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DOOR AND HINGE COMBINATION

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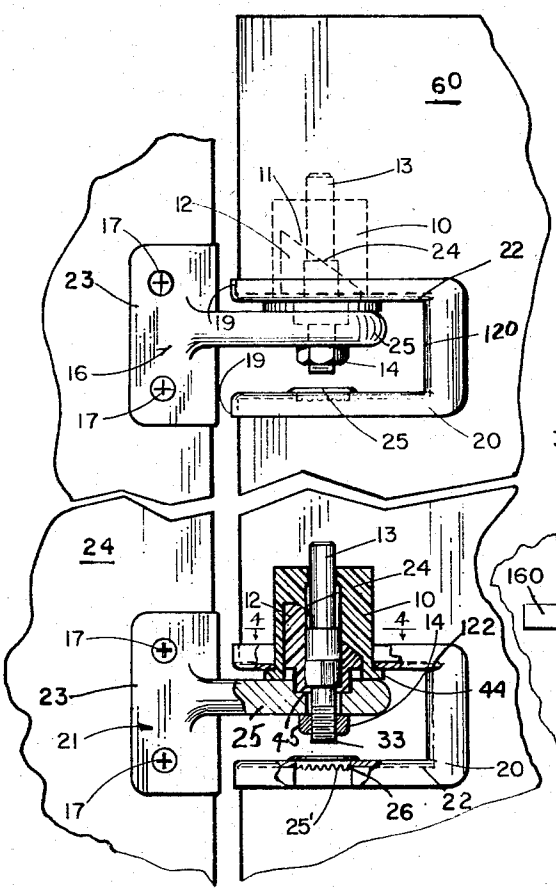


FIG. 1

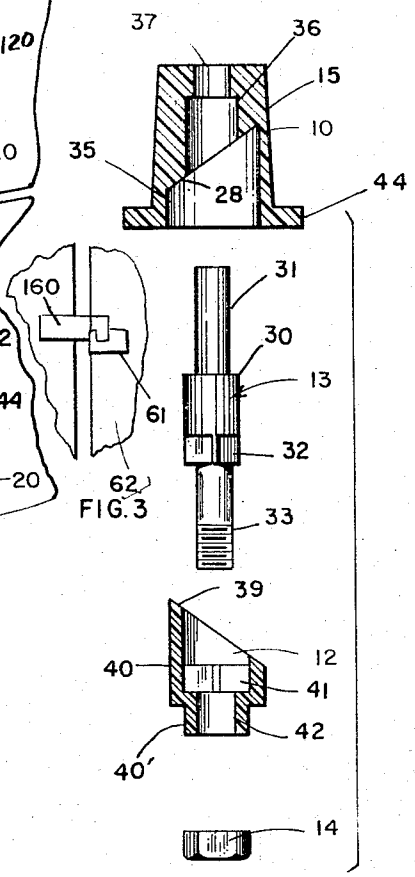


FIG. 3

FIG. 2

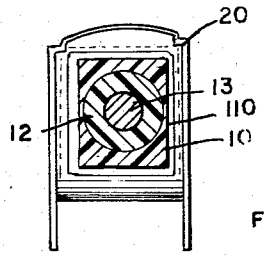


FIG. 4

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DOOR AND HINGE COMBINATION

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This invention relates to partitions and, more particularly, to doors in combination with partitions and hinges in combination therewith for use in rest rooms and the like.

Doors according to prior designs usually were made in such way that unauthorized persons could remove some of the fastening structure and dismantle the doors.

The hinge disclosed herein makes it almost impossible for an unauthorized person to dismantle the door without knowing the combination of steps necessary to dismantle the door. If a child locks himself in a rest room booth and crawls out of the booth, with the ordinary design of lock, it is necessary for some one to crawl under the door to unlock it. With the hinge design disclosed herein, the door can be lifted up bodily to unfasten the latch.

The hinge disclosed is also extremely easy to assemble; however, if a child in a school removed a nut with pliers, the unit would not come apart but would continue to work. Gravity would hold the hinges together. The child would have difficulty taking the door apart unless he knew the combination of assembling steps.

It is, accordingly, an important object of the present invention to provide a hinge in combination with a door and partition wherein the hinges are inset in the door at positions spaced from the top and bottom of the door.

Another object of the invention is to provide an improved hinge in combination with a door.

Still another object of the invention is to provide a door, hinge, and latch combination wherein the hinge is constructed in such a manner that the door can be disconnected from the latch by lifting the door bodily a sufficient amount of allow the door and latch to be disconnected.

A further object of the invention is to provide a plurality of hinges in combination with a door wherein the hinges will have a cam action to close the door.

Still a further object of the invention is to provide a hinge in combination with a door which is simple in construction, economical to manufacture, and simple and efficient in operation.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing:

FIG. 1 is a partial side view of a door and hinge combination according to the invention;

FIG. 2 is an exploded view of the male cam, female cam, pin and nut combination according to the invention;

FIG. 3 is a partial view of the door and latch combination; and

FIG. 4 is a cross sectional view of the cam member taken on line 4—4 of FIG. 1.

Now with more specific reference to the drawing, a door **60** is shown having a top hinge **16** and a bottom hinge **21** thereon. Both the top and bottom hinges are identical in construction. Each hinge **16** and **21** is made

up of a hinge member **23** which is attached to a pilaster **24** by means of a sheet metal screw or bolt **17** with a laterally extending bracket member **25** extending into a notch in the door.

The door **60** is of a suitable size and construction. It may be made of two parallel, spaced, sheet steel side panels of the type commonly used in modern construction. The door **60** has two vertically spaced notches **22** therein adjacent the rear end which terminate at the rear end. These notches each receive one of the escutcheons **20**. The escutcheons **20** are secured to the door by means of screws or pop rivets at both sides at **120**. The escutcheons **20** may be die cast, fabricated, or of any other suitable construction.

The hinge is made up generally of six parts; namely, the hinge member **21**, the escutcheons **20**, a female hinge cam member **10**, a male cam member **12**, a pin **13**, and a nut **14**. The hinge as well as the escutcheons may be made of a die casting.

The pin **13** has an intermediate enlarged cylindrical portion **30**, a reduced size top cylindrical portion **31**, and a rectangular shaped door portion **32** terminating in its lower end in a partial threaded portion **33**.

The male cam member **12** has a cylindrical upper portion **40** with a cam surface **39** on its upper end. It is hollow. The upper part of the hollow therein is of cylindrical shape and of complementary shape to the enlarged cylindrical portion **30** of the pin **13**. A lower part **41** of the hollow portion in the male cam member **12** is square and it receives the portion **32** of the pin. The outside of a lower portion **40'** of the male cam member **12** is square and it has a cylindrical hole **42** which receives the threaded portion **33** of the pin **13**.

The female cam member **10** has a tapered upper outer surface **15** which is rectangular in cross section. The female cam member is received in a bore **45** of the escutcheon. The square shape of the female cam member **10** prevents the cam member from rotating when the door is opened and closed. The female cam member **10** terminates at its lower end in the outwardly extending flange **44** which, in practice, rests on the upper surface of the bracket **25** and forms a bearing surface thereon. Male cam member **12** may be made of nylon or some other self-lubricating material to prevent noises as flange **44** rides on bracket **25**.

The hollow of the female cam member **10** has three cylindrical surfaces of different diameter. These are the cylindrical portion **35** which is complementary in shape to the outer cylindrical surface **40** of the male cam and the male cam is received in it. This large cylindrical portion joins with the intermediate cylindrical portion **36** which is of complementary shape to the cylindrical portion **30** of the pin **13**. The upper end of the female cam has the bore **37** which is complementary in shape to the reduced size portion **31** of the pin **13**. Nut **14** fits on pin **13**.

The downwardly disposed cam surface **28** in the female cam member **10** defines the bottom of the cylindrical bore **35** and this is complementary in shape to the cam surface **39** of the male cam member **12**.

The square end of the male cam fits into a star shaped counter bore **45** in the bracket **25**. Thus, cam **12** can be positioned selectively in a plurality of positions.

The escutcheon **20** may be of die-casting metal and has two continuous flanges with a flat bottom therein and having a generally flat bottom rests against the part of the metal door which defines the notches **22** and the flange around the edge of the escutcheon locates the escutcheon in the door. The escutcheon is U-shaped in cross section and the flanges and bottom form a continuous channel.

The hole **26** formed in the bottom of the escutcheon is open during assembly and closed by the bracket **25** which

has the teeth on it that holds it in position. This is merely to close the hole and form a neat appearing device.

The clearance between the lower end of the threaded portion **33** and the top surface of the closure is equal to or slightly larger than the thickness of the bracket **25** so that the bracket can be slid under the threaded member **33** when the device is assembled.

The door may be held in place by means of the door latch portion **160** which is fixed to the door and the fixed latch portion **61** which is fixed to the pilaster **62**. The notch in the member **61** is slightly less in depth than the space between the end **33** and the escutcheon **25'** so that the door can be lifted to unlatch it if necessary.

To assemble the door, it is only necessary to first, slip one door escutcheon **20** into each of the top and bottom notches with the escutcheon flanges laying along side the door secured to door with a screw or pop rivet, and then slide in and press the female nylon cam **10** up into the rectangular hole **110**. Female cam member **10** has a press fit in hole **110** so that it supports its own weight and then stays during assembly. An important feature is that the female cam member stays in the escutcheon until the hinge is assembled.

Pin **13** is then inserted thread end down through the female cam member into the hole. The male cam is then laid horizontally on the bottom of the escutcheon. It is moved over the threads of pin **13** and up into the bore **35** in the female cam member. The escutcheon **25'** is inserted into the hole **26** so that the entire assembly can't fall down into the hollow of the door and be lost temporarily.

The door may then be attached to the pilaster by merely setting the end permitting the pin **13** and end **40'** to drop into the star lock counterbore **45** in bracket **25**. The door may be swung to full open, full closed, or part open position.

The door may be lifted, for example, approximately one-fourth of an inch to release the latch.

The foregoing specification sets forth the invention in its preferred practical forms but it is understood that the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In combination, a door and hinges therefor,
said door having vertically spaced notches adjacent its rear edge,
means on said door defining an upper opening at the top side of each said notch,
means defining a lower opening aligned with said upper opening,
a female cam extending into said upper opening,
said female cam having a hollow cavity therein,
a downwardly facing cam surface in said cavity,
a male cam having a generally cylindrical portion terminating at its upper end in an upwardly facing cam surface disposed in said cavity,
said cam surfaces engaging each other,
hinge members having means thereon for attaching them to a pilaster,
said hinge members extending into said notches,
and a star shaped counterbore in the top of each said hinge member,
said male cam having a lower end having a noncircular shape disposed in each said star shaped counterbore holding said male cam against rotation and permitting said female cam to be selectively positioned to adjust the position at which said door is closed.

2. The combination recited in claim **1** wherein

a pin is disposed in each said cam and extends downwardly through the lower end thereof,
said pins each terminating at their lower end in a threaded portion,
and a nut disposed on the lower threaded end of each said pin, clamping said pins to said hinge members.

3. The combination recited in claim **2** wherein,
the lower ends of said pins are spaced from the upper inside edge of said means defining the inside bottom surface of said notches a distance at least as great as the vertical dimension of said hinge members,
said door being adapted to be lifted until said means defining the bottom surface of said notches engages the bottom surface of said hinge members whereby said pins can be moved from said counterbores in said hinge members and said door removed.

4. The combination recited in claim **1** wherein,
a pin extends through said cams,
said pin has a reduced size upper end,
a cylindrical portion is attached to said upper end,
a non-circular portion is attached to said cylindrical portion,
said male cam has a cylindrical bore terminating at its lower end in a non-circular bore and a reduced size cylindrical bore at the lower end of said non-circular bore,
and said female cam has a bore through its upper end,
said pin being disposed in said female cam with its reduced size upper end extending through said bore in said female cam and said cylindrical portion and said non-circular portion disposed in said male cam.

5. A hinge comprising
a female cam member square in cross section tapering outwardly and downwardly and terminating at its lower end in a flange,
a cylindrical bore in said female cam member terminating at its inner end in a cam surface,
a male cam having a cylindrical shaped part and having a square part attached to said cylindrical part,
the upper end of said cylindrical part of said male cam having a cam surface complementary in shape to said cam surface in said female cam member,
said male cam having a cylindrical bore terminating in a non-circular bore,
a pin having a cylindrical part disposed in said cylindrical bore in said male cam,
said pin having a non-circular part in said non-circular bore and a threaded part of said pin extending through the lower end of said male cam,
a part of said hinge being adapted to be disposed in a notch in a door,
an escutcheon made of sheet material in said notch,
said escutcheon having a flat portion forming an inside surface for said notch and edges overlying the sides of said door adjacent said notch,
a square hole in the upper flat part of said escutcheon receiving said female cam member,
and a hole in the lower portion of said flat part of said escutcheon directly below said square hole for receiving said pin during assembly.

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