United States Patent

Cencioni

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[54] HINGE FOR INTERNAL SURFACE MOUNTING, FOR DOORS OF PIECES OF FURNITURE OR CABINET DOORS IN GENERAL

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[52] **U.S. Cl.** **16/163**

[51] **Int. Cl.** **E05d 3/06**

[58] **Field of Search** 16/163, 164

[56] **References Cited**

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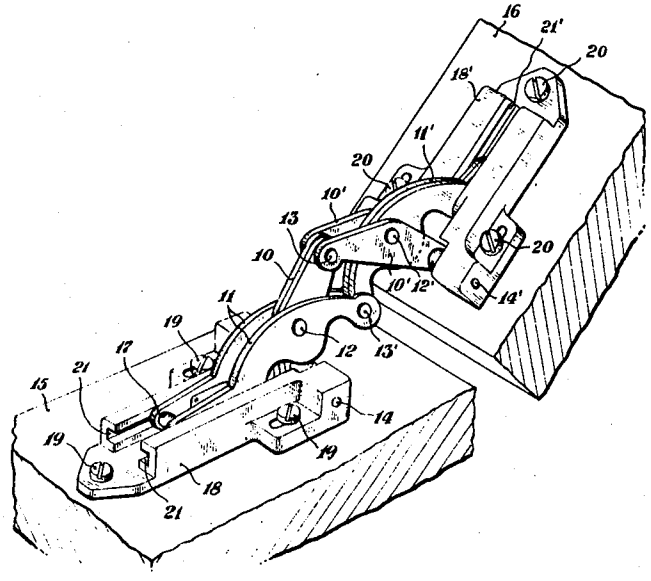
[57] **ABSTRACT**

A hinge for internal surface mounting, characterized in that comprises two pairs of levers crossing each other, and in particular that each lever of the first pair is pivoted together with the corresponding lever of the second pair, and moreover, the two converging ends of the levers which constitute the first pair are articulated each other, as also articulated each other, as also articulated each other are the two converging ends of the levers constituting the second pair, so as to constitute an articulated parallelogram, whereas the other two ends (diverging) of the first pair of levers are articulated the first on the fixed part of the cabinet and the other on the door, and the (diverging) ends of the second pair of levers are articulated each in a sliding way, the first with respect to the fixed part of the cabinet and the other with respect to the door.

3 Claims, 5 Drawing Figures



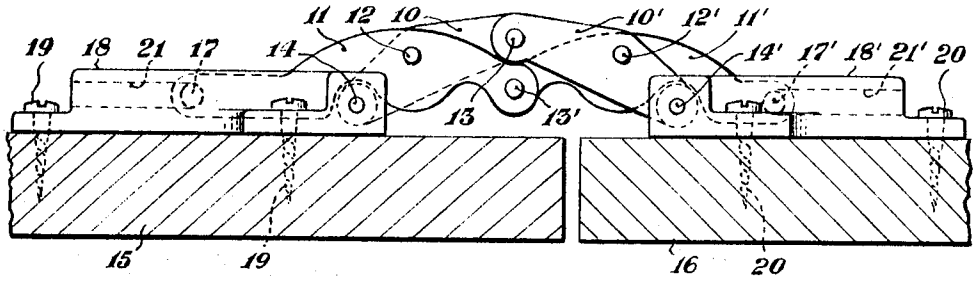


Fig. 1

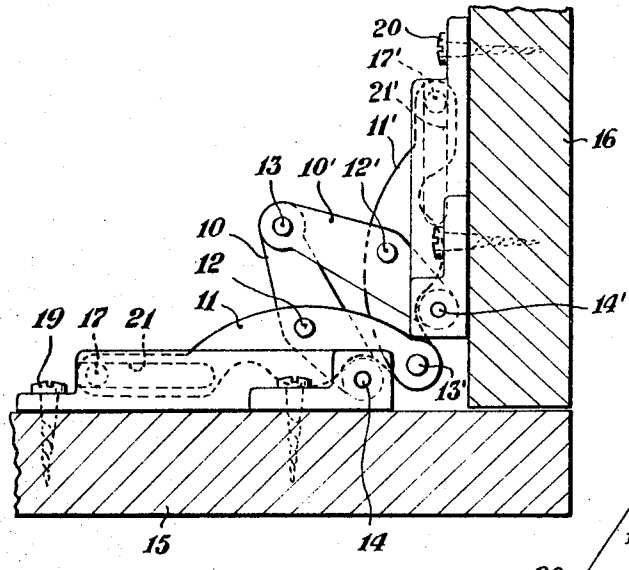


Fig. 2

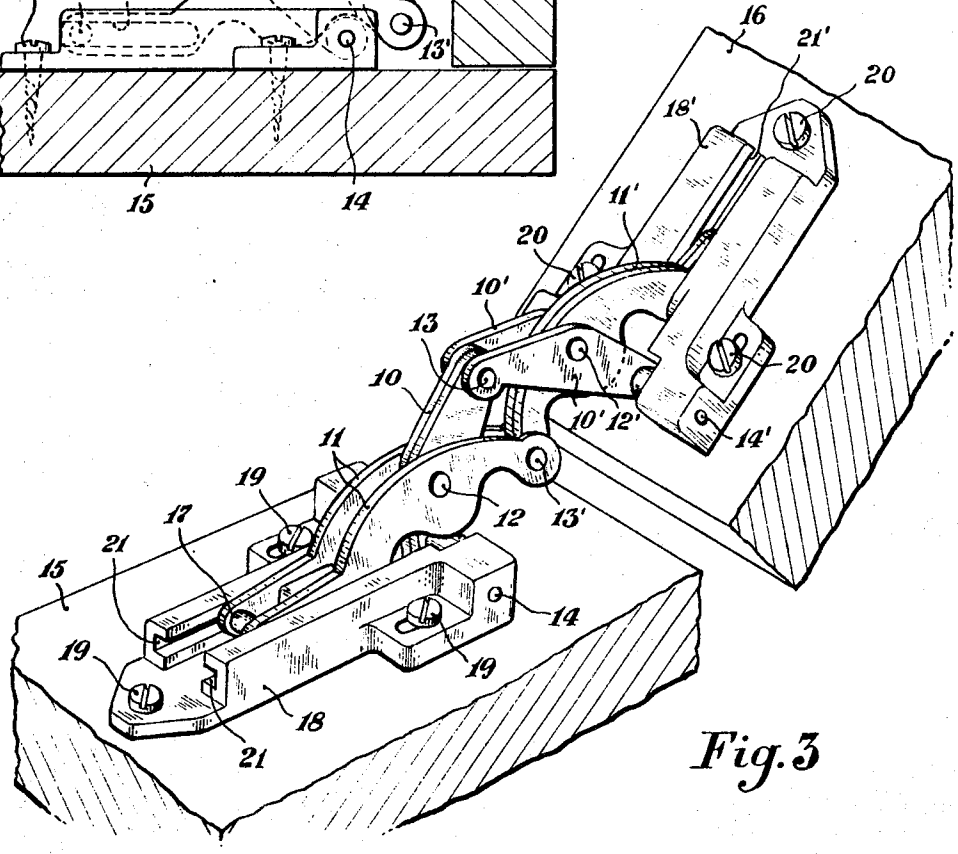


Fig. 3

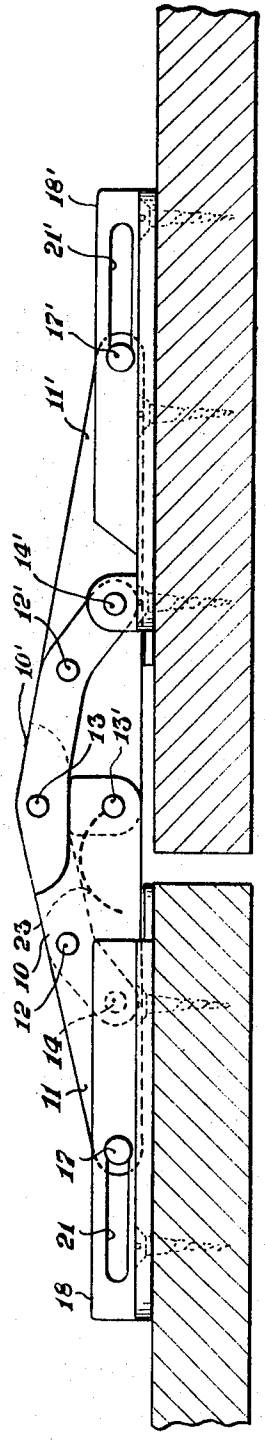

18'
21'
17'
11'
14'
12'
10'
13
13'
23
12
10
14
11
17
21
18

Fig. 4

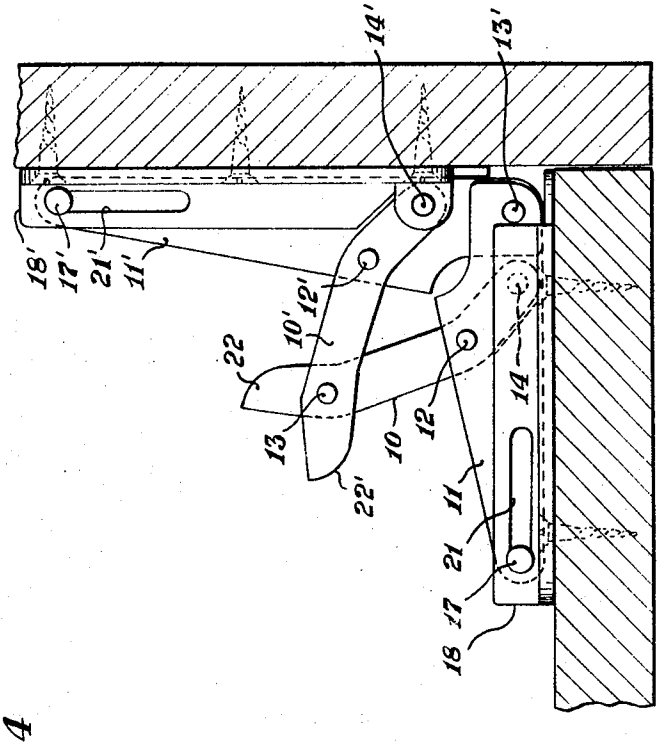

14'
13'
18'
17'
21'
11'
22
10'
12'
13
22'
10
12
14
11
21
18
17

Fig. 5

HINGE FOR INTERNAL SURFACE MOUNTING, FOR DOORS OF PIECES OF FURNITURE OR CABINET DOORS IN GENERAL

The industry of furniture, and in particular that of kitchen cabinet, among which the domestic appliances are included, requires hinges always more rugged, invisible, with automatic closing, and at the same time which allow an easy and cheap installation. Therefrom it derives the efforts of manufacturers of hinges to meet the ever increasing requirements of the market.

The object of the present invention is to provide a new hinge, apt to internal surface mounting, which eliminates completely the need of arranging for housing or recesses in the walls destined to receive it, and, this notwithstanding remains invisible and guarantees a full register of the edge of door with the lateral wall of the cabinet, thus ensuring a precise guided closing, a rugged supporting of the door also when the same is particular heavy (doors of refrigerators), and also, when this is sought, a final snap action which ensures the maintainment of the closure, without the use of latches or the like. The hinge according to the invention can be used not only in doors which rotate around a vertical axis, but also to doors or wings which can be turned over horizontally (secretary bookcases, liqueur furniture), which perform a rotation to go from the closing position down to the horizontal position to operate as a desk or support board.

According to the invention, a device is provided comprising two pairs of crossed levers, in which each lever of the first pair is pivoted on the same pivoting point of the corresponding lever of the second pair, and moreover the two converging ends of the two levers which constitute the first pair are articulated each other and the two converging ends of the two levers which constitute the second pair are also articulated each other, forming thus an articulated parallelogram, in which the said last articulation, opposed each other, in the closed position, lie on the bisecting line of the angle between the fixed part the cabinet and the door, whereas the other two (diverging) ends of the first pair of levers are articulated on the fixed part of the cabinet and the door, respectively, and the other (diverging) ends of the second pair of levers are articulated, each in a sliding way, on the fixed part of the cabinet and of the door, respectively.

The attached drawings represent schematically as a non limitative example some embodiments of the the hinge according to the invention, and more in particular:

FIG. 1 shows a lateral view of a hinge in the open condition;

FIG. 2 shows a lateral view of the same hinge in the closed condition;

FIG. 3 shows the hinge in perspective, and in an intermediate position;

FIGS. 4 and 5 show a second embodiment of the hinge according to the invention, particularly useful for cars or doors which can be turned over horizontally.

With reference now to FIGS. 1 to 3, the hinge according to the invention comprises substantially two pairs of crossing levers, shown in **10–10'** and **11–11'**, respectively, in which the lever **10** of the first pair is pivoted in **12** with the lever **11** of the second pair, and the lever **10'** of the first pair is pivoted in **12'** with the lever **11'** of the second pair; moreover, the two opposed or converging ends of the first pair **10–10'** are pivoted together in **13**, and the two opposed or converging ends of the second pair **11–11'** are articulated together in **13'** in order to constitute and articulated quadrilateral having as apexes the articulations **12–12'**, **13–13'**, and, finally, the two diverging ends of the first pair **10–10'** are articulated the first one in **14** on the fixed part **15** of the cabinet and the other one in **14'** on the movable door **16**, respectively; whereas the two diverging ends of the second pair of levers **11–11'** are articulated the first on the sliding pivot **17** and the other on the sliding pivot **17'** of a base **18–18'**, respectively in order that they can be moved in a guided way within the channels or slots **21–21'** of said bases **18–18'**, the first with respect to the wall of the cabinet **15** and the other with respect to the door **16**.

The bases **18** and **18'** constitute a support for the levers and are mounted, respectively, by means of screws **19** and **20** without any need of effecting in the cabinet and in the door any housing, which entails always expenses of manpower or of machinery, and which causes a weakening of the wood walls where the hinges are mounted.

According to the invention the disclosed hinges are mounted on the internal sides and on the surface.

In view of the fact that the mounting bases **18** and **18'** are rather long, the stress is distributed and transferred far from the swinging center, constituted by the articulation **13'**, with appreciable advantages in respect of the ruggedness of the hinge.

By a slight change of the general shape of the levers which constitute the two pairs of **10–10'**, **11–11'**, different embodiments can be obtained which are useful for different purposes, always remaining within the scope of the invention.

More in particular, it is possible to obtain an alignment of the two hinged surfaces or a backwards displacement of the one with respect to the other, at will.

The hinge of FIGS. **4** and **5** is particularly useful for supporting the board of a cabinet like a secretary bookcase which can be turned over, and which can be closed, as shown in FIG. **5** and is opened as shown in FIG. **4**.

In the case of the hinges of FIGS. **4** and **5**, they can be mounted on each side of the board which can be turned over, and the general shaping and mutual relationship of the four levers connected together is such to ensure the horizontality of the workboard or writingboard at the same level of the board internal to the cabinet, and a good stiffness of the cantilevered part without any need of using braces or support compasses.

When used on pieces of furniture of the kind shown as secretary bookcases, the levers of each pair are arranged on two different planes creating a lateral offset in order that they rest each against the other, at the end of the path with their complementary resting surfaces, performing, when in the open condition (FIG. **4**), as a rigid beam as if it was solid.

Indeed, as it is shown in FIGS. **4** and **5**, the levers **10** and **10'** of the first pair show besides the articulation point **13** an extension **22–22'** with an arcuated convex outline which match an exactly concave outline of the levers **11–11'** constituting an uninterrupted surfaces locked in the open position (FIG. **4**).

In what remains, the hinge is identical to the one above described. When going from the open position (FIG. **4**) to the closed position (FIG. **5**), the central pivot **13'** follows a circular path **23** (FIG. **4**), which makes it to approach the articulation **14** to bring it exactly on the bisecting line of the angle formed by the internal surfaces of the wall of the cabinet and of the door, a bisecting line on which lies always, in the closed position, also the opposed articulation **13** (see FIG. **5**).

In the hinge shown and disclosed according to several embodiments, it is possible at the end of their closing path a spring-loaded latching devices, which substitutes the usual separated latch. Such spring loaded device may be realized in several forms, for instance with balls protruding from stop housings and being under the action of springs or other known means.

The hinge according to the invention shows the noteworthy advantage of allowing, with a simple change of dimensions or shape of the levers which constitute the two pairs, to realize both in the closure and in the opening, the precise alignment of the edge of the door, with the external wall of the cabinet, or the backshift of the door of the converse, without changing the features of the invention.

It is also possible to build the several parts of the hinge with different materials, by coupling, for instance, the thin parts made out of metal with thick parts made out of plastics, obtaining in this way a smoothness of operation and freedom from noise without any need of lubrication.

What is claimed is:

1. A hinge for doors, particularly for cabinets and the like, consisting of two parts; each of said parts comprising a base

element, one of said base elements being fastened to the door and the other to the cabinet; a first lever having one end thereof slidably engaged in a slot in a first one of said base elements; a second lever pivotally connected at one end thereof to said base element, and at an intermediate point thereof to an intermediate point of said first lever, said first lever comprising a pair of parallel spaced plates extending along the sides of said second lever; a third lever having one end pivotally connected to the other end of said first lever and having its other end slidably engaged in a slot in the other of said base elements; a fourth lever pivotally connected at one end thereof to said last-mentioned base element, at an intermediate point thereof to an intermediate point of said third lever, and at its other end to the free end of said second lever, said fourth lever comprising a pair of parallel spaced plates extending along the sides of said third lever.

2. A hinge as claimed in claim 1, wherein, in the open position of said hinge, the pivotally connected ends of said first and third levers abut against the pivotally connected ends of said second and fourth levers.

3. A hinge as claimed in claim 2, said second and fourth levers each having at their pivotally connected ends extending portions, said extending portions being adapted to form in the hinge open position a second abutment with said first and third levers so as to form an essentially rigid beam structure.

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