

Aug. 3, 1954

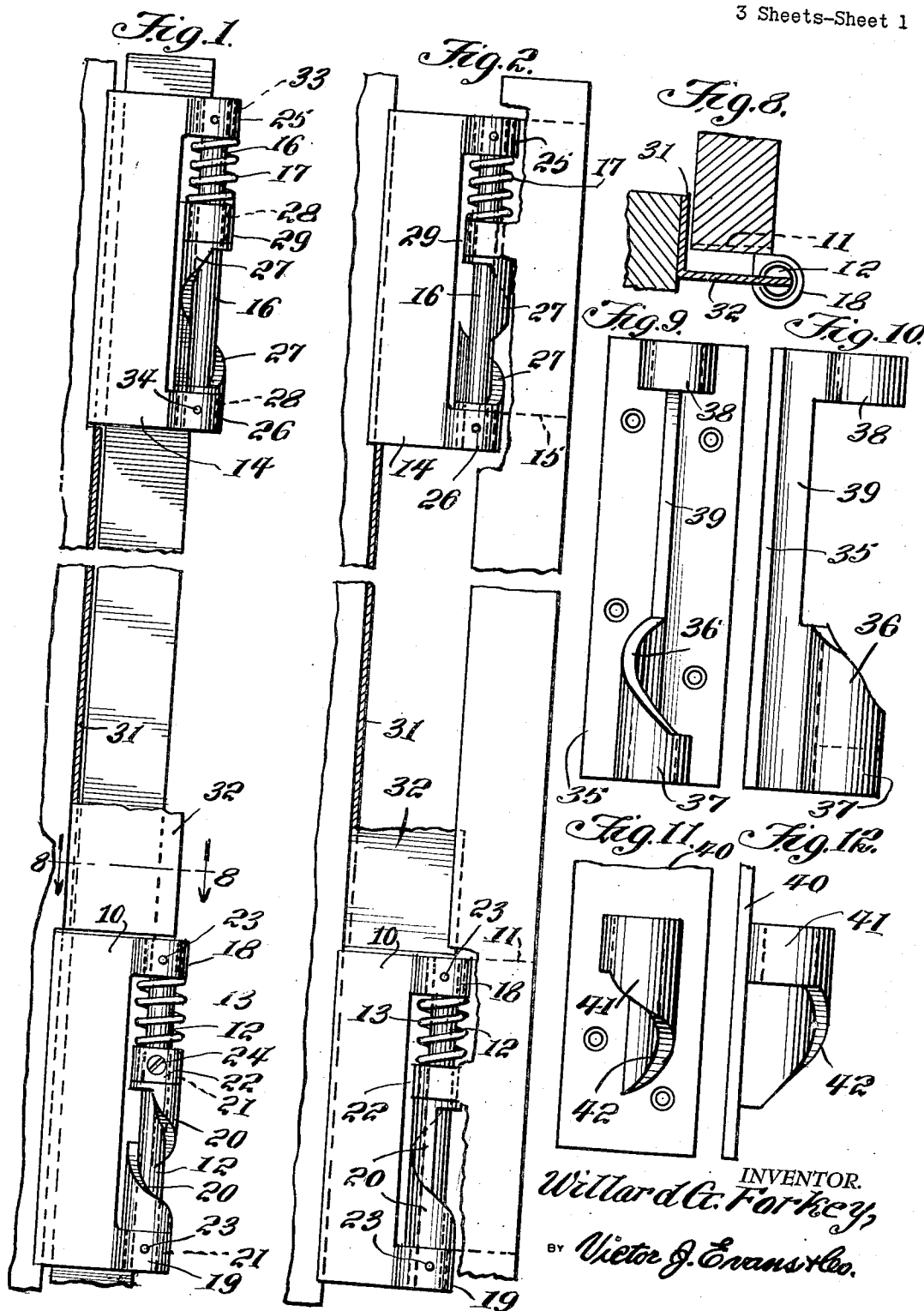
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2,685,102

GRAVITY CLOSING TWO-WAY SWINGING DOOR HINGE

Filed Jan. 11, 1950

3 Sheets-Sheet 1



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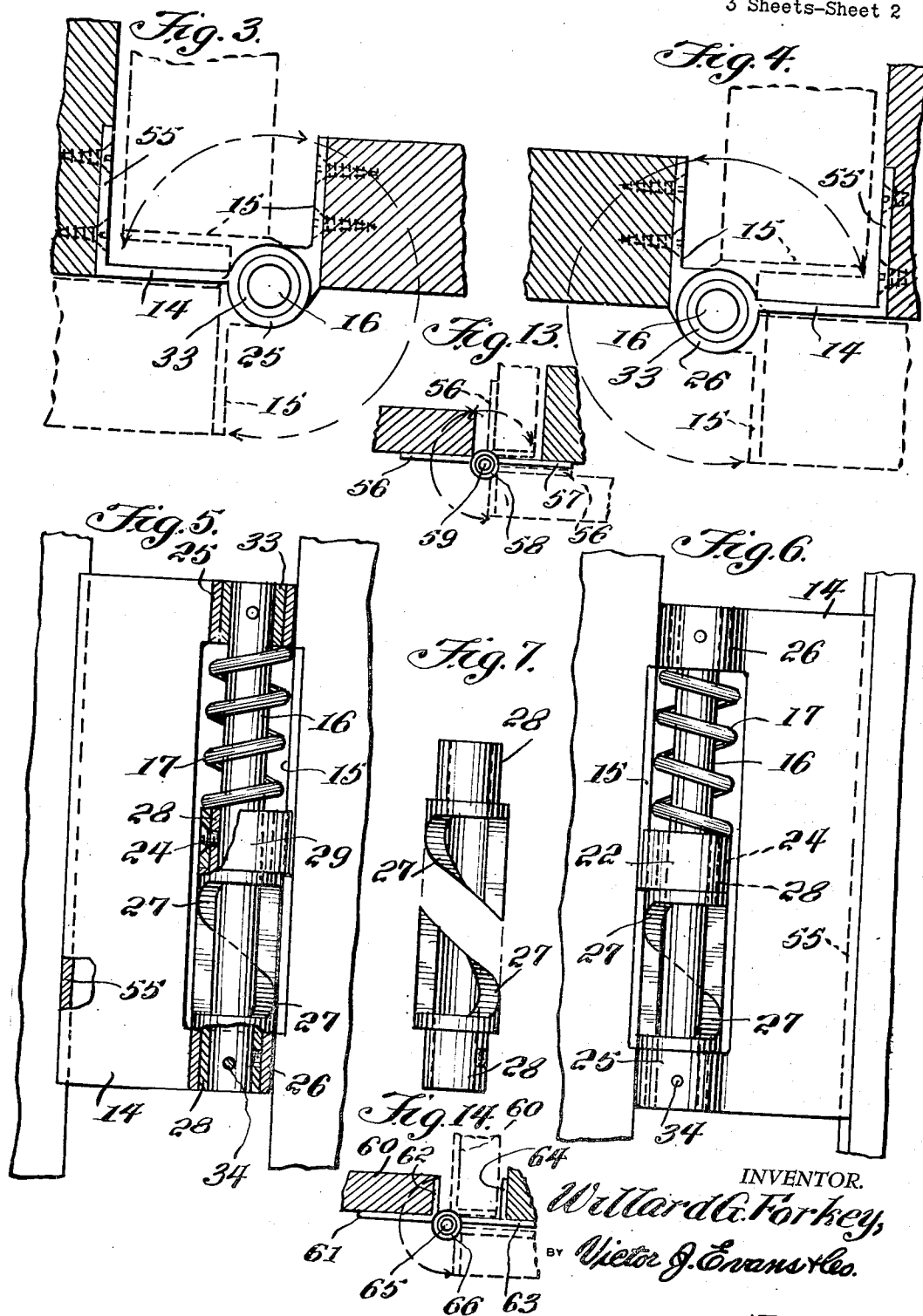
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GRAVITY CLOSING TWO-WAY SWINGING DOOR HINGE

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3 Sheets-Sheet 2



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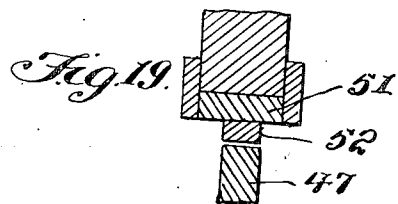
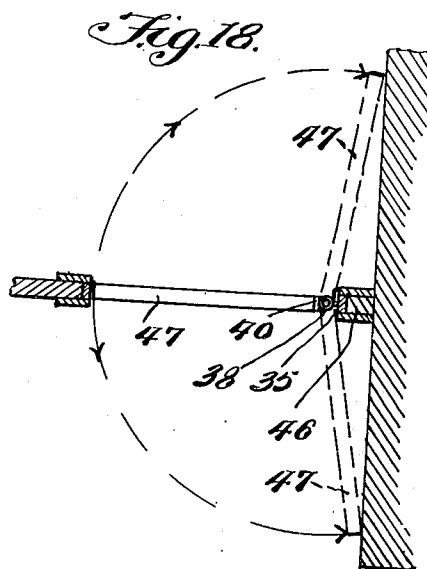
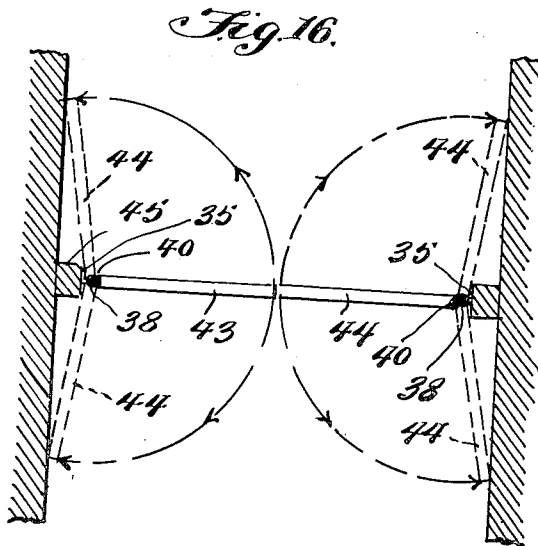
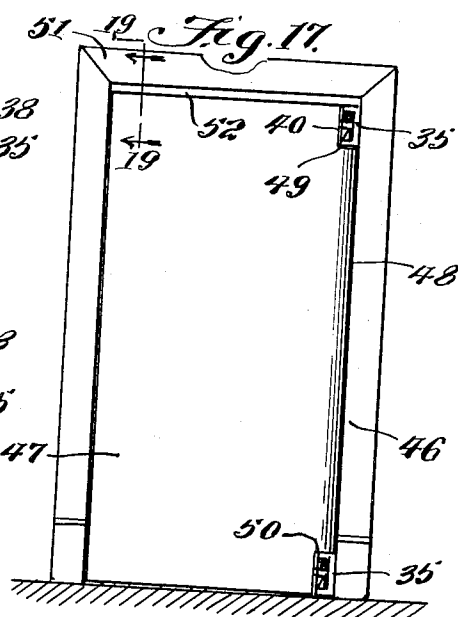
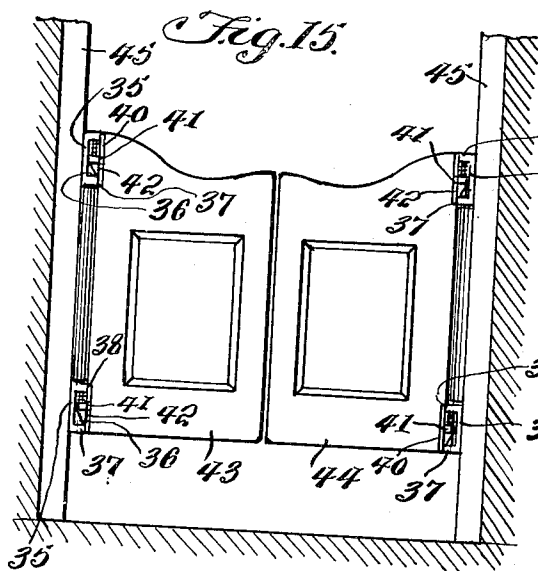
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3 Sheets-Sheet 3



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2,685,102

GRAVITY CLOSING TWO-WAY SWINGING
DOOR HINGEWillard G. Forkey, Augusta, Ga.; Margaret
Forkey, sole heir of said Willard G. Forkey, de-
ceased

Application January 11, 1950, Serial No. 138,044

2 Claims. (Cl. 16—153)

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This invention relates to doors of the swinging type wherein a double acting gravity closing hinge replaces the spring type of double acting swinging hinge, and in particular, the invention relates to a pair of hinges with one having an arcuate surface sloping upwardly from one side of the center and another having an arcuate surface sloping upwardly on the opposite side of the center with cam elements carried by the door and positioned to ride on the coacting arcuate surfaces and when the door is released, the weight thereof causes the cam elements to slide downwardly bringing the door into the closed position by gravity.

The purpose of this invention is to provide means in the hinges of a two-way swinging door whereby the door is returned to the closed position by gravity when released.

In the usual type of two-way swinging door of both the spring and gravity actuated types it is difficult to hold the door beyond the center so that it will remain open on either side of the hinge. Furthermore in the spring type of hinge where it is necessary for one side of the spring to unwind the movement of the wire coil causes noise that is objectionable. With this thought in mind this invention contemplates a pair of cam actuated hinges where the cam for returning the door from one side is provided in one hinge and the cam for returning the door from the opposite side is provided in another hinge and both hinges are provided with springs and sliding cams that coact to actuate the door.

The object of this invention is, therefore, to provide means for forming a pair of hinges for a two-way swinging door wherein one hinge returns the door from one side and the other from the other and the door is actuated by gravity by which the door is returned to the closed position.

Another object of the invention is to provide a pair of hinges for a two-way swinging door wherein the door is closed by gravity which may be attached to doors and door frames now in use.

A further object of the invention is to provide a pair of gravity cam actuated door hinges for two-way swinging doors with one hinge positioned to return the door from one direction and the other from the opposite direction and wherein the hinges are of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a pair of hinges having cam surfaces extended from base plates on a door jamb or frame, coacting cam surfaces

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extended from base plates on a door, pins extended through hubs positioned on the base plates, and springs urging the cam surfaces in engaging relation.

Other features and advantages of the invention will appear from the following description taken in connection with the drawings wherein:

Figure 1 is a side elevational view showing upper and lower hinge elements having oppositely positioned cam surfaces with the elements mounted on a door jamb or frame and on a door, with the door shown in the open position, and on the far side of the center.

Figure 2 is a similar view showing the door actuated through an angle of 180° from the position shown in Figure 1 and with parts of the door broken away to show the position of the hinge elements with the door in this position.

Figure 3 is a plan view showing the door and door jamb in section with the door shown in full lines in the closed position and in dotted lines in the open position.

Figure 4 is a similar view illustrating the position of the door on the opposite side of the opening.

Figure 5 is a detail illustrating the position of the hinge elements with parts shown in section and with the door in the closed position.

Figure 6 is a similar view showing the hinge of the door positioned in the opposite side of the frame.

Figure 7 is a detail showing the two positions of the cam, wherein the upper inverted cam rides downwardly on the lower cam to close a door.

Figure 8 is a sectional plan taken on line 8—8 of Figure 1 with the door in the open position as illustrated in Figure 1.

Figure 9 is a detail showing a modification illustrating one of the cam elements on a base plate with a bearing for the hinge pin at the upper end of the plate and with other parts omitted.

Figure 10 is a side elevation of the hinge plate and cam surface shown in Figure 9.

Figure 11 is a view showing a portion of a base plate of a hinge having a cam shaped to coact with the cam surface shown in Figure 9, the upper part of the base plate thereof being broken away.

Figure 12 is a similar view showing a side elevation of the base plate and coacting cam surface.

Figure 13 is a detail similar to that shown in Figure 4 illustrating a modification wherein the hinge plate extends straight outwardly from the center of the hinge.

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Figure 14 is a similar view showing the combination of the hinge or base plate shown in Figures 4 and 13 wherein the base plates are angular shaped in cross section.

Figure 15 is a front elevational view illustrating a pair of swinging doors of the half-mast type wherein the lower ends of the doors are positioned above the floor.

Figure 16 is a sectional plan illustrating the swinging movement of the door shown in Figure 15.

Figure 17 is a front elevational view showing the hinged element positioned on a folding door.

Figure 18 is a sectional plan through a door of the type illustrated in Figure 17 showing the movement thereof.

Figure 19 is a detail showing a section on line 19-19 of Figure 17 illustrating the upper rail or section of a door frame with the improved gravity type swinging door hinge positioned therein.

Referring now to the drawings wherein like reference characters denote corresponding parts the double swinging gravity door hinge of this invention includes a pair of hinges formed with a common mounting plate having extended hubs on the upper and lower ends and adapted to be mounted on a door jamb, a hinge plate mounted on a door and having a hub positioned between the hubs of the mounting plate, and cam inserts having mounting sleeves positioned in the lower hub of a mounting plate and the hub of the hinged plate with the cam in the hub of the hinge plate in an inverted position, and wherein the cam in the inverted position is resiliently urged against the surface of the lower cam by a spring positioned between the hub of the hinge plate and upper hub of the mounting plate. The mounting plate is used in one position on one side of a door frame and is used in an inverted position on the opposite side of the frame.

In the design shown the hinge at the lower end is formed with an L-shaped mounting plate 10 which is positioned on the door jamb or frame, a hinge plate 11 that is positioned on the edge of the door, a pin 12 and a spring 13, and the hinge at the upper end is provided with a similar mounting plate as indicated by the numeral 14 which is positioned on the door jamb or frame, a hinge plate as indicated by the numeral 15 mounted on the edge of the door, and a pin 16 with a spring 17.

The hinge mounting plate 10 is provided with outwardly extended hubs 18 and 19 in the ends of which the pin 12 is positioned and a cam 20 having a sleeve 21 extends upwardly from the upper surface of the hub 19 with the sleeve 21 positioned in the hub, as shown in Figure 1. The hinge plate 11 which is positioned on a door is provided with a hub 22 and an inverted cam 20 is carried by and extends downwardly from the hub 22 with the sleeve 21 in the hub and this cam coacts with the surface of the lower cam 20 in the hub 19 when the door is in the closed position and also when the door is extended on the near side of the frame, as illustrated in Figure 2. The hinge plate 11 is journaled on the pin 12 through the hub 22 with the sleeve 21 of the cam 20 positioned in the hub. Keys or pins 23 may be inserted through the hubs 18 and 19 to retain the pin 12 and cam 20 in position.

The sleeve 21 of the inverted cam 20 is secured in the hub 22 by a set screw 24, the cam, sleeve, and hub being free to slide vertically on the pin 12.

The upper mounting plate 14 is provided with hubs 25 and 26 similar to the hubs 18 and 19

and the pin 16 is positioned in these hubs with the sleeve of the cam elements 27 providing bushings in the lower hub and also in the hub 29 of the hinge plate 15. The hinge plate 15 is provided with a hub 29 and the inverted cam 27 is retained in the hub 29 by a screw 24 which extends into the sleeve 28 of the cam.

With the parts arranged in this manner a door carried by the hinge plates 11 and 15 is elevated by the coacting surfaces of the cams 27 as the door is moved from the closed position to the position on the opposite side of the hinge element as illustrated in Figure 1, and during this movement the surfaces of the cams 20 are separated. As the door is moved from the closed position to the opposite side or to the position shown in Figure 2 the cam surface of the inverted cam 20 rides upon the surface of the lower cam 20, raising the door to the position shown in Figure 2 and the surfaces of the cams 27 are separated. With the parts arranged in this manner the door remains in the closed position and after it has been opened to either side it will return to the closed position when released. The door is closed by gravity with the inverted cam element 27 sliding downwardly on the lower cam surface, as the door is returned from the position shown in Figure 1, and with the inverted cam element 20 riding downwardly upon the lower cam surface 20 when the door returns to the closed position from the position shown in Figure 2.

It will also be noted in Figures 3 and 4 that the door may be rotated from the closed position to an angle of 180° with the door opening on the near side of the hinge as illustrated in these figures.

The area between the upper end of the plate 10 and the lower end of the plate 14 may be filled in with an angle iron having a leg 31 secured to the door jamb by screws and an outwardly extended leg 32, as shown in Figures 1 and 7.

As illustrated in the enlarged scale detail shown in Figures 5 and 6 the upper end of the pin 16 is carried in a bushing 33 in the hub 25, the sleeve 28 of the cam 27 being positioned in the lower hub 26, the lower end of the pin being positioned in the sleeve 28 that is keyed to the pin 16 by a pin 34.

The mounting plates 10 and 14 are similar and when the mounting plate is changed to the opposite side of the door from that shown in Figures 1 and 5 the position of the mounting plate is inverted and the cam is removed and reinserted pointing in the opposite direction so that when turned end for end the cam assumes its original position as shown in Figures 1 and 5 but positioned in the frame or jamb on the right hand side of the frame.

In the modification illustrated in Figures 9 to 18 inclusive the hinge is formed with a mounting plate 35 having a cam surface 36 at the upper end of a hub 37 thereof and a hub 38 is provided at the upper end with a web 39 extended between the hubs.

The mounting plate illustrated in Figures 9 and 10 carries a cam surface similar to the cam surface of the mounting plate 10 shown in Figure 1 and it will be understood that a similar plate may be provided for the upper hinge on which a cam surface corresponding to the surface 27 may be provided.

In this type of hinge the hinge plate 40 positioned on the door is provided with a hub 41 similar to the hubs 22 and 29 and a cam surface

42 similar to the inverted cam surfaces 20 and 27 extends downwardly from the hub.

With this type of hinge positioned on a pair of doors 43 and 44, such as half mast doors (Figure 15) the doors are free to swing from side to side and will be returned to the closed position by gravity when released. In this design the plates 35 are secured on a door jamb 45 and in the design shown in Figures 17 and 18 the mounting plates are positioned on a door jamb 46 with a door 47 carried by the hinges and provided with a rounded edge 48 to close the area between the hinges. In this design the upper corner of the door is provided with a notch 49 for the upper hinge and the lower corner is provided with a notch 50 in which the lower hinge is positioned.

Figure 19 illustrates a cross section through the upper rail of a door frame 51 and shows a bar 52 extended downwardly from the frame 51 with the door 47 spaced below the member 52.

It will be noted, particularly as illustrated in Figures 1, 5 and 6 that with the cam surface 20 extended upwardly along the pin on one side in the lower hinge, and the cam surface 27 extended upwardly also along the pin on the other side in the upper hinge, with the door swinging from the closed position the surface of the inverted cam 20 will ride upwardly on the surface of the lower cam 20 when the door swings toward the near side of the hinge and the inverted cam surface 27 rides upwardly on the lower cam surface 27 when the door swings toward the far side of the hinge whereby the door is elevated in the open positions and as soon as the door is released the cam surfaces ride downwardly on the coacting surfaces of the cams 20 and 27 so that the door closes by gravity.

The hinge plate and also the mounting plate may be formed as illustrated in Figures 1 and 2 or as shown in Figures 9 and 10 and the plate may be provided with suitable openings for screws and the like. The mounting plates 10 and 14 are provided with flanges 55 for mounting the plates on a door jamb or frame and these plates may be extended toward either side depending upon the door opening of the frame or the side upon which the door is positioned.

The hinge and mounting plate may also be formed as shown in the modification illustrated in Figure 13 wherein a hinge plate 56 is positioned on the side of a door and a mounting plate 57 extends straight outwardly from the hub 58. The plates are connected by a pin 59.

Figure 14 shows a further modification wherein a door 60 is supported by a hinge plate 61 having an angle section 62 and a mounting plate 63 is also provided with a plate 64 that extends outwardly at an angle. The plates are connected by pins 65 extended through hubs 66. It will be understood that modifications may be made in the design and arrangement of the

parts without departing from the spirit of the invention.

What is claimed is:

1. A double swinging door hinge comprising a lower mounting plate having hubs extended from the upper and lower ends and having a cam surface positioned on the upper end of the hub on the lower end of said lower mounting plate and extended upwardly, an upper mounting plate having hubs extended from its upper and lower ends and having a cam surface positioned on the upper end of the hub on the lower end of said lower mounting plate and extended upwardly, a lower hinge plate having a hub intermediate of the ends thereof and having a cam surface positioned on the lower end of the hub and extended downwardly to coact with the cam surface of the lower mounting plate, an upper hinge plate having a hub intermediate its ends with a cam surface extended downwardly therefrom and positioned to coact with the cam surface extended upwardly from the lower hub of the upper mounting plate, pins extended through the hubs of the upper and lower mounting and hinge plates with the hubs of the hinge plates positioned between the hubs of the mounting plates, and springs positioned on said pins between the hubs of the hinge plates and the upper hubs of the mounting plates.

2. A double swinging door hinge comprising a mounting plate having hubs extended from the upper and lower ends, a cam insert having a sleeve positioned in the hub in the lower end of the mounting plate with an arcuate cam surface, a hinge plate having a hub positioned between the hubs of the mounting plate, a cam insert having a sleeve with the sleeve positioned in the hub of the hinge plate and having a cam surface thereon extended downwardly and positioned to coact with the cam surface of the cam insert in the hub extended from the lower end of the mounting plate, a pin extended through the hubs of the mounting and hinge plates and through the sleeves of the cam inserts therein, a spring positioned on the pin between the hub of the hinge plate and hub on the upper end of the mounting plate, a compensating sleeve in the upper hub of the mounting plate, and means securing the cam inserts and pin in the hubs.

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