Feb. 10, 1959 J. P. GOMMELS 2,872,698

HINGE CONSTRUCTION

Filed Sept. 22, 1954

FIG. 1

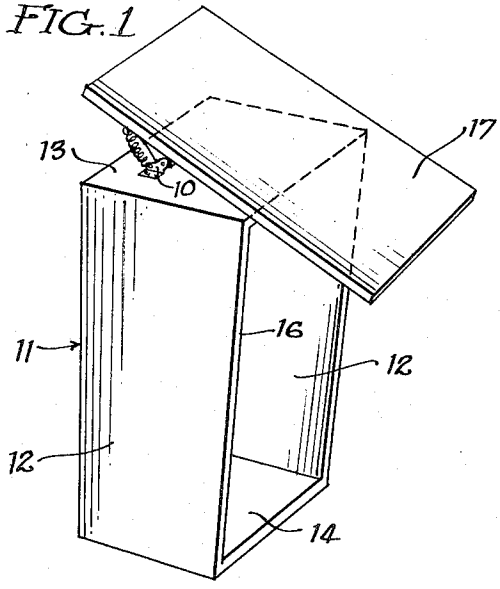


FIG. 2

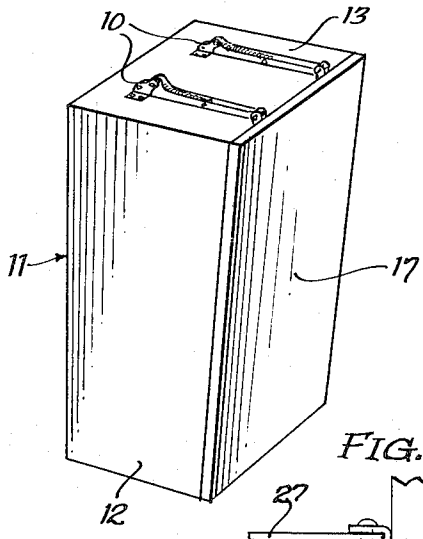


FIG. 6

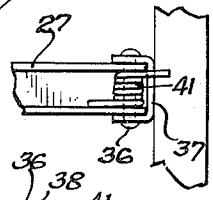


FIG. 5

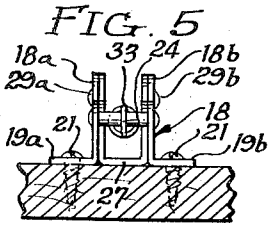


FIG. 3

FIG. 4

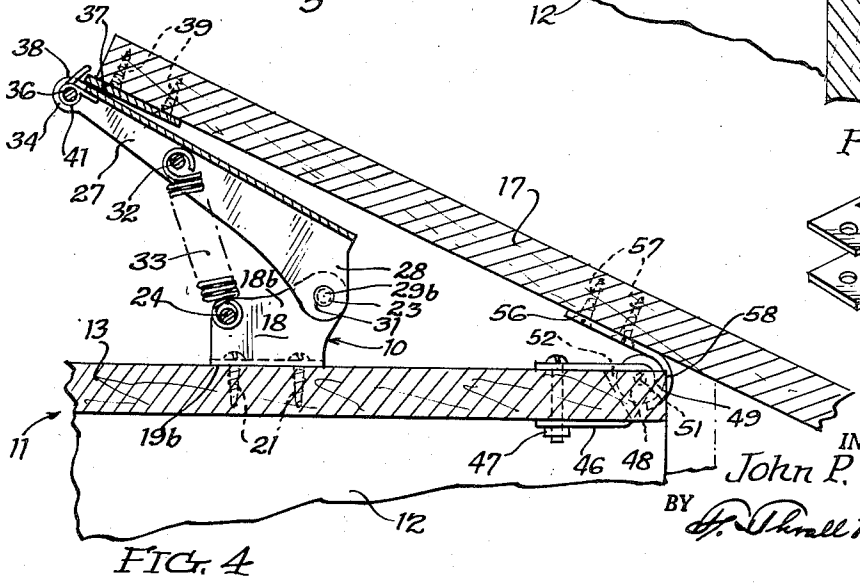
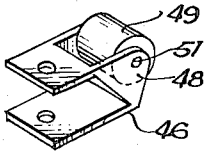


FIG. 2



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HINGE CONSTRUCTION

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11 Claims. (Cl. 16—163)

This invention relates to a hinge construction, and more particularly to a double acting hinge suitable for overhead use on cabinets and the like.

It is an object of the invention to provide an improved double acting hinge which is attachable to a door or similar type of closure member and which includes parts and biasing means for urging the door toward its closed and open positions when manually moved thereto.

It is a further object of the invention to provide a hinge having an over-center spring mechanism so constructed and arranged that a closure member to which it is attached is urged to assume and retain either an open or a closed position at various points in the movement of the hinge as the position of the door is being changed.

It is also an object of the invention to provide a hinge enabling a portion of a closure member controlled by the hinge to swing in a relatively short arc and causing another portion of such closure member to effect a sliding movement.

It is yet another object of the invention to provide a hinge which is particularly adapted for use on the upper or top side of a door-supporting structure such as a cabinet, so that the door to which the hinge is attached is moved upwardly to afford convenient access to the cabinet when the door is in its open position, and thereby to avoid interference from, or obstruction by the door in the area in front of such cabinet.

It is still another object of the invention to provide a door-supporting structure with a roller and door stop arrangement which facilitates free movement of the door and which limits such movement when the door is in its open position.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawing in which similar characters of reference indicate similar parts throughout the several views.

Referring to the one sheet of drawings:

Fig. 1 is a perspective view of a cabinet, such as a kitchen cabinet or the like, to which is attached a hinge embodying my invention for control of the cabinet door, the view showing the cabinet door in an open position;

Fig. 2 is a perspective view of the cabinet illustrated in Fig. 1, and shows the cabinet door in a closed position;

Fig. 3 is a fragmentary side view, partly in section, of a cabinet to which my improved hinge is attached, and illustrates the position of various elements of the hinge when the cabniet door is in a closed position;

Fig. 4 is a fragmentary side view similar to that of Fig. 3 and with the cabinet door in an open position, the view further showing a device employed with my improved hinge to facilitate free movement of the door and to limit such movement when the door is in its open position;

Fig. 5 is a fragmentary end view, partly in section, and taken substantially as indicated by a line 5—5 and accompanying arrows in Fig. 3;

Fig. 6 is a fragmentary top plan view of an end portion of the hinge shown in Fig. 3; and

Fig. 7 is a perspective view of a part of the structure depicted in Fig. 4.

Having reference to the accompanying drawing, wherein an exemplary embodiment of my invention is disclosed for illustrative purposes, it may be observed that my improved hinge **10** is suitable for use with a cabinet **11**, such as a kitchen cabinet or the like. The cabinet includes side panels **12** and top and bottom members **13** and **14**, respectively, which define a cabinet interior **16**. The cabinet **11** includes a suitable closure element such as a door **17**, movable against the front edges of the sides, top and bottom to close the front of the cabinet interior.

As shown in detail in Figs. 3 and 4, my hinge **10** comprises a hinge base **18** which, in the disclosed embodiment, includes opposed side brackets **18***a* and **18***b* having flanges **19***a* and **19***b* in contact with and secured to the top member **13** of the cabinet, as by screws **21** extending through suitable openings provided in the flanges **19***a* and **19***b*. The side brackets **18***a* and **18***b* of the hinge base **18** are spaced from each other and project upwardly from the flanges in substantially parallel relationship. Each of the brackets **18***a* and **18***b* is provided with a suitable aperture **23** for pivotal connection to other parts of the hinge, the apertures **23** being spaced from the flanges **19***a* and **19***b*. The rear portion of the hinge base **18** includes an anchoring connection for a coil spring, such as a base pin **24** suitably affixed at opposite ends to the brackets of the hinge base.

Pivotally connected to the hinge base **18** is a link member **27** having on one end thereof a pair of ears **28** which are spaced from each other and each having an aperture **31** therein. The link ears **28** are registered with and pivotally connected to the base ears **22** by rivets **29***a* and **29***b* extending through the apertures **23** and **31**, such pivotal connection enabling the link member to swing relative to the hinge base during operation of the hinge. The link member also includes a link pin **32** suitably secured to the link member between its ends for the attachment thereto of a coil type tension spring **33** so as to provide a desired over-center action. The spring has one end movably attached to the base pin **24** and the other end movably attached to the link pin **32**, so that it tends to urge the link member toward the hinge base. The positions of the base pin and link pin are so related to the axis of the aligned rivets **29***a* and **29***b* that the action line of the spring crosses the said axis during movements of the hinge link between open and closed positions. Since the point of attachment of the coil spring to the hinge base pin is closer to the top member **13** of the cabinet than is the axis of the rivets connecting the link member to the hinge base, the action of the coil spring is such that it tends to cause the door **17** to assume and retain either an open position or a closed position as will be more fully described.

The link member **27** has on its end opposite the ears **28**, an opening **34** for reception of a pintle **36**. Pivotally connected to this end of the link member is a door leaf **37** having a pintle-receiving opening **38** on one end thereof which is registered with the opening **34** of the link member and connected thereto by the pintle extending through the openings **34** and **38**. The door leaf **37** is attached to the door by means such as screws **39** extending through openings in the door leaf provided for that purpose. Associated with the pivotal connection of the link member and the door leaf is a torsion spring **41** which is preferably disposed around the pintle **36** and has one end engaging the link member **27** and the other end engaging the door leaf **37**. The torsion spring **41**

is adapted to urge the door leaf toward the link member thereby causing the door **17** to close tightly against the front of the cabinet **11**.

The hinge construction thus described controls the movement of the door **17** in such a manner that when the door is open it is moved upwardly and rearwardly so as to give convenient access to the interior **16** of the cabinet without interference from, or obstruction by the door in the area in front of the cabinet. This is of particular advantage in the case of a cabinet having considerable use, such as a kitchen cabinet, inasmuch as the door may be left in its open position during periods of heavy use so that its shelves and contents are readily available. When the cabinet is no longer in use, the door **17** may be moved to its closed position, so that the cabinet interior is protected from dirt and dust and the cabinet exterior has a neat and trim appearance.

The pivot and spring arrangements of my improved hinge **10** tend to urge the door **17** in two directions simultaneously, in that the pivot connection of the link member to the hinge base controls the movement of the door in an edgewise direction of travel while the pivot connection of the link member to the door leaf controls the movement of the door in a sidewise direction of travel. The latter action serves to keep the door **17** tightly against the front edges of the cabinet, and is also of advantage in maintaining the door against the cabinet as the link member is pivoted on the hinge base.

As controlled by my improved hinge **10**, the upper portion of the door moves in a relatively short or flat arc, while the lower portion of the door slides along the front edge of top member **13** of the cabinet. Such action enables the door to be opened with a minimum of overhead space and permits the area immediately above the cabinet to be utilized for reception of the door with the lower edge of the door being maintained in a convenient position for closing.

The spring and pivot arrangement of the link member to the hinge base is of advantage in changing the position of the door. As the door is being opened, the pivoting of the link member **27** rearwardly is resisted by the coil spring **33** until the link member has moved the center portion of the coil spring upwardly beyond the rivets **29***a* and **29***b*, whereupon the coil spring then urges the link member rearwardly, so that the door **17** tends to assume and retain its open position. Conversely, as the door is being closed, the coil spring at first resists pivoting of the link member forwardly until the center portion of the coil spring has passed downwardly beyond the rivets **29***a* and **29***b* whereupon it urges the link member downwardly so that the door tends to assume and retain its closed position. This action has the further advantage of minimizing the necessity of having catches or locks to maintain the door either in its open or closed position.

To facilitate movement of the door **17** as it is being opened and closed, a roller is provided on the top member **13** of the cabinet in substantial alignment with each hinge. A bracket **46** is secured on the front edge of top member **13** by a bolt **37** extending through suitable openings in the bracket. The bracket includes lugs **48** projecting therefrom in spaced and substantially parallel relationship for supporting therebetween a roller **49**, as by a roller pin **51** secured to the lugs. The roller **49** is preferably of a resilient and soft material such as rubber and is contained in a recess **52** provided in the front edge of top member **13** for that purpose. The roller projects slightly from the top surface of the cabinet so that as door **17** is moved on the hinge **10** the interior surface of the door will contact and ride upon the roller. The use of a pair of the rollers **49** avoids frictional and sliding contact of the door **17** with the upper front edge of the cabinet as the door is being opened or closed.

To provide a uniform open position for the door, a door stop **56** (Fig. 4) is secured to the door **17**, as by screws **57** extending through openings provided in the door stop, the stop **56** including a projecting end portion **58** suitably curved for reception of the roller **49**. The door stop is positioned on the interior surface of the door **17** in alignment with the roller **49**, so that end portion **56** engages the roller as the door is being moved to its open position. The use of the door stop **56** insures that when the door is in its open position the upper edge of the door does not move rearwardly beyond the rear edge of top member **13**. Also, it maintains the lower edge of the door in a uniform and convenient position with respect to the front of the cabinet for a neat and trim appearance of the door in its open position and for accessibility of the lower edge of the door when the door is to be closed.

In operation of a door controlled by my improved hinge **10**, the lower edge of the door is moved outwardly and upwardly, so that the link member **27** is pivoted upwardly on the hinge base **18** and the door leaf **37** is moved toward the link member **27**. The upper portion of the door swings in an arc around the hinge base, while the lower portion of the door slides along the rollers **49** on the front edge of the cabinet. As the coil spring passes the rivets **29***a* and **29***b*, the action of the spring aids the door to swing upwardly and rearwardly of the cabinet. This movement continues until the projecting end portion **58** of the door stop engages the roller **49**. To return the door to its closed position, the lower portion of the door is pulled downwardly and inwardly toward the cabinet. As this occurs, the link member **27** is pivoted on the hinge base and swings the opper portion of the door toward the front of the cabinet. The coil spring **33**, upon passing the rivets **29***a* and **29***b*, urges the door downwardly into its closed position. The action of the torsion spring **41** forces the door inwardly to hold it firmly against the front edges of the cabinet.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A hinge comprising a hinge base, a link member having one end pivotally connected to said hinge base and having on its other end a pintle-receiving opening, resilient means having spaced ends and adapted to produce tension along a straight line passing through said spaced ends, means for mounting one of said ends in fixed relation to the hinge base and spaced with respect to the pivotal connection between the hinge base and link, and means for pivotally mounting the other of said ends on the link member spaced from said pivotal connection so that the line of action of the said resilient means lies on opposite sides of said pivotal connection in open and closed positions respectively, a door leaf having a pintle-receiving opening on one end thereof registered with said pintle-receiving opening of the link member, a pintle extending through and pivotally connecting the pintle receiving openings of said link member and said door leaf, and a spring element connected to said pintle and door leaf and urging said door leaf to pivot about said pintle toward said link member.

2. A hinge for a door supporting structure and door therefor which comprises a hinge base attachable to said door supporting structure, a link member having one end pivotally connected to said hinge base and having on the other end a pintle-receiving opening, resilient means having spaced ends and adapted to produce tension along a straight line passing through said spaced ends, means for mounting one of said ends in fixed relation to the

hinge base and spaced with respect to the pivotal connection between the hinge base and link, and means for pivotally mounting the other of said ends on the link member spaced from said pivotal connection so that the line of action of said resilient means lies on opposite sides of the said pivotal connection in open and closed positions respectively, a door leaf attachable to said door and having a pintle-receiving opening on one end thereof registered with said pintle receiving opening of the link member, a pintle extending through and pivotally connecting the pintle-receiving openings of the said leaf member and said door leaf, and a spring element connected to said pintle and door leaf and urging said door leaf toward said link member.

3. A hinge for a door-supporting structure and door therefor which comprises a hinge base attachable to said door-supporting structure and including a pair of spaced and apertured base brackets, a link member having on one end thereof a pair of spaced apertured ears, individual pintles pivotally connecting each ear to a corresponding base bracket, said link member having on the other end thereof a pintle-receiving opening, a coil spring having one end pivotally secured to a point on said link member between its ends and the other end pivotally secured to a point on said hinge base spaced with respect to the pivotal connection between these parts, the points at which the ends of the coil spring are pivotally secured being so located that the line of action of said spring lies on opposite sides of said pivotal connection in open and closed positions respectively; a door leaf attachable to said door and having a pintle-receiving opening on one end thereof registered with said pintle-receiving opening of the link member, a pintle extending through and pivotally connecting the pintle-receiving openings of said link member and said door leaf, and a torsion spring disposed around said pintle with one end of said torsion spring secured to the link member and the other end of said torsion spring secured to the door leaf, said torsion spring being adapted to urge the door leaf to turn about said pintle toward the link member.

4. A hinge for a door-supporting structure and door therefor which comprises a hinge base having brackets attachable to said door-supporting structure with a pair of spaced apertured base portions projecting therefrom, a base pin secured to said hinge base, a link member having on one end thereof a pair of spaced apertured ears registered with said base ears, individual pintles pivotally connecting each ear to its corresponding base bracket, said link having on the other end thereof a pintle-receiving opening, a link pin secured to said link member eccentrically of the pivoted connection, a coil spring having spaced ends and adapted to produce tension along a straight line passing through said spaced ends, means for mounting one of said ends in fixed relation to the hinge base and spaced with respect to the pivotal connection between the hinge base and link, and means for pivotally mounting the other of said spring ends on the link member spaced from said pivotal connection so that the line of action of said spring lies on opposite sides of said pivotal connection in open and closed positions respectively, a door leaf attachable to said door and having a pintle-receiving opening on one end thereof registered with said pintle-receiving opening of the link member, a pintle extending through and pivotally connecting the pintle-receiving openings of the said link member and said door leaf, and a torsion spring disposed around said pintle having one end engaging the link member and the other end of said torsion spring engaging the door leaf, said torsion spring being adapted to urge the door leaf to rotate about said pintle toward the link member.

5. A door combination which comprises a door-supporting structure, a door, and a hinge, said hinge comprising a hinge base attached to said door-supporting structure, a link member having one end pivotally connected to said hinge base and having on the other end a pintle-receiving opening, resilient means having spaced ends and adapted to produce tension along a straight line passing through said spaced ends, means for mounting one of said ends in fixed relation to the hinge base and spaced with respect to the pivotal connection between the hinge base and link, and means for pivotally mounting the other of said ends on the link member spaced from said pivotal connection so that the line of action of said spring lies on opposite sides of the said pivotal connection in open and closed positions respectively; a door leaf attached to said door and having a pintle-receiving opening on one end thereof registered with said pintle-receiving opening of the link member, a pintle extending through and pivotally connecting the pintle-receiving openings of the said link member and said door leaf, and a spring element associated with said pintle so as to urge said door leaf toward said link member.

6. A door combination as defined in claim 5, and further combining a door fitting which comprises a bracket attached to said door-supporting structure in spaced relationship with said hinge and having lugs projecting therefrom, and a roller rotatably secured to said lugs and projecting from said door-supporting structure adjacent a corner thereof to facilitate movement of said door as it is opened on said hinge.

7. A door combination as defined in claim 5, and further combining a door fitting which comprises a bracket attached to said door-supporting structure in spaced relationship with said hinge and having lugs projecting therefrom, a roller rotatably secured to said lugs and projecting from said door-supporting structure adjacent a corner thereof, and a door stop attached to said door in alignment with said roller and having a projecting end portion adapted to be received by said roller to limit the movement of said door as the door is opened on said hinge.

8. In combination, a cabinet having an opening defined in part by a top wall, a door for closing the opening and a hinge structure for mounting the door on the cabinet for swinging movement relative thereto, said hinge structure comprising a base mounted on the top wall and removed from the opening, a link pivotally mounted at one end on the base to have a swinging movement about the pivotal mounting and having its other end adapted to swing in proximity to the opening, a door leaf secured to the door and having a pivotal connection with the said other end of the link, a spring connected between the door leaf and the link and urging the door against the opening, and an over-center spring connected between the link and base, said over-center spring in one range of the said movement of the link about its pivotal mounting resisting lateral movement of the door across the opening and in another range of movement of said link urging such lateral movement of the door across the opening.

9. The combination described in claim 8, said door being continuously held against the corner of the top wall adjacent the opening by the first-mentioned spring during all movement of the door relative to the cabinet, and roller means mounted on said corner and adapted to support the door during such relative movement of the door and cabinet.

10. The combination described in claim 8, said door being continuously held against the corner of the top wall adjacent the opening by the first-mentioned spring during all movement of the door relative to the cabinet, roller means mounted on said corner and adapted to support the door during such relative movement of the door and cabinet, and stop means on the door and engageable by the roller to limit such relative movement between the door and cabinet in one direction of movement therebetween.

11. A hinge structure comprising, in combination, a hinge base, a link in the form of an arm having one end

connected to the base for swinging movement about a fixed axis between door opening and closing positions, resilient means having spaced ends and adapted to produce tension along a straight line passing through said spaced ends, means for mounting one of said ends in fixed relation to the hinge base and spaced with respect to the said fixed axis, and means for pivotally mounting the other of said ends on the link member spaced from said fixed axis and with the line of action of said resilient means lying on opposite sides of the said fixed axis in open and closed positions respectively, a door leaf connected to the other end of the link for swinging movement relative to the link, and a torsion spring biasing the door leaf in one direction of rotation relative to the link.

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