Sept. 2, 1958 U. HOFMANN 2,850,200

HINGED LID CONSTRUCTION

Filed July 8, 1955 2 Sheets-Sheet 1

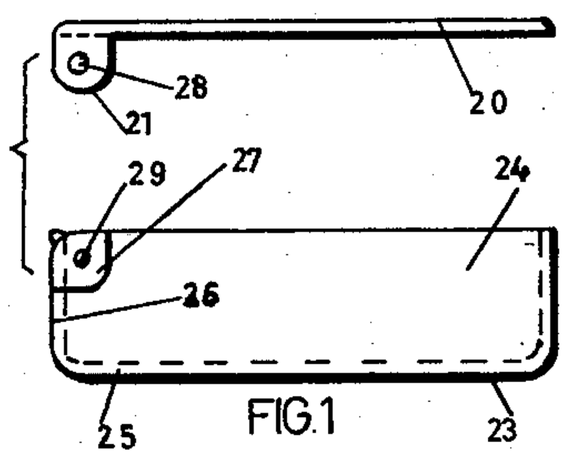

FIG.1

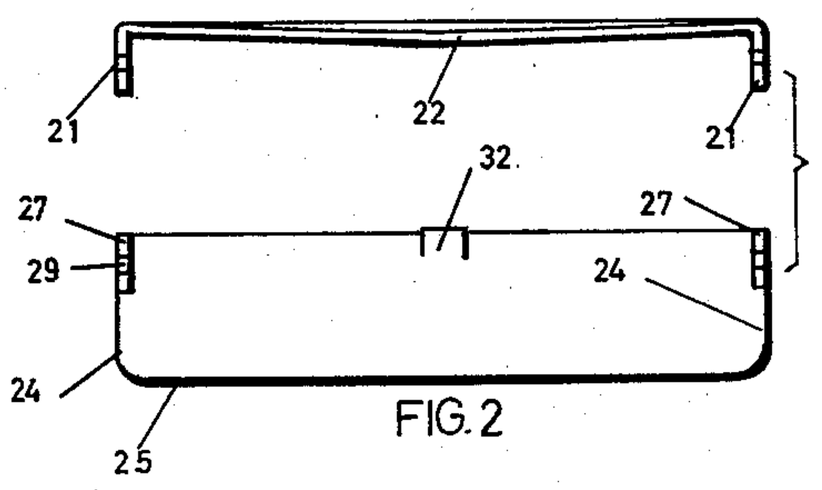

FIG. 2

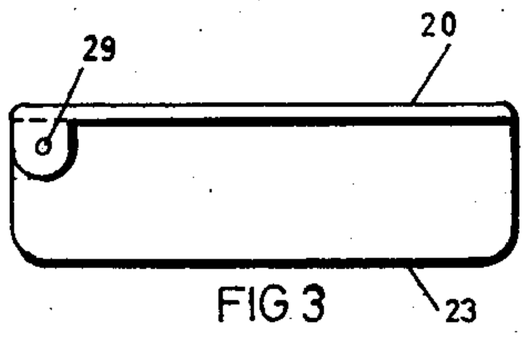

FIG 3

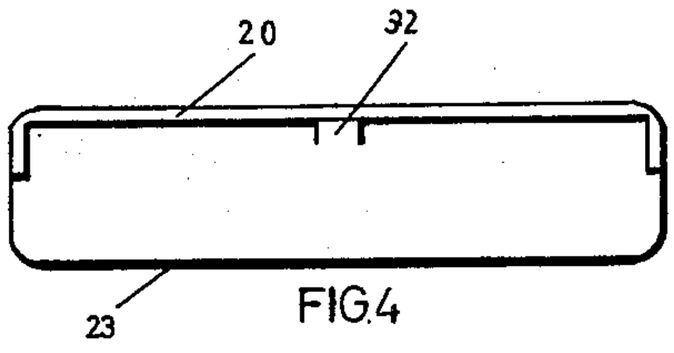

FIG.4

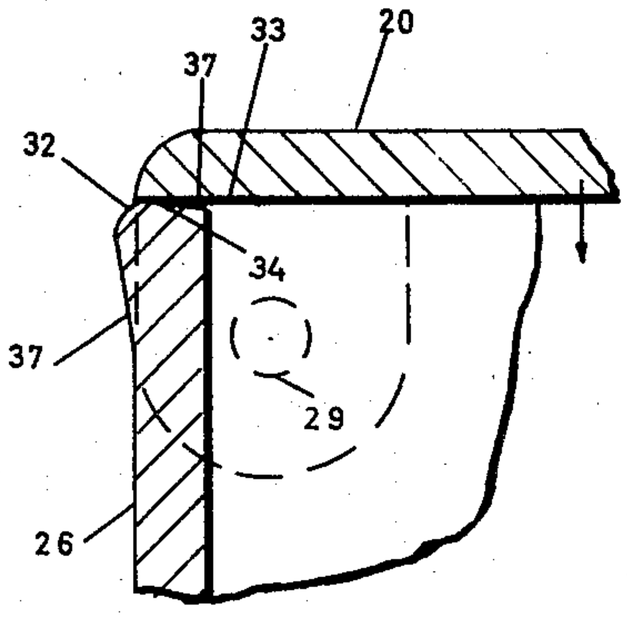

FIG. 5

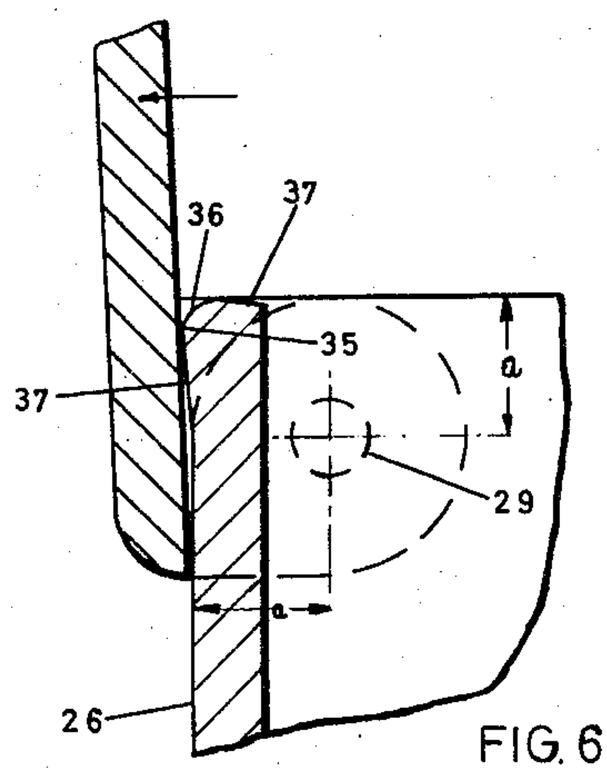

FIG. 6

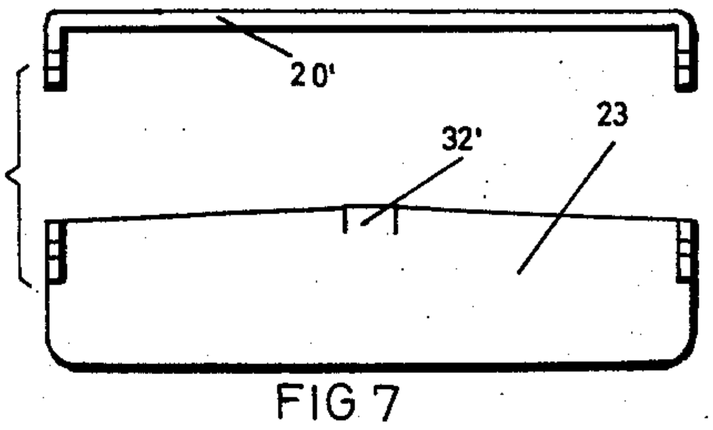

FIG 7

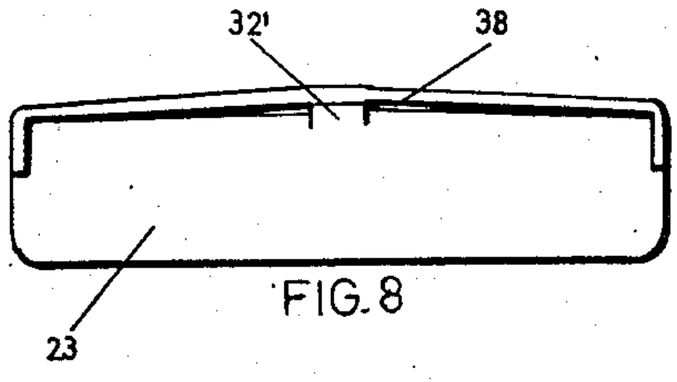

FIG. 8

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HINGED LID CONSTRUCTION

Filed July 8, 1955 2 Sheets-Sheet 2

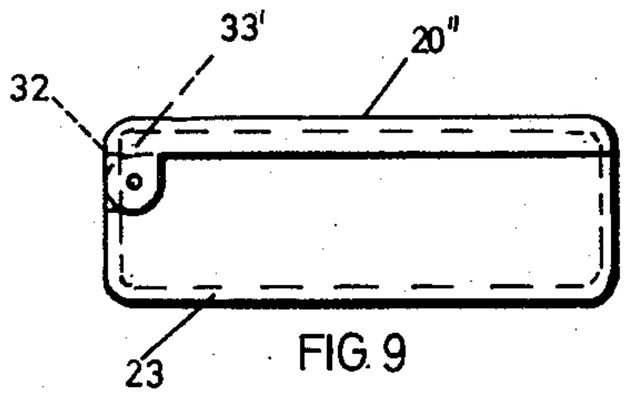

FIG. 9

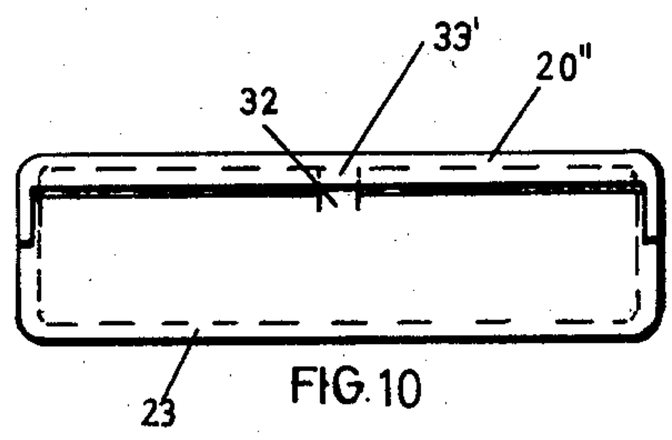

FIG. 10

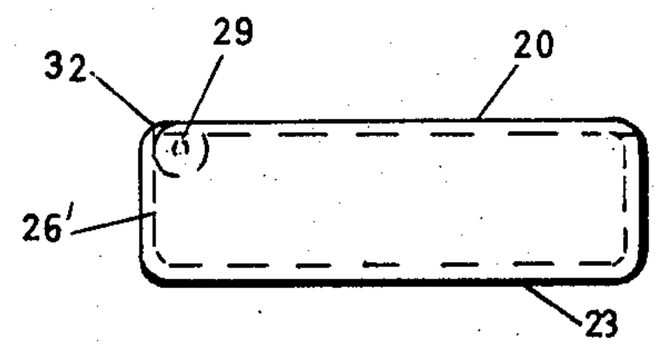

FIG. 11

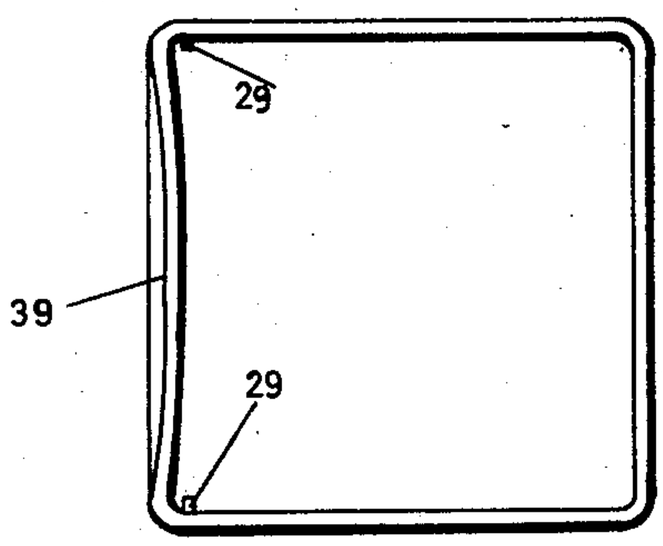

FIG. 12

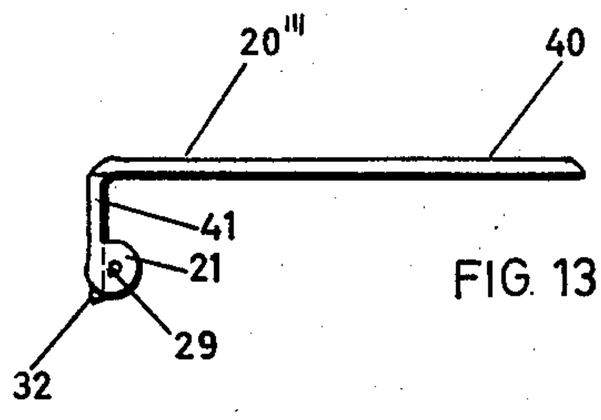

FIG. 13

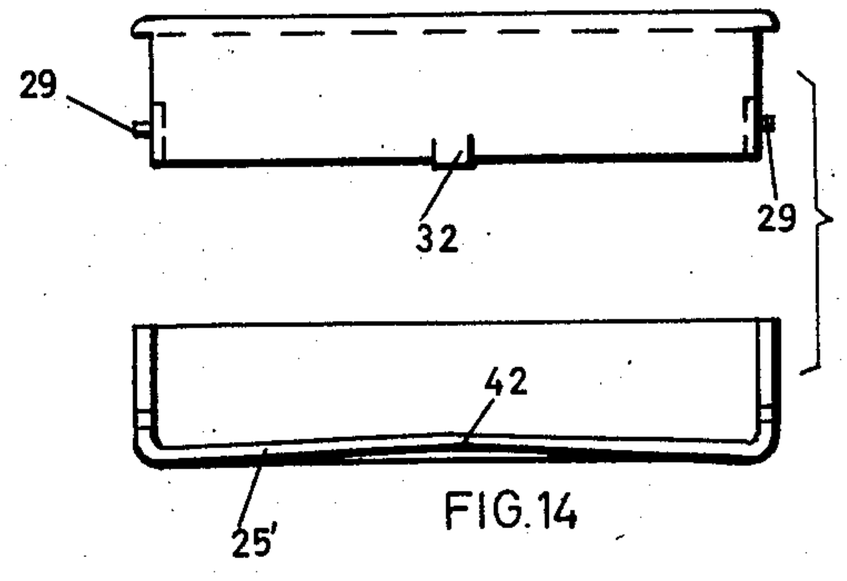

FIG. 14

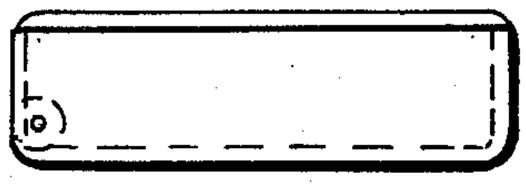

FIG. 15

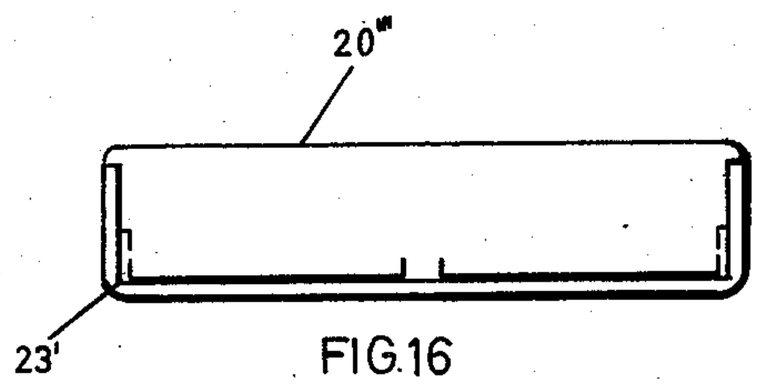

FIG. 16

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HINGED LID CONSTRUCTION

Ulrich Hofmann, Ebingen, Germany

Application July 8, 1955, Serial No. 520,892

Claims priority, application Germany July 21, 1954

5 Claims. (Cl. 220—31)

The present invention relates to a hinged lid construction and more particularly to a hinged lid construction in which the lid is held in its end position by spring action and in which the movement of the lid when turned, proceeds towards its end position with a snap action.

One of the objects of the present invention is to build such a lid construction from few and simple parts.

Another object of the present invention is to build such a lid construction without separate springs.

It is yet another object of the present invention to build such a lid construction especially for boxes which can be manufactured at a very economical price.

With the above objects in view, the lid construction of the present invention includes support means, a lid member mounted on the support means for turning movement about an axis and being turnable between an open position and a closed position, the lid member having a contact face, at least one retaining member fixed on the support means and having a contact face cooperating with the contact face of the lid member, the contact face of one of the members being a cam face including a first portion engaging the contact face of the other of the members when the lid member is in the closed position, a second portion engaging the contact face of the other of the members when the lid member is in the open position, and an intermediate portion farther spaced from the axis than the first and second portions and engaging the contact face of the other of the members during turning movement of the lid member so that the same tends to assume either of the open or closed positions when turned about the axis.

Preferably, one of the aforementioned members is being made of resilient material and the cam face formed on the other of the two members engages when the two members are assembled the contact face of the member formed of resilient material to resiliently deform this member and to create thereby a contact pressure between the two contact faces.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is an exploded side view of a box in which the lid construction of the present invention is used;

Fig. 2 is an exploded rear view similar to Fig. 1;

Fig. 3 is a side view similar to Fig. 1 in which the parts are shown in assembled condition;

Fig. 4 is a rear view similar to Fig. 2 in which the parts are shown in assembled position;

Figs. 5 and 6 are enlarged cross sectional views of a detail of the construction shown in Fig. 3, showing the lid member in closed and open positions, respectively;

Fig. 7 is an exploded end view showing a modification of the construction;

Fig. 8 is a rear view of the same modification shown in Fig. 7 with the parts illustrated in assembled position;

Figs. 9 and 10 are side views and rear views, respectively, showing another modification made according to the present invention;

Fig. 11 is a side view of a further modification of a construction according to the present invention;

Fig. 12 is a top view of one of the members illustrated in Fig. 11 before assembly with the other member;

Fig. 13 is a side view of yet another modification of a lid member according to the present invention;

Fig. 14 is an exploded end view of the lid member shown in Fig. 13 and the corresponding box member;

Fig. 15 is a side view showing the members illustrated in Fig. 14 in assembled position; and

Fig. 16 is a rear view of the modification shown in Fig. 15.

Referring now to the drawings, and more particularly to Figs. 1–4 of the same, which show one modification of a lid construction according to the present invention in which this lid is used to form the cover of a box. The lid member **20** is formed as a plate having two ears **21** extending in downward direction at one end respectively from the side edge of this plate. The portion **22** of this plate directed towards the two ears is preferably formed with a downwardly directed bend as shown clearly in the end view of Fig. 2. The construction comprises further a box member or support means **23** which is formed with a pair of parallel side walls **24**, a bottom wall **25** and a rear wall or retaining member **26**. The side walls **24** are preferably provided with recesses **27** in the region where the ears **21** will be located when the lid member **20** is assembled with the box member **23**. The ears **21** are preferably formed with centrally located holes **28** and corresponding trunnions **29** are integrally formed in the recessed portion **27** of the side walls **24** and extending substantially normal to the side walls. The lid member **20** is assembled to the box member **23** by inserting the trunnions **29** through the holes **28** provided respectively in the ears of the lid member **20** whereby during the assembly the side walls in the box member **23** are slightly bent inwardly and the ears on the lid member outwardly. Instead of a pivot trunnions integrally formed with the side walls separate short pivot pins can be used connecting each of these ears **21** pivotally to the respective side wall in which case the side walls are also provided with holes. Such pivot pins are respectively riveted over the outside of the ears **21** and over the inside of the side walls **24** to prevent a lateral shifting of the pins. Instead of forming trunnions **29** extending in outward direction into the holes **28** of the ears **21** it is also possible to form pivot trunnions **29** integrally on the box member but extending in inward direction from the side walls as shown in Fig. 12 or integrally with the lid member as best shown in Fig. 14 which can also be assembled with holes in the other member by slightly deforming the walls of the box member during the assembly operation.

The rear wall or retaining member **26** is formed with a cam face **32** which engages the contact face **33** on the lid member **20** in such a way that the curved portion **22** of the lid member is resiliently deformed and straightened as clearly shown in Fig. 4, where the lid member **20** and the box member **23** are shown in assembled position. By this resilient deformation of the portion **22** of the lid member **20** a contact pressure between the cam face **32** of the box member and the contact face **33** of the lid member **20** is created which tends to press the lid member against the top edge of the box member.

The construction of the cam face **32** is more clearly shown in the enlarged sectional views of Figs. 5 and 6. This cam face **32** includes a first portion **34** engaging the contact face **33** of the lid member **20** when this lid

member is in closed position (Fig. 5), a second portion **35** engaging the contact face **33** when the lid member is in open position (Fig. 6) and an intermediate portion **36** farther spaced from the axes of the pivot pin **29** than the aforementioned first and second portions of the cam face and engaging the contact face during the turning of the lid member.

The construction just described will work as follows:

The bent portion **22** of the lid member **20** is resiliently deformed by the cam face **32** of the retaining member **26** when the lid member **20** is assembled with the box member **23**. The portions **34** and **35** of the cam face **32** tend to keep by their resilient engagement with the contact face **33** of the lid member this lid member either in the closed or in the open position. When the lid member **20** is turned around the pivot pin **29** from one of its end positions towards the other of its end positions the portion **22** of the lid member is further resiliently deformed by the intermediate portion **36** of the cam face **32** and the contact pressure between the contact face **33** and the cam face **32** is increased. As the lid member **20** approaches during the turning movement one of its end positions the portion **22** of the lid member forced away from the axis of the pivot pin can approach the same again so that the lid member swings with a snap-like action towards its respective end portion.

The faces **37** of the end wall **26** extending beyond the first and second portion of the cam face are preferably inclined towards the axis to facilitate the movement of the lid member to the open and closed positions, respectively, and to assure a proper contact between the contact face **33** of the lid member and the first or second portion of the cam face of the retaining member.

To assure substantially the same tensioning of the portion **22** of the lid member in the open and closed position of the same the distance *a* of the axis of the pivot pin **29** from the top edge of the box member is preferably made equal to the distance of this axis from the outer face of the rear wall **26**.

Figs. 7 and 8 show a modification of the just described construction in which the lid member **20'** is formed with a straight wall and does not have a curved portion as shown in Fig. 2. The cam face **32'** on the box member **23**, on the other hand, extends beyond the top edge of the box member in such a way so as to resiliently deform and curve the lid member **20'** at **38** when the two members are assembled as shown in Fig. 8. By this resilient deformation the aforementioned contact pressure between the cam face **32'** of the box member **23** and the contact face of the lid member **20'** is created. The cam face **32'** is otherwise preferably formed as described above in connection with Figs. 5 and 6.

A further modification of the construction according to the present invention is shown in Figs. 9 and 10. In this modification the lid member **20''** is recessed and the contact face **33'** on this lid member is provided on a boss extending from the inner face of the hollow lid member towards the top edge of the box member **23**. Otherwise, the construction and the interaction of the members is the same as described before. The box member **23** is provided with a cam face **32** which will cooperate with the contact face **33'** of the lid member in the manner as above-described.

Figs. 11 and 12 show an additional modification of the present invention. In this case the rear wall **26'** of the box member **23** is formed with a curved portion **39** as clearly shown in Fig. 12 in which the box member is illustrated before the same is assembled with the lid member **20**. In this case, the lid member **20** is provided with the cam face **32** which contacts the inner face of the rear wall **26'** and cooperates with the curved portion **39** of the rear wall **26'**, when the lid member **20** is assembled with the box member **23** by means of the pivot trunnions **29**, to resiliently deform and straighten the curved portion **39** of the rear wall **26'**. By this resilient deformation and straightening of the rear wall **26'** contact pressure between the cam face **32** of the lid member **20** and the rear wall **26'** is again established. The cam face **32** on the lid member **20** is again formed in a manner similar as described in connection with Figs. 5 and 6 and the interaction between the cam face **32** and the rear wall **26'** will be similar as described above.

Figs. 13–16 show an additional modification of the present invention. In this case, the lid member **20'''** is L-shaped and comprises a cover plate **40** and a hinge plate **41** extending substantially normal to the cover plate from one of its transverse end edges. Ears **21** are again provided on this lid member extending, respectively, from the side edges of the hinge plate **41** at the free ends thereof and a cam face **32** is provided at the center of this hinge plate **41** extending from the bottom edge thereof. The box member **23'** in this case has no rear wall and the bottom wall **25'** of this box member is formed with a curved portion **42** clearly visible in Fig. 14 where the lid member and the box member are shown before assembly. This curved portion **42** of the bottom wall **25'** is again resiliently deformed and straightened when the lid member **20'''** and the box member **23'** are assembled as shown in Figs. 15 and 16. In this case, the cam face **32** on the lid member cooperates therefore with the portion **42** of the bottom wall **25'** of the box member in the manner as previously described to keep the lid member either in closed or open position and to move the lid member with a snap-like action towards either of its end positions when the same is turned from one end position to the other.

At least the member which is deformed by the cam face provided on the other member is formed from elastic material and preferably a resilient plastic material is used for this purpose, but any other material can be used in which the deformation, resulting from the engagement of this member with the cam face on the other member, is within the elastic limits of this material.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of hinged lid constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a hinged lid construction in which the lid is held in its end position by spring action and in which the movement of the lid when turned, proceeds towards its end position with a snap action, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A hinged lid construction comprising, in combination, a box member having a bottom wall and two pairs of side walls extending from said bottom wall and defining a top edge, all of said side walls being connected to each other along the side edges thereof; pivot means respectively formed in one of said pair of side walls and located adjacent said top edge and adjacent one of the walls of the other pair of said side walls, said pivot means defining an axis; a lid member mounted on said box member for turning movement about said axis and being turnable between an open position and a closed position, said lid member having a contact face and said one wall having a cam face engaging said contact face of said lid member to resiliently deform said lid member and to create pressure between said contact face of said lid member and said cam face in all positions of said lid member,

said cam face including a first portion and a second portion engaging said contact face of said lid member, respectively, in said closed and said open position and an intermediate portion farther spaced from said axis than said first and second portions and engaging said contact face of said lid member during turning movement of said lid member to increase said pressure so that said lid member tends to assume either of said open or closed positions when turned about said axis.

2. A hinged lid construction comprising, in combination, a box member having a bottom wall and two pairs of side walls extending from said bottom wall and defining a top edge, all of said side walls being connected to each other along the side edges thereof; pivot means respectively formed in one of said pair of side walls and located adjacent said top edge and adjacent one of the walls of the other pair of said side walls, said pivot means defining an axis; a lid member mounted on said box member for turning movement about said axis and being turnable between an open position and a closed position, said lid member having a cam face contacting said one wall to resiliently deform said one wall and to create pressure between said cam face of said lid member and said one wall, said cam face including a first portion and a second portion engaging said one wall in all positions of said lid member when said lid member is in said closed or said open position, respectively, and an intermediate portion farther spaced from said axis than said first and second portions and engaging said one wall during turning movement of said lid member to increase said pressure so that said lid member tends to assume either of said open or closed positions when turned about said axis.

3. A hinged lid construction comprising, in combination, a box member having a bottom wall, a pair of parallel side walls and a third side wall arranged between said pair of parallel side walls, said side walls extending from the periphery of said bottom wall, said parallel side walls respectively formed with holes therethrough adjacent the free edges thereof opposite said third side wall and adjacent said bottom wall, said holes aligned on an axis; an L-shaped lid member comprising a cover plate having longitudinal side edges and transverse end edges and a hinge plate from one of said transverse end edges thereof; a pair of aligned trunnions integrally formed with said hinge plate and extending respectively from the side edges of the same near the free end thereof into said holes in said side walls to mount said lid member on to said box member for turning movement of the former about said axis between an open and a closed position, said lid member having a cam face contacting said bottom wall, said cam face including a first portion and a second portion engaging said bottom wall in said closed and said open positions of said lid member, respectively, to resiliently deform said bottom wall so that the pressure between said cam face and said deformed bottom wall tends to keep said lid member in said open and said closed position, respectively, and an intermediate portion farther spaced from said axis than said first and second portions and engaging said bottom wall during turning movement of said lid member to increase said pressure so that said lid member tends to assume either of said open or closed positions when turned about said axis.

4. A hinged lid construction comprising, in combination, a box member having a bottom wall and two pairs of side walls extending from said bottom wall and defining a top edge, all of said side walls being connected to each other along the side edges thereof, pivot means respectively formed in one of said pair of side walls and equally spaced from said top edge and from the outside of one of the walls of the other pair of said side walls, said pivot means defining an axis; a lid member mounted on said box member for turning movement about said axis and being turnable between an open position and a closed position, said lid member having a contact face and said one wall having a cam face engaging said contact face of said lid member, said cam face including a first portion and a second portion engaging said contact face of said lid member, respectively, in said closed and said open position to resiliently deform said lid member so that the pressure between said cam face and said deformed lid member tends to keep said lid member in said open and said closed position, respectively, and an intermediate portion farther spaced from said axis than said first and second portions and engaging said contact face of said lid member during turning movement of said lid member to increase said pressure so that said lid member tends to assume either of said open or closed positions when turned about said axis.

5. A hinged lid construction comprising, in combination, a box member having a bottom wall and two pairs of side walls extending from said bottom wall and defining a top edge, all of said side walls being connected to each other along the side edges thereof; pivot means respectively formed in one of said pair of side walls and equally spaced from said top edge and from the outside of one of the walls of the other pair of said side walls, said pivot means defining an axis; a lid member mounted on said box member for turning movement about said axis and being turnable between an open position and a closed position, said lid member having a contact face and said one wall having a cam face engaging said contact face of said lid member, said cam face including a first portion and a second portion engaging said contact face of said lid member, respectively, in said closed and said open position to resiliently deform said lid member so that the pressure between said cam face and said deformed lid member tends to keep said lid member in said open and said closed position, respectively, and an intermediate portion farther spaced from said axis than said first and second portions and engaging said contact face of said lid member during turning movement of said lid member to increase said pressure so that said lid member tends to assume either of said open or closed positions when turned about said axis and the faces of said one wall extending beyond said cam portions being inclined toward said axis to facilitate the movement of said lid member to said open or closed positions, respectively.

References Cited in the file of this patent

UNITED STATES PATENTS

127,811	Trottier	June 11, 1872
2,527,318	Magnus	Oct. 24, 1950

FOREIGN PATENTS

130,244	Great Britain	July 31, 1919