Aug. 1, 1933. A. E. JONES ET AL 1,920,509

HINGE

Filed July 28, 1928

Fig. 1

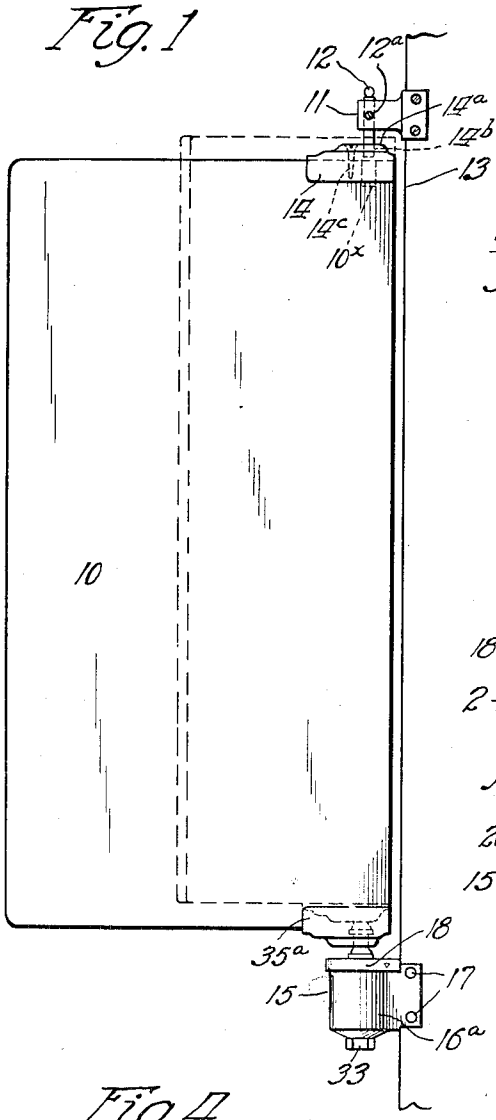


Fig. 2

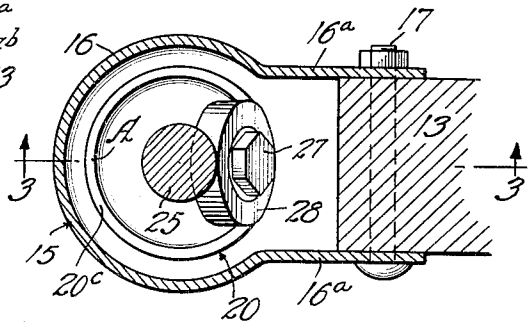


Fig. 3

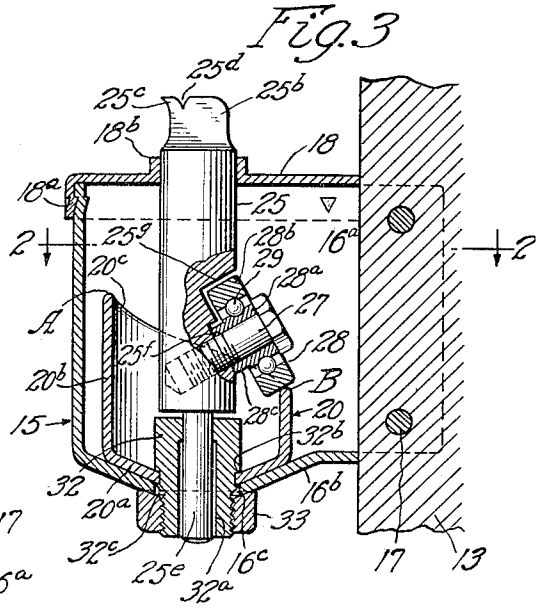
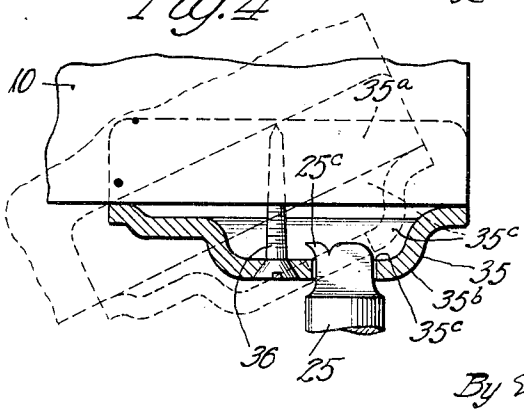


Fig. 4



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HINGE

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Application July 28, 1928. Serial No. 295,954

25 Claims. (Cl. 16—154)

This invention relates to hinges, and has among its objects to provide a novel, compact and economical type of gravity hinge which will function to automatically return a swinging door or the like to normal position, which position may be either open, closed, or any position in between, as desired by the owner. Other objects consist in the provision of a hinge to which the door may be readily attached or detached without removal of the hinge from its mounting; to provide a gravity hinge in which wear of the roller and trackway may be greatly lessened or eliminated; to provide a gravity hinge utilizing a roller so arranged as to impart an angular thrust or force to the pintle by which it is carried; and in general, to provide a hinge which may be readily installed and which will function satisfactorily to obtain the desired results. These and other objects will be more fully set forth and described in the following specification, and shown in the accompanying drawing, in which:

Fig. 1 illustrates a side elevation of a door mounted to swing in either direction to and from closed position, utilizing our invention;

Fig. 2 is a horizontal section along the line 2—2 of Fig. 3;

Fig. 3 is a vertical section along the line 3—3 of Fig. 2; and

Fig. 4 is a vertical section through the cap attached to the door, showing its engagement with the upper end of the pintle.

Like numerals refer to like elements throughout the drawing.

10 indicates generally a swinging door which is provided with a simple form of pivot at its upper corner which permits not only swinging but vertical movement of the door. This includes a strap or bracket 11 secured to the door-post 13 and provided with an aperture in which is adjustably mounted a pin 12 secured in adjusted position by the set screw 12^a. Mounted on the upper corner of the door is the plate or cap 14 provided with the raised top portion 14^a which is apertured at 14^b to permit entrance of the pin 12. The cap or plate 14 is secured to the door by a screw 14^c or the like in position with the aperture 14^b underlying the pin 12, the door 10 being also apertured as indicated by numeral 10^x to accommodate the pin 12 during vertical movement of the door 10. During mounting or dismounting of the door the pin 12 may be raised or removed to permit the angular movement of the door 10 necessary to effect this action, as will be more fully described below.

15 indicates the hinge embodying our invention. This comprises a main casing 16 having sides 16^a outwardly projecting for attachment by bolts 17 or the like to the door-post 13. A bottom portion 16^b extends between and is formed integral with the sides 16^a, being concaved as illustrated in Fig. 3 for example. This bottom portion is provided with an aperture 16^c. A cover 18 is mounted upon the top of the casing to close the same, and is secured thereto by struck-in teeth 18^a engaging suitable recesses in the outer upper periphery of the casing 16, as illustrated in Fig. 3.

A cup-shaped member 20 is provided, having a convexed bottom portion 20^a which fits upon and generally conforms to the concaved bottom portion 16^b of the casing, being also apertured. Projecting upwardly from the bottom 20^a is the side wall 20^b having an inclined upper edge 20^c around it, as illustrated in Fig. 3. The inclination of this upper edge 20^c varies from a maximum at the point A to a minimum at the point B.

A pintle is provided, generally indicated by numeral 25. This pintle is provided at its upper end with the square or non-circular head 25^b having a portion 25^c protruding from one side, this protrusion being effected by means of a chiseled incision 25^d or the like, as illustrated in Fig. 3.

The cover 18 is suitably apertured to accommodate and journal the pintle 25 and is struck up or flanged as indicated by numeral 18^b around the pintle, as illustrated in Fig. 3.

At its lower end the pintle 25 is formed of reduced diameter as indicated by numeral 25^e. Threaded into a suitable threaded inclined aperture in the pintle 25 is the upwardly inclined stud 27 constituting the shaft upon which is mounted the inner race or cone 28^a of a bearing member, the outer race or cup constituting a roller, being indicated by numeral 28^b, bearing balls 29 being interposed between the cone and cup in well known manner. The pintle is provided with an inclined cut or recess 25^f, within which is mounted an extended shoulder 28^c of cone 28^a which serves to position the cone 28^a, and a second stepped notch or recess 25^g located above the recess 25^f to accommodate the cup 28^b. By this construction the roller generally indicated by numeral 28, lies in a plane inclined with respect to the axis of the pintle 25, the outer periphery of the roller cup 28^b, which is the rotatable portion thereof, riding upon the rounded trackway or edge 20^c.

A bushing member 32 is provided centrally

apertured at 32^a, being shouldered at 32^b and projecting through the apertures in the cup bottom 20^a and casing bottom 16^b, this projecting extremity being threaded for engagement by the nut 33. The shoulder 32^b bears upon the bottom 20^a of the cup 20, and is swaged or upset beneath the cup bottom 20^a to secure the bushing thereto as designated in Fig. 3 by numeral 32^c. The cup can be clamped in adjusted position with respect to the casing bottom 16^b by means of the nut 33 and bushing 32 in an obvious manner. The reduced end 25^e of the pintle 25 is rotatably journaled in the aperture in the bushing 32, and the body of the pintle 25 extends through a suitable aperture in the cover 18 through the flange or collar 18^b.

35 indicates a cap having the side flanges 35^a for attachment to the bottom inner corner of the door 10 by means of a screw 36 or the like. The bottom portion 35^b of this cap is offset to provide a chamber 35^c, and this offset portion is apertured at 35^d to substantially conform to the contour of the upper end 25^b of the pintle 25. The aperture 35^d is constructed of such size as to require tilting, as indicated in dotted lines in Fig. 4, to slip over and engage the upper end 25^b of the pintle, after which engagement when the door is returned to its normal upright position the protruding portion 25^c will prevent vertical disassembly of the door and pintle, as will be apparent.

In the operation of the structure utilizing our improved hinge, the cup may be set and clamped in position to locate the low point B where desired, this being the point to which the roller under the weight of the door will normally return when the door is released. After mounting and attachment of the lower hinge 15, the cap 35 may be engaged with the upper end of the pintle 25 by tilting as described above, after which the door is moved to upright position and the pin 12 adjusted to engage the cap 14 and door 10 in such manner as to permit the necessary vertical movement of the door in its rotation.

By inclining the roller 28 in the manner shown and described, greater arcuate contact is obtained and less slippage occurs, hence wear upon the trackway and the roller is lessened or eliminated as will be readily understood, and the diagonal thrust or force of the door will be neutralized or partially neutralized.

The hinge illustrated and described embodying our invention may be readily and economically manufactured, assembled and applied to door structures, and permits ready accommodation to the door position as necessary and as desired.

It will be apparent that our invention is susceptible to modification and variation from the form illustrated and described, and we do not wish to be restricted to such form except as defined in the claims or as covered by the claims properly interpreted.

What we claim is:—

1. A hinge comprising a casing, said casing being provided with a concaved supporting bottom portion, a cup-shaped member convexed to lie on said portion, the cup-shaped member being provided with an inclined upper edge, a pintle rotatable with respect to said casing and cup-shaped member, and a roller carried by said pintle and riding on said upper edge of said cup-shaped member.

2. A hinge comprising a casing, said casing being provided with a concaved supporting bottom portion, a cup-shaped member convexed to lie on said portion, the cup-shaped member being provided with an inclined upper edge, a pintle rotatable with respect to said casing and cup-shaped member, and a roller carried by said pintle and riding on said upper edge of said cup-shaped member, said roller being arranged with the plane thereof inclined with respect to the axis of said pintle.

3. A hinge comprising a casing having spaced side walls and a bottom portion extending therebetween, a cover mounted upon said casing, said bottom portion and said cover being apertured, a cup-shaped member mounted on said bottom portion, securing means comprising a threaded bushing and a nut securing said cup-shaped member in position on said bottom portion, a pintle journaled in said cover and said bushing, said cup-shaped member being provided with an inclined track portion, and a roller carried by said pintle riding thereon.

4. A hinge comprising, in combination, a cap attachable to a door or the like, supporting means, a pintle rotatable with respect to said supporting means and provided with a non-circular engageable portion, said cap being provided with an aperture of substantially similar contour fitting over and engaging said portion of said pintle to rotate therewith, said pintle being provided with a protruding portion requiring tilt of said cap to engage said non-circular portion of said pintle and preventing separation of said pintle and cap when in properly assembled relation.

5. A hinge comprising, in combination, a cap, a supporting means, a pintle supported by and rotatable with respect to said means, said pintle being provided with a non-circular engageable end, said cap being provided with an aperture of contour substantially similar to that of said pintle end, said end of said pintle being provided with a protruding portion requiring tilting of said cap for engagement between said cap and said pintle end.

6. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by and in upwardly inclined position relative to said pintle shaft, an inclined trackway associated therewith for supporting said roller and engaged by said roller at an angle downwardly inclined to create a radial thrust to counteract partly the forces created by the non-axial stresses on said pintle shaft, and a bracket for supporting said trackway and having means for centering said pintle shaft.

7. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by and in upwardly inclined position relative to said pintle shaft, said pintle shaft being recessed to receive the upper portion of the roller so as to minimize the lateral projection thereof from the pintle shaft, an inclined trackway associated therewith for supporting said roller and engaged by said roller at an angle downwardly inclined to create a radial thrust to counteract partly the forces created by the non-axial stresses on said pintle shaft, and a bracket for supporting said trackway and having means for centering said pintle shaft.

8. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by said pintle

shaft, a cup-shaped member surrounding the lower end of said pintle shaft having an opening in its lower end and having its upper end inclined to the horizontal to provide an inclined track for said roller, a supporting means provided with a casing for enclosing said roller and trackway, said casing having an opening in its bottom to register with the opening in said member, and means passing through said openings for adjustably securing said member in place.

9. A hinge construction of the character described comprising in combination a lower supporting hinge structure, a pintle associated therewith, a pintle receiving member attachable to a door or the like and having a recess therein to receive the end of said pintle, said recess being relatively shallow compared to the cross section of the pintle to permit engagement with and disengagement from said pintle by tilting of said member relative to said pintle, and an upper hinge structure having a hinge member for engaging the door and longitudinally movable to release said engagement with the door whereby the door may be positioned and removed by a tilting movement upon release of said hinge member.

10. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by said pintle shaft, a hollow supporting housing having means for connecting it to a door frame, and an inclined trackway member associated with said pintle for supporting the same and providing a track for said roller, said trackway member resting upon and being supported by the bottom of said housing.

11. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by said pintle shaft, a hollow supporting housing having means for connecting it to a door frame and having a concave bottom, and an inclined trackway member having a concave bottom adapted to nest in the concave bottom of said housing and associated with said pintle for supporting the same and providing a track for said roller, said trackway member being centered in the concave bottom of said housing and being supported thereby.

12. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by said pintle shaft, a hollow cylindrical trackway member associated with said pintle for supporting the same, the upper edge of the cylindrical wall of said member providing a track for said roller, a bracket for supporting said trackway member and having means to permit said trackway to be axially adjusted relative to said pintle shaft, said bracket including a housing surrounding said trackway and roller and having an opening at the top from which the pintle shaft projects.

13. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by said pintle shaft, an inclined trackway associated with said pintle for supporting the same and providing a track for said roller, a bracket for supporting said trackway, and a clamping member for centering said pintle shaft and for securing said trackway in place, said clamping member being releasable to permit an adjustment of the trackway relative to said member.

14. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by said pintle shaft, an inclined trackway associated with said pintle for supporting the same and providing a track for said roller, a bracket for supporting said trackway, and a hollow stud having means for clamping said trackway in said bracket, said pintle being seated in the hollow of said stud to provide a bearing for centering the lower end of said pintle shaft, said clamping means being releasable to permit an adjustment of said trackway relative to said roller.

15. A hinge construction for doors and the like comprising in combination, a pintle shaft having means for operatively connecting the same to a door, a roller carried directly by said pintle shaft, a cup-shaped member surrounding the lower end of said pintle shaft having its upper end inclined to the horizontal to provide an inclined track for said roller, a supporting housing for enclosing said roller and trackway and having means in its bottom for holding said member centered relative to the axis of said pintle shaft, and a removable cover for said casing having an opening therein to provide a bearing for the upper portion of said pintle shaft.

16. A hinge construction of the character described comprising in combination, an inclined trackway, a roller operable on said trackway, and means for supporting said roller and trackway so that they are relatively axially rotatable, said roller being constructed and arranged so that its bearing surface is inclined to the axis of rotation of the hinge.

17. A hinge construction of the character described comprising in combination, a member providing a curved trackway coaxial with the hinge axis and inclined relatively thereto, a roller operating on said trackway and having its bearing surface arranged to engage the concave side of the curved surface of the trackway, and means for relatively supporting said trackway and roller for relative rotation about the hinge axis.

18. A hinge construction of the character described comprising in combination, a member providing a curved trackway coaxial with the hinge axis and inclined relatively thereto, a roller operating on said trackway and having its axis inclined to the hinge axis so that substantially no portion of the roller or its supporting structure projects beyond said trackway, and means for relatively supporting said trackway and roller for relative rotation about the hinge axis.

19. A hinge construction comprising in combination, a fixture attachable to a door or the like, a supporting hinge structure, a hinge pintle operatively connecting said fixture and supporting hinge structure, said fixture and supporting hinge structure being respectively provided with seating means for receiving said pintle, said pintle being provided with a laterally projecting portion internally engageable with said seating means and releasable by relative tilting which requires the tilting of said fixture for separation of the latter from said supporting hinge structure, whereby the door or the like cannot be separated from the supporting hinge structure by mere vertical movement.

20. A hinge construction comprising in com-

bination, a fixture attachable to a door or the like, a supporting hinge structure, a hinge pintle operatively connecting said fixture and supporting hinge structure, said fixture and supporting hinge structure being respectively provided with seating means for receiving said pintle, means for effecting an engagement between said pintle and one of said seating means which permits separation only by tilting between said fixture and said supporting hinge structure, whereby the door or the like may not be disengaged from the supporting hinge structure by mere vertical movement.

21. A hinge construction of the character described comprising in combination, an inclined trackway, a roller operable on said trackway, and means for supporting said roller and trackway so that they are relatively axially rotatable, said roller having its axis inclined to the axis of rotation of the hinge.

22. A hinge construction of the character described comprising in combination, a circular track member presenting a curved inclined trackway, a roller operable on said trackway, means for supporting said roller and trackway so that they are relatively axially rotatable, said roller being mounted so that its axis is inclined relative to the axis of rotation of the hinge and so as to incline said roller inwardly relative to the curved trackway.

23. A hinge construction for doors and the like comprising in combination a track member having a curved, inclined trackway, a roller operable on said trackway, means for supporting said roller and track member so that they are relatively axially rotatable, a bracket member for supporting the hinge with its axis in a substantially vertical position, a fixture for connecting the hinge to a door or the like, said roller being mounted with its axis inclined to the axis of the hinge to create a lateral thrust tending to counterbalance the lateral thrusts set up by the weight of the door or the like.

24. A hinge structure of the character described comprising in combination a hinge fixture for attachment to a door post, a cooperating movable hinge member for attachment to a door, said hinge fixture including a bracket, a cam member mounted thereon and means for securing said cam member on said bracket, said securing means being provided with a generally cylindrical socket, said movable hinge member including a pintle having a body portion and an upper extension of non-circular cross section for seating engagement in a correspondingly shaped opening carried by the door and a lower extension of generally cylindrical form for rotatable engagement in said socket, said pintle body portion being provided with a stud portion on which is journalled a roller for movement along the cam surface of said cam member.

25. A door hinge of the character described comprising in combination, a pintle shaft having a non-circular extremity adapted to fit in a socket carried by a door, a roller carried directly by said pintle shaft, a cup-shaped trackway having inclined edges upon which said roller travels, a supporting member including a housing which completely encloses said roller and trackway and leaving an opening in its top through which said pintle projects, said trackway resting on the hollow of said bracket and its bottom having an opening registering with an opening in the bottom of said supporting member, and a fastening member passing through said opening and having a longitudinally extending bore therein and clamping said trackway to said supporting member, said pintle shaft having an extremity extending into said bore to center said pintle shaft.

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