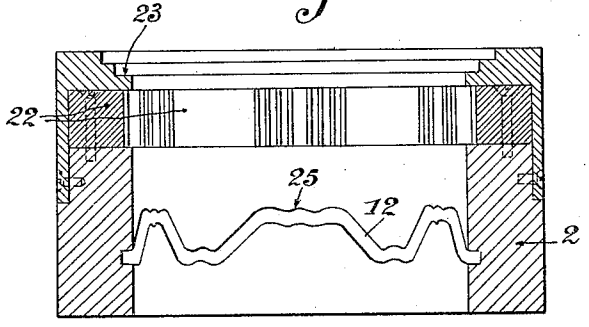


Fig. 10



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UNITED STATES PATENT OFFICE

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OBTURATING DEVICE

Application filed June 23, 1931, Serial No. 546,372, and in France July 12, 1930.

My invention has for its object a device for obturating an orifice. A characteristic feature of the device according to my invention consists in providing, in the vicinity of the orifice to be obturated, a movable piece adapted to be displaced with respect thereto. A lid pivoted, through a point close to its periphery, either to the part to be obturated or to said movable piece, and preferably at a point close to the edge of the orifice, is operatively connected to said movable piece in such a manner as to be actuated by a very small displacement of the movable part with respect to the part which is to be obturated.

According to another feature of my invention, a pin, integral either with one of the parts (movable part or part to be obturated) or with the lid, can be displaced in an eccentric groove either of the lid or of one of the two parts above mentioned, and causes the lid to pivot when said parts are displaced with respect to each other.

My invention also relates to tubes, recipients and all objects or devices having an orifice, or opening, provided with an obturating device according to my invention.

Preferred embodiments of my invention will be hereinafter described with reference to the accompanying drawings given merely by way of example and in which:

Fig. 1 is an elevational view of a box half obturated by a device according to my invention;

Fig. 2 is a corresponding plan view;

Fig. 3 is a vertical section of the same box shown in the closed position;

Fig. 4 is a plan view, partly in section and at an enlarged scale, of the means for articulating and controlling the lid;

Fig. 5 is a vertical section of another embodiment, the box being half open;

Fig. 6 is a plan view partly in section;

Fig. 7 is a back view of the same box;

Fig. 8 is a vertical section showing another embodiment of my invention;

Fig. 9 is a vertical section of the inner container of the box shown in Fig. 8 and of the lid by which it is obturated;

Fig. 10 is a vertical section showing the casing that surrounds the box;

Fig. 11 is a vertical section of another embodiment of my invention.

In the embodiment shown in Figs. 1 to 4, the box comprises an inner container 1, the outside part of which is cylindrical, the inside being of any shape whatsoever. A cylindrical casing 2 is rotatably mounted on cylinder 1 with a snug fit. It is preferable that bottom 3 of container 1 should have a diameter larger than casing 2 and should be provided with a series of notches, for example, to allow of taking hold easily of container 1 in order to move casing 2. The casing may, to this effect, comprise a series of recesses 4, which may be of circular shape and disposed on the periphery of said casing.

A flat lid 5 is pivoted, at a point close to its periphery, about an axis 6 fixed through any suitable means to container 1 at right angles to said lid.

In the vicinity of the point about which it pivots, lid 5 comprises, on its inner surface, a groove or slot 7, which is engaged by the head of pin 8 fixed to casing 2 by any suitable means. This groove 7 is eccentrically located with respect to the center of lid 5.

When it covers the orifice of tube or box 1, lid 5 is held in position by an appropriate device. In the embodiment of Figs. 1 to 3, the edge of lid 5 is thinned along a part of its periphery, that is along *a m b*, Fig. 2. When container 1 is closed, said thinned edge fits into a circular groove 9 provided in the corresponding side of casing 2, on a level with the top of container 1 (Figs. 1 and 3). Preferably, the edge of the other part *a n b* is flanged towards container 1, so as to fit over the edge of said container in the same way as an ordinary lid, and suitably cut out in the vicinity of point *a* so as not to interfere with the opening movement. To this effect, the top part of casing 2 is suitably slit at point 10, along that line of its periphery which corresponds to part *a n b* of the lid (Fig. 3).

The operation of my device is as follows: When casing 2 is rotated with respect to box 1 in the direction of arrow *f* (Figs. 2 and 4), pin 8 rotates in the same direction with re-

lation to axis 6 and causes lid 5 to pivot by acting upon the edge *c* of groove 7 along the different points on which it bears successively. This displacement causes box 1 to open. In order to close said box 1, casing 2 is rotated, with relation to the box, in the direction opposite to that indicated by arrow *f*. Pin 8 then causes lid 5 to rotate by acting upon the edge *d* of groove 7. Said lid thus pivots about its axis 6 and covers box 1. These different operations can be performed with one hand.

It is quite evident that axis 6 of lid 5 could be supported by casing 2, pin 8 being, in this case, integral with box 1. Again, pin 8 could be supported by lid 5, the corresponding groove 7 being provided in the form of a cavity, either in cylinder 1 or in casing 2.

Another embodiment of my invention is shown in Figs. 5 to 7, where lid 5 is applied against inner box 1 so as to be integral therewith once the obturating operation is completed. To this effect, casing 2 is so devised as to be able to slide and pivot on box 1, by means of one or more pins 11 integral with said casing. Each of the pins 11 is movable in a groove 12 of box 1. Said groove 12 has a part which is inclined, provoking, through the pivoting movement of casing 2, a longitudinal displacement of the latter on box 1, while a substantially horizontal part of said groove 12 allows of a simple rotary movement of said casing 2 with relation to box 1, when the former is in its upper position. Obviously, pins 11 might be fixed to box 1 and grooves 12 might be provided in casing 2.

Casing 2 comprises an inward flange 13 which is applied against the edge of lid 5. Preferably, lid 5 is of reduced thickness on its periphery, as shown at 14, so that edge 13 of casing 2 may be supported by the thinned part and the central part of lid 5 may fit into the opening limited by edge 13. Thus, when casing 2 is lowered, lid 5 is held down firmly so as to avoid any displacement which might bend said lid or the pins, thus ensuring a tight closing of the box.

In order to insure a free passage for lid 5 when box 1 is being opened, casing 2 is provided with a lateral slot 15 (Figs 5 and 7), the breadth of which is slightly wider than the thickness of lid 5 and the length of which is about equal to half the circumference of the casing. Preferably, a horizontal lug 16 is provided, which is fixed on the outside of casing 2, on the level of the lower part of slot 15, so as to support lid 5 when it is outside casing 2.

Groove 7 of the lid in which pin 8 moves is open on the periphery of said lid, so as to allow for the moving in and out of said pin 8. Lid 5 comprises moreover a circular groove 17, which allows for the displacement of said pin 8 during the rotation of casing 2 that corresponds to the upward displacement of said casing. For the same reasons, box 1 comprises a notch 18 in which pin 8 can freely be displaced.

Box 1, when closed, is completely covered by lid 5, which is held down by casing 2, the edge 13 of which fits upon circular notch 14. To open the box, casing 2 is rotated with respect to said notch 14 in the direction of arrow *f* (Fig. 63). As the pin, or pins, 11 are moving in the inclined part of the groove or grooves 12, casing 2 is displaced axially with respect to box 1 in the direction of arrow f^1 (Fig. 5). Meanwhile, pin 8 moves in slot 18 of box 1 and in circular notch 17 of lid 5 without actuating the latter.

When pin, or pins, 11 reach the top of the slopes of groove, or grooves, 12, casing 2 is sufficiently lifted to bring lateral slot 15 of said casing on a level with lid 5. From that time on, when casing 2 is pivoted, it remains on the same level with respect to box 1, owing to the horizontal portions of slots 12. In that second part of the pivoting movement of casing 2, pin 8 engages groove 7 of lid 5 and causes said lid 5 to pivot by acting upon edge *c* of the groove. Lid 5 is moved out of casing 2 through slot 15, thus uncovering box 1.

To close the box, casing 2 is rotated with one hand, with respect to said box, in the direction opposite to that indicated by arrow *f*. The same movements as above described take place in the opposite direction, pin 8 bearing on edge *d* of groove 7.

In the two embodiments of my invention that have been above described, the box is opened through the slight pivoting movement obtained by displacing, with one hand, casing 2 with respect to box 1 in a determined direction. It is closed by the same pivoting movement effected in the opposite direction. The box could also be successively opened and closed through a rotary movement in one direction only, no matter which, as shown, for example, in Figs. 8, 9, 10 and 11.

In the embodiment shown by Figs. 8, 9 and 10, lid 5 is fixed to a vertical axis 19, on which is keyed pinion 20. Said pinion 20 and axis 19 are disposed in a recess 21 provided in the lateral surface of box 1, said pinion 20 projecting outwardly from said surface. Pinion 20 meshes with a toothed rim 22, placed inside casing 2, where it is fixed by any suitable means. Thus, the rotary displacement of casing 2 about box 1 causes pinion 20 and lid 5 to rotate successively, producing the opening and closing of box 1. Of course, pinion 20 and axis 19 on which is fixed lid 5 might also be mounted on casing 2, toothed rim 22 being then fixed to the outer lateral surface of box 1 and the teeth of said rim being on the outside.

When pinion 20 is supported by box 1, casing 2 preferably extends above the top of said box and is provided with a circular groove 23 on a level with the upper edge of

said box, the diameter of said groove 23 being substantially equal to that of lid 5, so that, when the box is closed, said lid 5 fits into said groove 23 and is thus maintained in position.

In order that the rotary displacement of casing 2, with respect to box 1, may produce the displacement of lid 5, it is therefore necessary for said casing to be first lowered, with respect to the box, into a position which will disengage said lid 5. This is obtained automatically in the embodiments shown in Figs. 8 to 10, through a device similar to that which is shown in Figs. 5 to 7.

In this arrangement, pin, or pins, 11, carried by box 1, move in a continuous groove 12 of casing 2. Said groove 12 comprises horizontal portions which correspond to the simple pivoting movement of casing 2 with respect to box 1 in the lower portion of the casing. Preferably, notches 25 are provided in the middle of said horizontal portions, in order to more firmly maintain the position of the casing and of all the movable parts when at rest. Said horizontal portions are connected to each other by sloping parts located below said horizontal portions, so that when pins 11 move in said sloping parts, due to the pivoting movement of casing 2, said casing is raised or lowered with respect to box 1.

Lid 5 must be rotated only when it is disengaged from slot 23, viz, when casing 2 is in its lower position with respect to box 1. This corresponds to the passage of pins 11 in the horizontal portions of groove 12. To this effect, rim 22 is toothed only at intervals, the toothed portions being separated by smooth intervals. Said toothed portions are so disposed that pinion 20 engages the teeth of one of said intervals during the passage of pins 11 in the horizontal portions of groove 12 and the number of teeth of each toothed portion is equal to that of pinion 20.

Thus, when box 1 is closed, casing 2 is in the upper position, pins 11, carried by box 1, being at the bottom of the sloping portions of groove 12 of casing 2. Lid 5 is immobilized in groove 23 and pinion 20 is located between two toothed portions of rim 22.

To open the box, casing 2 is pivoted with respect to box 1 in any direction. As pins 11 move along the sloping parts of groove 12, casing 2 is lowered and disengages lid 5. When casing 2 is in its lower position and pins 11 are at the top of the sloping parts of groove 12, pinion 20 comes into contact with the teeth of a toothed portion of rim 22. In that manner, when casing 2 is further rotated, lid 5 is caused to rotate and uncovers box 1. The length of each horizontal portion of groove 12 being equal to the circumference of the pinion, lid 5 has rotated through 180° when pinion 20 reaches the middle of the toothed portion of rim 22, pins 11 being then in the middle of the horizontal portions of groove 12.

Whatever the direction in which casing 2 is further rotated, lid 5 also pivots in the same direction about its axis and is brought into a position in which it covers box 1. At that time, pinion 20 leaves the toothed portion of the rim so that it is no longer driven thereby. Pins 11 move down the sloping portions of groove 12 and casing 2 moves in an upward direction with respect to box 1, finally locking lid 5 by means of circular slot 23.

I have shown in Fig. 11 an embodiment of my invention in which pinion 20 and axis 19 to which is secured lid 5 are mounted on casing 2. Toothed rim 22 is then secured to the lateral outer portion of box 1 and the teeth of said rim are disposed on the outside. The toothed rim might also be replaced, as shown in Fig. 11, by projections 27 suitably disposed on the outer surface of box 1.

In the last mentioned embodiment, lid 5 may be provided with a circular recess or groove 26 which is engaged by the edge of box 1 in the closed position, so as to insure fluid tightness. In that position, casing 2 is in the lower position with respect to box 1. Preferably, a piece 28, having the shape of a horse shoe, is fixed, through one of its branches, to casing 2, at right angles to the plane of lid 5 and at a point diametrally opposite to axis 19, the branches of the horse shoe being radially disposed with respect to the casing. The positioning of that piece is such that, when the box is being closed, the edge of lid 5 is brought between the branches of the horse shoe inside which it is thus immobilized by the upper branch.

In order to open box 1, the casing is caused to rotate about said box until it is brought into the upper position for which the circular groove 26 of lid 5 is released from the edges of the box. From that time on, as pinion 20 is in mesh with projections 27, a slight movement of rotation of casing 2 produces, as in the preceding example, the pivoting of lid 5, so as to uncover box 1.

To close the box, casing 2 is rotated, with respect to said box, in any direction whatever. Lid 5 is thus brought over box 1, the edge of said lid in the portion opposite to axis 19 being brought between the branches of piece 28, when lid 5 covers box 1, pinion 20 leaves the toothed portion formed by projection 27 and casing 2 moves in a downward direction with respect to the box and drives along lid 5 in its motion. Groove 26 of said lid is thus applied against the upper edge of box 1. In that way, owing to groove 26 and to piece 28, the box is closed in fluid-tight manner.

It will be readily understood that pinion 20 and toothed rim 22 or projections 27 might be replaced by frictional surfaces.

It should be well understood that my invention is not limited to the embodiments above described and disclosed in the drawings, and which have been shown merely by

way of example. In particular, the obturating devices above described are capable of being applied not only to boxes but to all objects having an orifice, and chiefly to optical or similar apparatus, ports, windows, apertures for automobile bodies, and so on.

In all these cases, the obturation of an orifice of any kind is obtained by displacing a movable element in the vicinity of the orifice. Obviously, a lid pivoted as described in one of the preceding examples, on the one hand to the movable element, and on the other hand to the piece to be obturated will act exactly as the lid of the above described boxes when the movable element will be displaced with respect to the orifice.

What I claim is:

1. An obturating device of the type described comprising in combination, two concentric pieces adapted to be rotated one with respect to the other, the innermost of said pieces forming the mouth of the container to be obturated, an axle parallel with the common axis of said two pieces and supported on one of said pieces, a lid eccentrically pivoted about said axle and adapted to be rotated about said axle in a plane at right angles with said common axis of the two pieces, and means, carried by the other piece and operatively connected to said lid for causing it to pivot about said axle when the two concentric pieces are rotated with respect to one another.

2. An obturating device of the type described comprising in combination, an annular part forming the mouth of the container to be obturated, an annular casing concentrically surrounding said annular part, and adapted to rotate with respect to it, an axle parallel with the common axis of said annular part and annular casing and supported by the upper edge of said annular part, a lid eccentrically pivoted to said annular part about said axle in a plane at right angles with said common axis of the two pieces, and means, carried by said casing and operatively connected to said lid, for causing it to pivot about said axle when the casing is rotated relatively to the inner annular part.

3. An obturating device of the type described comprising in combination, two concentric annular pieces adapted to rotate within one another, the innermost of said pieces forming the mouth of the container to be obturated, an axle parallel with the common axis of said two pieces and supported by one of said pieces, a lid pivoted about said axle at a point close to its periphery and adapted to be rotated about said axle in a plane at right angles with said common axis of said two pieces and to be applied against the mouth of said annular inner piece, and means, carried by the other piece in the vinicity of said axle and operatively connected to said lid for causing it to pivot about said axle when said two pieces are rotated relatively to each other, whereby the lid can be caused to entirely uncover the orifice of the container.

4. An obturating device of the type described comprising in combination, two concentric annular pieces adapted to rotate within one another, the innermost of said pieces forming the mouth of the container to be obturated, an axle parallel with the common axis of said two pieces and supported by one of said pieces, a lid pivoted about said axle at a point close to its periphery provided with an eccentric slot and adapted to be rotated about said axle in a plane at right angles with said common axis of said two pieces, and a pin fixed to the other annular piece adapted to engage said slot for causing said lid to pivot.

5. An obturating device of the type described comprising in combination, an annular part forming the mouth of the container to be obturated, a circular casing concentrically surrounding said annular part and adapted to rotate about it, an axle parallel with the common axis of said annular part and annular casing and supported by the upper edge of said annular part, a lid adapted to be applied against said mouth pivoted about said axle at a point close to its periphery and provided with an eccentric slot close to its periphery, and a pin fixed to said outer casing adapted to engage said slot for causing said lid to pivot about said axle when said casing is rotated relatively to said inner annular part.

6. An obturating device of the type described comprising in combination, two concentric pieces adapted to both rotate and slide longitudinally one with respect to the other, at least one sloping groove and one pin provided respectively on the adjacent peripheral faces of said two pieces, said pin engaging said groove, whereby upon rotation of one piece with relation to the other said pieces are moved lengthwise with relation to one another, an axle parallel with the common axis of said two pieces and supported on one of said pieces, a lid eccentrically pivoted about said axle in a plane at right angles with said common axis of the two pieces, and means carried by the other piece and operatively connected to said lid for causing it to pivot about said axle when the two concentric pieces are rotated with respect to one another.

7. An obturating device according to claim 6, in which the casing is provided with a slot for permitting the rotation of the lid in the outward direction when the casing is in its upper position.

8. An obturating device of the type described comprising in combination, two concentric annular pieces adapted to rotate one within the other, the innermost of said pieces forming the container to the obturated, an

axle parallel with the common axis of said two pieces and supported by the upper end of one of said pieces, a lid pivoted about said axle at a point close to its periphery, a plurality of teeth on the periphery of the other of said pieces, and a pinion keyed to said lid and adapted to mesh with said teeth, whereby the lid is caused to pivot when said annular pieces are rotated one with respect to the other.

9. An obturating device of the type described comprising in combination, an annular part forming the mouth of the container to be obturated, a cylindrical casing surrounding said annular part and adapted to rotate with respect to it, a lid adapted to be applied against said mouth, an axle parallel with the common axis of said annular part and annular casing and extending through said lid at a point thereof close to its periphery and rotatably supported by said inner annular part, a pinion keyed to said axle, and a toothed sector fixed to the inner wall of said casing and adapted to mesh with said pinion, whereby said lid is caused to pivot when said casing is moved annularly with respect to said annular part.

10. An obturating device of the type described comprising in combination, an annular part forming the mouth of the container to be obturated, a cylindrical casing surrounding said part and adapted to both rotate and slide longitudinally with respect to it, a lid adapted to be applied against said mouth, an axle parallel with the common axis of said annular part and said annular casing and extending through said lid at a point thereof close to its periphery and rotatably supported by said inner annular part, said axle being integral with said lid, a pinion keyed to said axle, a toothed sector fixed to the inner wall of said casing and adapted to mesh with said pinion, said casing being provided with at least one sloping groove in its inner wall, at least one pin integral with the inner annular part adapted to engage said groove, the edge of said casing being provided with a circular groove adapted to receive the edge of the lid when the casing is in its upper position.

In testimony whereof I have signed my name to this specification.

ZOUNIA MINCOVSKY.