

## TITLE OF THE INVENTION

### A PIVOT HINGE ASSEMBLY FOR DOOR AND A METHOD OF INSTALLING THE SAME

#### FIELD OF THE INVENTION

5 The present invention relates to a hinge, and in particular, relates to a hinge for door.

#### BACKGROUND OF THE INVENTION

The present invention pertains to pivot hinge assembly for pivotally mounting doors, and, more particularly, to such hinge assembly which may be mounted into door with ease and can be easily adjusted after mounting into the door.

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Often the door is installed by the user with pivot hinge assembly and it is important that the pivot hinge assembly must be simple to install by use of commonly available tools. One way in which the door installation may be simplified is to have simple pivot hinge which can be installed with ease.

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US Patent No. 7,650,670 discloses a method of aligning and mounting a vertically-hung door in a frame with a hinge including at least first and second leaves pivotally connected together, the method comprising: (a) positioning a movable door in a stationary door frame; (b) inserting at least one fastener into the frame through a mounting hole in the first leaf; (c) inserting at least one fastener into the door through at least one vertical slot in the second leaf so that the fastener may slide in the slot; (d) raising or lowering the door with respect to the frame; (e) fixing the vertical position of the door with respect to the frame; (f) removing the fastener from the vertical slot; and (g) adjusting laterally the position of the door with respect to the frame.

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US Patent No. 7,694,388 discloses a horizontally adjustable hinge for use with a door and frame, the adjustable hinge comprising: (a) a first leaf rotatably connected to a second leaf; (b) the first leaf adapted and configured to be connected to a door and the second leaf adapted and configured to be connected to a frame; (c) one of the leaves having a top surface and a bottom surface, the bottom surface abutting one of the door and frame; (d) an adjustment screw capturing member operatively

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connected to the bottom surface, the capturing member having an opening for receiving a head of an adjustment screw, the screw having its head having a width larger than a width of its shank, the capturing member configured to allow the adjustment screw to slide a longitudinal length of the leaf into position; (e) the capturing member having opposing sides, the sides, at one location, spaced at a distance less than the width of the head of the screw and at another location greater than the width of the head of the screw, wherein the head of the screw is captured between the bottom surface and the sides and is still rotatable while captured, the bottom surface limiting movement of the adjustment screw toward the bottom surface and the sides limiting movement of the adjustment screw away from the bottom member, rotation of the adjustment screw, while captured, horizontally adjusts the hinge; and (f) the one of the leaves having an access opening for allowing a tool to have access from the top surface to turn the adjustment screw.

US Patent No. 7,594,302 discloses a hinge assembly, comprising: a base adapted to be secured to a support for a pane to be hinged; a first cover and a second cover, said first and said second covers being adapted to lie on each side of said pane; a block, said block being secured between said first and said second covers; said block having a flat surface flush with a flat edge of said first cover and a flat edge of said second cover; said block being recessed inwardly from lateral edges and back edges of said first and said second covers respectively so as to accommodate the pane, the pane being cut-out at a mounting location thereof so as to match the contour of the block; the block having a first bore extending into said block perpendicular to said flat end thereof, each lateral edge of the block being provided with a single bore, including a second bore in a first lateral edge thereof and a third bore in a second lateral edge thereof opposite said first lateral edge, each of said second and third bores extending inwardly from a respective lateral edge and intersecting said first bore; wherein said base is secured to said block by a shaft extending from said base and engaging said first bore of said block, said second and said third bores each receiving a spring, said spring pressing against a surface of said shaft extending in said first bore thereby moving said shaft to a selected position relative to said base and providing on said shaft a detent force that maintains the pane closed in a closed position, and a restoring force closing the pane when the pane is part way open.

Despite the improvements that the aforementioned teachings provide, there still remains further need for a pivot hinge assembly and a method of installation to provide even greater flexibility and ease in adjusting a door to properly align it with its frame under a wide variety of frame and door conditions encountered in the field.

- 5 There is a further need for an improved hinge and method of installation that reduces reliance on the skills of the installer to allow installers of various skill levels to properly align and hang a door.

## **SUMMARY OF THE INVENTION**

- 10 The object of the present invention is to provide a pivot hinge assembly for door which can be easily and quickly mounting onto a door frame, facilitating the installation of the door to a designated area.

- To accomplish this object, the present invention is characterized by a pivot hinge  
15 assembly for door having a wooden door frame comprising:

- i. an upper door hinge having a knuckle flushed with a door mounting plate and a barrel having a latching pin slidable therein, one end of the barrel being flushed with a door mounting plate; wherein
- ii. a lower door hinge including a hinge plate with a knuckle thereon, a L-shaped door  
20 mounting bracket having a vertical mounting plate and a horizontal mounting plate, wherein a ball support having a depression to hold a steel ball bearing is mounted on the L-shaped door mounting bracket and is in aligned with the knuckle such that the knuckle is rotatable about the ball support;

- wherein the barrel with the latching pin is mounted at the top corner edge of the door  
25 frame with the pin protruded above the edge of the door frame, and the knuckle of the upper door hinge is disposed in opposite to but in aligned with the latching pin, the knuckle sat on the pin and is rotatable about the pin within the barrel; wherein the L-shaped door mounting bracket of the lower door hinge is mounted to the lateral wall to hold the door, and the knuckle with the hinge plate is mounted to the bottom  
30 edge of the door frame, the hinge leave being rotatably about the ball bearing support on the L-shaped door bracket.

Yet another object of the present invention is to provide a pivot hinge assembly for door, wherein the lower end of the latching pin is provided with a plurality of teeth adapted for the engagement with a universal key.

5 Still an object of the present invention is to provide a pivot hinge assembly for door, wherein external surface of the barrel is provided with a though hole, allowing the universal key to be inserted to adjust the length of the pin within the barrel protruded above the upper door edge.

10 Still a further object of the present invention is to provide a pivot hinge assembly for door, wherein the length of the pin protruded beyond the upper door edge is corresponding to the depth of the knuckle.

Yet still a further object of the present invention is to provide a pivot hinge assembly  
15 for door, wherein the position of the ball support of the lower door hinge is either on the center of the horizontal plate of the L-shaped door mounting bracket or at off center of the horizontal plate of the L-shaped door mounting bracket.

It is an object of the present invention to provide a method of installing a pivot hinge  
20 assembly onto door frame, comprising the steps of:

i. mounting the knuckle of the upper pivot hinge into a prefabricated hole on the wall frame mounted on the wall;

ii. prefabricating a hole on the top edge of the door frame for the mounting of the barrel of the pivot hinge assembly, wherein the latching pin is a short distance  
25 beyond the top edge of the door;

iii. mounting lower pivot hinge to the wall supporting the door with the L-shaped door mounting bracket to the wall supporting and the disposing the knuckle onto the ball support such that the hinge leave of the lower pivot hinge sits onto the horizontal plate member, wherein the knuckle is being mounted into the lower edge of the door  
30 and is rotatable about the ball support upon fitting the knuckle sit onto the ball seat support; wherein, when the door is operated from the closed position to the open position, the upper pivot hinge and lower pivot hinge are simultaneously rotate about the axis of the latching pin and the steel ball support , thereby, operating the door is

actuated to a predetermined distance and enabling the operation of the door in a way free from obstacle from the wall supporting the lower pivot hinge and the door frame. An object of the present invention is to provide a method of installing a pivot hinge assembly onto door frame, wherein the ball bearing support being mounted onto the horizontal plate is off set towards one edge of the horizontal plate, such that the angle of swinging of the door on the pivot hinge assembly opens at 90 degree without obstacle.

It is particularly preferred that a roller-mounting hole is defined in the leaf spring and a spring-mounting hole is defined in the positioning member corresponding to the roller-mounting hole, the leaf spring and the positioning member being interconnected by a bolt screwing respectively into the roller-mounting hole and the spring-mounting hole.

It is particularly preferred that the adjustment of the length of the latching pin is done by using a universal key to rotate either clockwise or anticlockwise to slide the latching pin within the barrel.

It is particularly preferred that the knuckle of the upper hinge is aligned capped onto the latching pin protruded from the barrel.

Another object of the present invention is to provide a pivot hinge assembly comprising a top pivot hinge and a lower pivot hinge which can be fabricated readily and relatively economically to install as well.

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## **BRIEF DESCRIPTION OF THE DRAWINGS**

In the drawings:

FIG. 1 is a perspective view of a pivot hinge assembly for a door with wooden door frame in accordance with the present invention.

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FIG. 2 is a perspective view of the lower pivot hinge of the pivot hinge assembly of the present invention.

FIG. 2A is a perspective view of the L-shaped hinge mounting plate in accordance with the present invention.

5 FIG. 2B is a perspective view of the L-shaped hinge mounting plate, wherein the horizontal plate thereof is offset (non-aligned with) the vertical mounting plate, in accordance with the present invention.

10 FIG. 2C is a perspective view of the upper pivot hinge, wherein an aperture is formed for the insertion of a Universal Key to extend or retract the latching pin in the barrel, in accordance with the present invention.

FIG. 3 is an exploded perspective view of the lower pivot hinge of the pivot hinge assembly of the present invention.

15 FIG. 4 is a schematic perspective view showing the mounting of the pivot hinge assembly to the door in accordance with the present invention.

## **DESCRIPTION OF THE PREFERRED EMBODIMENT**

20 An exemplary embodiment of the present invention will now be described in detail with reference to the accompanying drawings. In the following description, a representative embodiment of the present invention will be presented in order to achieve the object. Furthermore, other embodiments that may be presented according to the present invention are replaced with the description in the construction of the present invention.

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The present invention is intended to fit a door hinge 100 which enables a door 80 to be smoothly opened and closed about the pivoted hinge 100. There is a small gap formed between the door 80 and a door frame 60 when the door 80 is opened in such a manner that the door 80 is rotatably turned to 90 degree from the door 80 on which the door frame 60 is mounted. The exemplary embodiment of the present invention will now be described in detail with reference to the accompanying drawings.

35 FIG. 1 is a perspective view of the pivot hinge assembly 100 in accordance to an exemplary embodiment of the present invention, and FIGs. 2 and 3 are perspective

views showing the bottom pivot hinge in accordance with the present invention. FIG. 2C is a perspective view of the upper pivot hinge in accordance with the present invention.

5 As shown in FIG. 1, the pivot hinge assembly 100 for door 80 having a wooden door frame 60 comprising an upper door hinge 18, a lower door hinge 38. The upper door hinge 18 includes a knuckle 10 flushed with a door mounting plate 11 and a barrel 13 having a latching pin 12 slidable therein. One end of the barrel 13 is being flushed with a door mounting plate 15. Both the door mounting plates 11 and 15 are mounted  
10 respectively to the door frame of a door and to the edge of the door 80 by means of screws or the like so that the knuckle 10 and the lower door hinge 38 are securedly fastened.

Referring to FIGS. 2 and 3, the lower door hinge 38 includes a hinge plate 32 with a  
15 knuckle 31 thereon, a L-shaped door mounting bracket 34 having a vertical mounting plate 33 and a horizontal mounting plate 34, wherein a ball support 35 having a depression 37 to hold a steel ball bearing 36 is mounted on the L-shaped door mounting bracket 34 and is in aligned with the knuckle 31 such that the knuckle 31 is rotatable about the ball support 35.

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FIG. 2C is a perspective view of the upper pivot hinge 18, wherein an aperture 14 is formed for the insertion of a Universal Key (not shown) to extend or retract the latching pin 12 in the barrel 13, in accordance with the present invention. In the present invention, the barrel 13 has a hollow center and the latching pin 12 is slidable  
25 within the hollow barrel 13. The knuckle 10 of the upper door hinge 18 is mounted at the top corner edge of the door frame 60, and the barrel 13 is mounted to the door such that the latching pin 12 can be protruded above the edge of the door 80, and the knuckle 10 of the upper door hinge 18 is disposed in opposite but in aligned with the latching pin 12. The knuckle 10 sits onto the latching pin 12 at one end thereof  
30 and is rotatable about the latching pin 12 within the barrel 13. The L-shaped door mounting bracket 33 of the lower door hinge 38 is mounted to the door frame 60 and the hinge mounting plate 32 allows the door 80 be hinged thereon. In the present invention, the knuckle 31 with the hinge plate 32 is mounted to the bottom edge of the door 80, the hinge plate 32 is rotatable about the ball bearing support 35 on the  
35 L-shaped door bracket 33.

FIG. 2 is a perspective view showing the lower door hinge 38 according to an exemplary embodiment of the present invention. The mounting plate 34 is made in such a way that the plate 34 is off set to that of the horizontal mounting bracket 33.

5 The ball support 35 is therefore off set. The knuckle 31 with the hinge mounting plate 32 is fitted onto the ball support 35 having a steel ball 36 sitting onto the depression 37. The hinge mounting plate 32 is therefore rotatable about the ball support 35. A door (not shown) fitted onto the hinge mounting plate 32 is therefore able to rotate to a maximum angle of 90 degree.

10 FIG. 2A is a perspective view of the L-shaped hinge mounting plate in accordance with the present invention. FIG. 2B is a perspective view of the L-shaped hinge mounting plate, wherein the horizontal plate thereof is offset (non-aligned with) the vertical mounting plate, in accordance with the present invention.

15 In the preferred embodiment of the present invention, the lower end of the latching pin 12 is provided with a plurality of teeth (not shown) adapted for the engagement with a Universal Key. When the section of the latching pin 12 is to be protruded out from the barrel 13, the Universal Key is inserted via the aperture 14 provided at the side of the barrel 13, and the key is turned either clockwise or anticlockwise to protrude the latching pin 12. The aperture 14 is provided at the lower section of the barrel 13 and the aperture has a size which allows the Universal Key to be inserted to adjust the length of the latching pin 12 within the barrel 13 protruded above the upper door edge.

25 Generally, the appropriate length of the latching pin 12 protruded beyond the upper door edge is corresponding to the depth of the knuckle 10 such that the protruded latching pin 12 is appropriately fitted within the knuckle 10 of the upper pivot hinge 18. In the present invention, the position of the ball support 35 of the lower door hinge 38 is on the center of the horizontal mounting plate 34 of the L-shaped door mounting bracket 33 so that a door 80 can be mounted thereon.

Hereinafter, the installation of the pivot hinge assembly according to the present invention is described as follows with reference to FIG. 4, comprising the steps of :

- i. mounting the knuckle 10 of the upper pivot hinge 18 into a prefabricated hole on the door frame 60 mounted on the wall;
- ii. prefabricating a hole on the top edge of the door 80 for the mounting of the barrel 13 of the pivot hinge assembly 100, wherein the latching pin 12 is a short distance  
5 beyond the top edge of the door 80;
- iii. mounting lower pivot hinge 38 to the wall supporting the door with the L-shaped door mounting bracket 33 to the wall supporting and the disposing the knuckle 31 onto the ball support 35 such that the hinge mounting plate 32 of the lower pivot hinge 38 sits onto the horizontal plate member 34, wherein the knuckle 31 is being  
10 mounted into the lower edge of the door 80 and is rotatable about the ball support 35 upon fitting the knuckle 31 sit onto the ball support 35; wherein, when the door 80 is operated from the closed position to the open position, the upper pivot hinge 18 and lower pivot hinge 38 are simultaneously rotate about the axis of the latching pin 12 and the steel ball support 36 , thereby, operating the door 80 is actuated to a  
15 predetermined distance and enabling the operation of the door 80 in a way free from obstacle from the wall supporting the lower pivot hinge 38 and the door frame 60.

To mount the knuckle 10 on the door frame 60, a hole 14 on the door frame 60 has to be made. The latching pin 12 is adjusted in such a way that a portion thereof can be  
20 inserted within the knuckle 10. Then, the lower pivot hinge 38 is fixed onto the door frame with the L-shaped door mounting bracket 33, and horizontal plate 34, to the wall supporting and the disposing the knuckle 31 onto the ball support 35 such that the horizontal plate 34 of the lower pivot hinge 32 sits onto the horizontal mounting plate 34, wherein the knuckle 31 is being mounted into the lower edge of the door 80 and  
25 is rotatable about the ball support 35 upon fitting the knuckle 31 to sit onto the ball support 35.

In accordance with the present invention, the horizontal plate 34 is off set from the vertical mounting plate 33 and thus the ball support 35 is also off set from the  
30 horizontal plate 34, such that angle of swinging of the door 80 on the pivot hinge assembly 100 opens at 90 degree without obstacle . Fastening means such as a plurality of screws are used to mount the upper pivot hinge and the lower pivot hinge onto the edge of the door frame and rough frame. The hinge plates 33, 34 of the L-shaped door mounting bracket 38 are 90 degrees to each other.

Referring to FIG. 4, there is shown a perspective view on the mounting of the upper door hinge 18 to the door 80 and door frame 60 in accordance with the present invention. In accordance with the preferred embodiment of the present invention, the fitting of the upper door hinge 18 is very convenient. A hole on the top edge of the door frame 60 is made with the size corresponding to that of the knuckle 10 and the door mounting plate 11 is secured to the door frame 11 as shown. The upper door hinge 18 is secured to the door frame 11. The latching pin 12 within the barrel 13 is protruded to be mounted by the knuckle 10. A hole has to be fabricated on the door so as to hold the barrel 13 and is aligned with the knuckle 10. The mounting plate 15 of the barrel 15 is screwed onto the edge of the door 80.

After the door 80 is fixed, and if it is sought to open the door 80, the door can be actuated inward or outward about the pivot hinge assembly 100 of the present invention. At this time, the rotatable moving of the door 80 is about the axis formed by the upper door hinge 18 and the bottom door hinge 38. According to the present invention, the length of the latching pin 12 that is protruded is adjustable. The moving angle of the door 80 for the hinged used is about 90 degree. The door 80 with the pivot hinge assembly 100 of the present invention will stably perform the opening operation without interference, such as a collision in the door frame 60.

While the present invention has been described with reference to the particular illustrative embodiment, it is not to be restricted by the embodiment but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiment without departing from the scope and spirit of the present invention. Example embodiments being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

**CLAIMS**

1. A pivot hinge assembly for door having a wooden door frame comprising:
  - i. an upper door hinge having a knuckle flushed with a door mounting plate and a barrel having a latching pin slidable therein, one end of the barrel being flushed with a door mounting plate; wherein
  - ii. a lower door hinge including a hinge plate with a knuckle thereon, a L-shaped door mounting bracket having a vertical mounting plate and a horizontal mounting plate, wherein a ball support having a depression to hold a steel ball bearing is mounted on the L-shaped door mounting bracket and is in aligned with the knuckle such that the knuckle is rotatable about the ball support;

wherein the barrel with the latching pin is mounted at the top corner edge of the door frame with the pin protruded above the edge of the door frame, and the knuckle of the upper door hinge is disposed in opposite to but in aligned with the latching pin, the knuckle sat on the pin and is rotatable about the pin within the barrel; wherein the L-shaped door mounting bracket of the lower door hinge is mounted to the lateral wall to hold the door, and the knuckle with the hinge plate is mounted to the bottom edge of the door frame, the hinge leave being rotatably about the ball bearing support on the L-shaped door bracket.
2. The pivot hinge assembly of Claim 1, wherein the lower end of the pin is provided with a plurality of teeth adapted for the engagement with a universal key.
3. The pivot hinge assembly of Claim 1 or 2, wherein external surface of the barrel is provided with a though hole, allowing the universal key to be inserted to adjust the length of the pin within the barrel protruded above the upper door edge.
4. The pivot hinge assembly of Claim 1, wherein the length of the pin protruded beyond the upper door edge is corresponding to the depth of the knuckle.
5. The pivot hinge assembly of Claim 1, wherein the position of the ball support of the lower door hinge is either on the center of the horizontal plate of the L-shaped door mounting bracket or at off center of the horizontal plate of the L-shaped door mounting bracket.

6. A method of installing a pivot hinge assembly onto door frame as claimed in Claim 1, comprising the steps of:

- i. mounting the knuckle of the upper pivot hinge into a prefabricated hole on the wall  
5 frame mounted on the wall;
- ii. prefabricating a hole on the top edge of the door frame for the mounting of the barrel of the pivot hinge assembly, wherein the latching pin is a short distance beyond the top edge of the door;
- iii. mounting lower pivot hinge to the wall supporting the door with the L-shaped door  
10 mounting bracket to the wall supporting and the disposing the knuckle onto the ball support such that the hinge leave of the lower pivot hinge sits onto the horizontal plate member, wherein the knuckle is being mounted into the lower edge of the door and is rotatable about the ball support upon fitting the knuckle sit onto the ball seat support; wherein, when the door is operated from the closed position to the open  
15 position, the upper pivot hinge and lower pivot hinge are simultaneously rotate about the axis of the latching pin and the steel ball support, thereby, operating the door is actuated to a predetermined distance and enabling the operation of the door in a way free from obstacle from the wall supporting the lower pivot hinge and the door frame.

7. The method of installing as set forth in Claim 6, wherein the ball bearing support  
20 being mounted onto the horizontal plate is off set towards one edge of the horizontal plate, such that angle of swinging of the door on the pivot hinge assembly opens at 90 degree without obstacle.

8. The method of installing as set forth in Claim 6, wherein the length of latching pin  
25 protruded beyond the upper door edge is corresponding to the depth of the knuckle.

9. The method of installing as set forth in Claim 8, wherein the adjustment of the length of the latching pin is done by using a universal key to rotate either clockwise or anticlockwise to slide the latching pin within the barrel.

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10. The method of installing a pivotal hinge assembly as set forth in Claim 1, wherein the knuckle of the upper hinge is aligned capped onto the latching pin protruded from the barrel.

11. The pivot hinge assembly as set forth in Claim 1, wherein the lathing pin is smoothly slidable within the barrel.
12. The pivot hinge as claimed in Claim 1, further comprising fastening means to  
5 mount the upper hinge and the lower pivot hinge onto the edge of the door frame.
13. The pivot hinge assembly as claimed in Claim 12, wherein the fastening means is a plurality of screws mounting the hinge plate to the edge of the door frame.
- 10 14. The pivot hinge assembly as claimed in Claim 1, wherein the hinge plates of the L-shaped door mounting brackets are 90 degrees to each other.
15. The pivot hinge assembly as claimed in Claim 1, wherein the horizontal mounting plate of the L-shaped door brackets is offset from the vertical mounting plate of the L-  
15 shaped door bracket such that the axis of the vertical mounting plate is not in alignment with that of the horizontal mounting plate.