United States Patent [19]

Surko, Jr.

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[54] **ADJUSTABLE SUPPORT**

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[73] Assignee: **Emhart Corporation**, Bloomfield, Conn.

[22] Filed: **Mar. 31, 1972**

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[52] **U.S. Cl.**..... **292/251.5**, 248/206 A, 248/285, 287/3, 287/21

[51] **Int. Cl.**..... **E05c 17/56**

[58] **Field of Search**..... 292/251.5, DIG. 15; 248/206 A, 285, 286, 181; 287/3, 21, 87, 12

[56] **References Cited**

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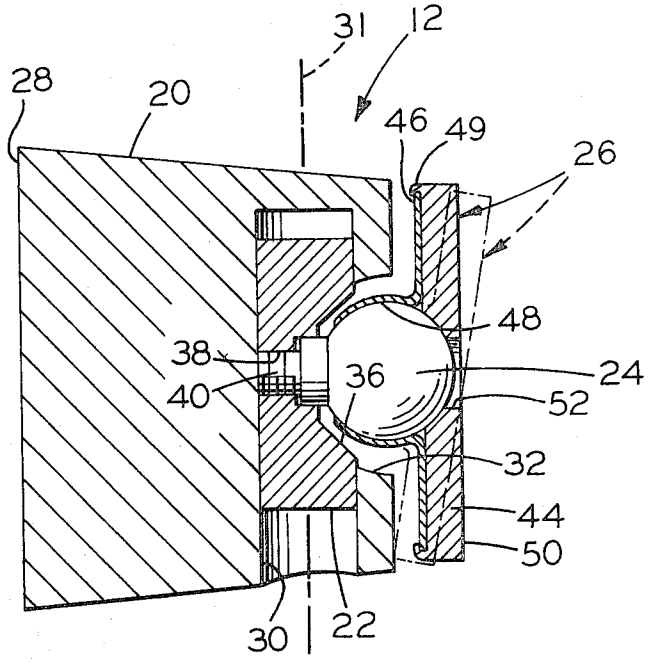
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Primary Examiner—Marvin A. Champion
Assistant Examiner—William F. Pate, III
Attorney—Frederick J. Haesche

[57] **ABSTRACT**

An adjustable magnetic door holder comprises an electromagnetic unit and an adjustable strike support which includes a base and an armature or strike plate. The strike plate is adjustably coupled to the base by a ball and socket joint carried by a cylindrical member supported for limited angular movement and axial translation relative to the base whereby wide variation of adjustment between the strike plate and base may be attained to facilitate precise alignment of the strike plate with the electromagnetic unit.

15 Claims, 5 Drawing Figures



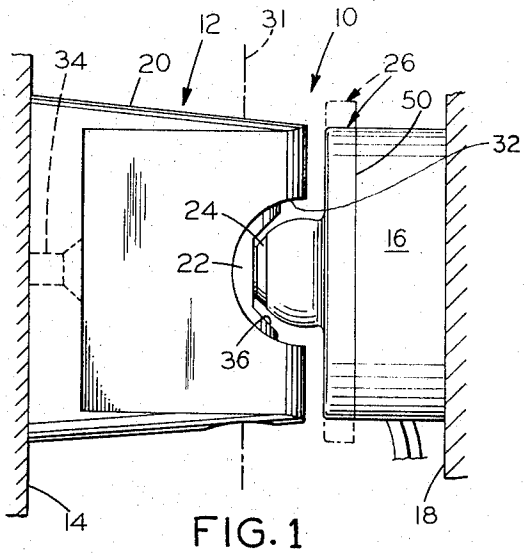


FIG. 1

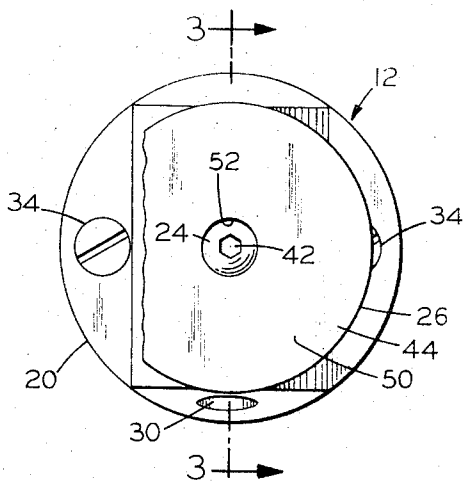


FIG. 2

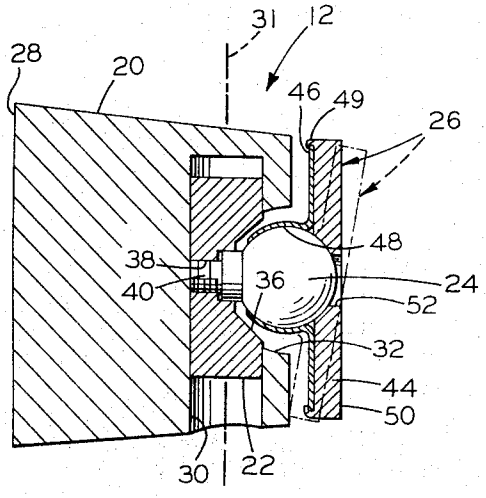


FIG. 3

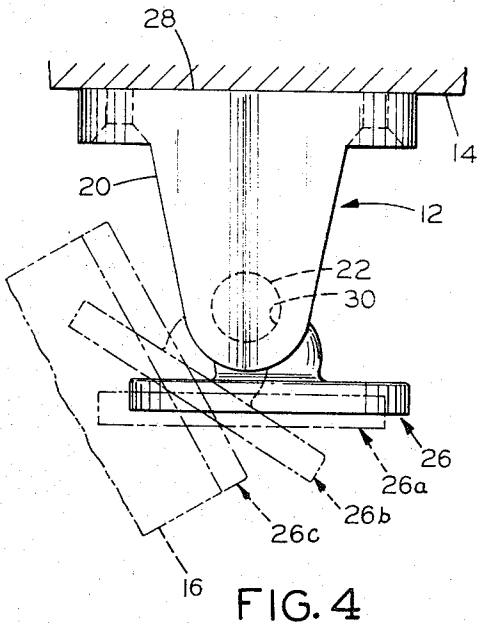


FIG. 4

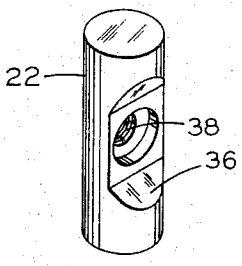


FIG. 5

ADJUSTABLE SUPPORT

BACKGROUND OF THE INVENTION

This invention relates in general to adjustable supports for coupling structures in stationary relation and deals more particularly with improved supports which provide universal adjustment.

The structure of the present invention may be advantageously employed wherever it is desired to universally couple two relatively stationary structures. However, it has been found particularly suitable for use in a magnetic latching or holding device which maintains a door or the like in open position and permits closing of the door upon application of suitable force or in response to predetermined ambient temperature or smoke condition. A magnetic door holder of the aforedescribed type usually includes an electromagnetic unit for mounting on a wall or the like and an adjustable strike or armature support which includes a base for mounting on a door and a relatively adjustable armature or strike plate which cooperates in magnetic coupled relation with the magnetic unit to hold the door in open position. Wide variations in mounting problems encountered in the field require that the strike plate be adjustable relative to its mounting surface to facilitate proper alignment with the magnetic unit. Heretofore, such strike assemblies have been provided with ball and socket joint connection between a mounting base and armature or strike plate to permit some degree of swivel adjustment therebetween. However, the limited degree of adjustment attainable by such strike assemblies has not proven satisfactory to meet all mounting requirements.

It is the general aim of the present invention to provide an improved adjustable support having a wide range of adjustment. A more specific aim of the invention is to provide an attractive durable strike support for a magnetic door holder of the aforedescribed general type which support has an extremely wide range of adjustment and a degree of self alignment capability.

SUMMARY OF THE INVENTION

In accordance with the present invention, an adjustable support is provided which comprises a first member supporting a second member for limited angular movement about an axis and relative to the first member. A ball mounted on the second member with the center thereof radially offset from the axis is received in a socket associated with a third member which is angularly movable relative to the ball. A means is provided to releasably retian the second member in a selected position of angular adjustment relative to the first member.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevational view of a magnetic door holder which includes an adjustable strike support embodying the present invention, the strike support being shown attached to a door and magnetically coupled to an electromagnetic holder unit mounted on a wall.

FIG. 2 is a front elevational view of the strike support of FIG. 1.

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2.

FIG. 4 is a plan view of the strike support of FIG. 1 shown mounted on a door, various positions of adjustment being illustrated.

FIG. 5 is a perspective view of a pivot which comprises a part of the holder of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawing, the present invention is illustrated with reference to a magnetic door holder indicated generally by the reference numeral 10 and adapted to provide for automatic emergency release of a closer-equipped smoke and fire barrier door or the like. The door holder 10 comprises a strike assembly or adjustable strike support indicated generally at 12 shown attached to a door 14 and an electromagnetic holder unit 16 shown mounted on a wall 18. As illustrated, the door holder 10 is in activated condition, the strike assembly 12 being magnetically coupled in face-to-face relation to the electromagnetic unit 16 and holding the door 14 in an open position. On interruption of currect to the elctromagnetic unit 16 by any means such as by operation of a fire or smoke detector, a sprinkler system or the like upon occurrence of a power failure, the electromagnetic holder 16 is deactivated permitting the closer-equipped door 14 to swing to closed position.

Novel features of the invention are embodied in the adjustable strike assembly 12 which generally comprises a first member or base 20, a second member or pivot 22, which is adjustably mounted on the base and carries a ball 24, and a third member or strike indicated generally at 26. The strike or armature 26 is carried by the ball 24 and is angularly adjustable relative thereto.

Considering the strike support 12 in further detail, the base 20 has a substantially planar rear mounting surface 28 and a generally cylindrical bore 30 opening through the lower surface of the base. The axis of the bore 30 is designated by the numeral 31 and generally parallel to the mounting surface 28. A forwardly opening groove 32 formed in the base communicates radially with the bore 30 and has a generally semicircular configuration as viewed in side elevation and as best shown in FIG. 1. The radius of curvature of the groove 32 is substantially greater than the radius of curvature of the ball 24 which is at least partially received within the groove. Fasteners 34, 34 secure the base 20 to the door 14, substantially as shown.

The pivot 22 is generally cylindrical and slidably received in the bore 30 for limited angular movement about the axis 31 and for limited axial translation relative to the base 20. It has a radially outwardly opening recess or notch 36 formed therein and an internally threaded opening 38 which extends diametrically therethrough and opens into the recess 36. The ball 24 is mounted on the pivot 22 to move therewith, the center of the ball being radially offset from the axis 31. The ball 24 has a parti-spherical configuration and includes a radially outwardly projecting threaded shank 40 which is threadably received in the hole 38. The outer end of the shank 40 is adapted to extend through the pivot 22 and bear against the surface of the bore 30 to releasably retain the pivot 22 in a preselected position of adjustment relative to the base 20. An hexagonal socket 42 formed in the ball 24 diametrically opposite the shank 40 opens through the forward surface of the ball for cooperative engagement with an associated tool or wrench (not shown) which may be used to tighten the ball and thereby secure the device in a desired position of adjustment.

As shown, the strike **26** is formed in two parts and icludes a generally circular strike or armature plate **44**, which complements the circular configuration of the face of the magnet unit **16**, and a relatively thin back plate **46**, which cooperates with the armature plate to define a parti-spherical socket **48**, which recevies and retains the ball **24** therein and in frictional engagement therewith. The armature plate **26** has a rearwardly extending annular peripheral skirt **49** which is rolled inwardly over the edge of the back plate **46** to retain it in assembly with the armature plate **44**. The armature plate has a generally forwardly facing substantailly planar strike surface **50** for engaging the face of the magnet unit **16**. A circular hole **52** opens through the strike surface **50** and communicates with the socket **48** to expose a portion of the ball **26** diametrically opposite the shank **40** whereby a wrench may be inserted into the hexagonal socket **42** to turn the shank **40** in the pivot **22** in adjusting the device.

The strike assembly **12** is mounted on the door **14** with the strike **26** in general alignment with the magnet unit **16** and the axis **31** disposed in a generally vertical direction. Some adjustment may be necessary to attain precise alignment between the strike surface **50** and the associated face of the magnet unit **16** to attain maximum magnetic efficiency. Vertical alingment may be attained by loosening the shank **38** relative to the pivot **22** and adjusting the vertical position of the pivot **22** relative to the base **20**, as shown in FIG. **1** where the limits of vertical adjustment of the strike **26** are indicated by broken lines. Horizontal alignment may be attained by adjusting the angular position of the pivot **22** relative to the base **20** and the strike **26** relative to the ball **24** as shown in FIG. **4** where a centralized position of the strike is indicated by broken lines at **26***a* and an alternate position of horizontal offset adjustment is indicated by the full line position of the strike **26**. The plane of the strike surface **50** may also be angularly offset relative to the plane of the mounting surface **28** to adapt the device to various mounting requirements by adjusting the angular position of the pivot **22** relative to the base **20** such as shown by the position of the strike indicated at **26***b* in FIG. **4**. A somewhat more extreme position of angular adjustment is indicated at **26***c* in FIG. **4**. The adjustable strike support **12** is releasably retained in any preselected position of adjustment by turning the ball **24** relative to the pivot **22** to cause the shank **40** to bear against the wall of the bore **30**. As previously noted, the strike **26** is supported for limited angular movement relative to the ball **24** and is retained in precise alignment relative to the magnetic unit **16** by frictional engagement of the ball **24** and its associated socket **48**. Since the strike may move relative to the ball in response to applied force sufficient to overcome the frictional engagement of the ball and socket it will be evident the face of the strike **26** will align itself with the face of the magnet unit **16** when the strike support **26** is brought into engagement with the magnet unit **16**. Even if the ball joint should loosen due to wear the strike **26** will nevertheless attain face-to-face engagement with the magnetic unit **16** each time the door **14** is moved to its hold open position provided a reasonable degree of alignement is maintained between the strike and magnetic unit.

The invention has been illustrated and described with reference to a magnetic door holder; however, it will be evident that the adjustable support of the invention may be advantageously employed wherever it is desirable to adjustable couple structures. Thus, for example, an adjustable support made in accordance with the present invention may be employed as a mount means for a camera or optical instrument and it should be understood that such varied uses are contemplated within the scope of the invention. I claim:

1. An adjustable support comprising a first member, a second member pivotally mounted on said first member for angular movement about an axis and relative to said first member, a ball having a parti-spherical surface, means for mounting said ball on said second member with the center of said ball radially off-set from said axis and for movement with said second member and relative to said first member and for releasably retaining said second member in selected angular position relative to said first member, and a third member having a parti-spherical socket receiving and retaining said ball therein, said third member being angularly movable relative to said ball.

2. An adjustable support as set forth in claim **1** wherein said ball has a shank projecting outwardly therefrom threadably engaging said second member and engageable with said first member, said shank comprising said means for releasably retaining said second member.

3. An adjustable support as set forth in claim **2** wherein said first member has a generally cylindrical bore, said second member is journalled in said bore, and said shank extends through said second member and engages the wall defining said bore.

4. An adjustable support as set forth in claim **1** wherein said first member defines a generally planar mounting surface and said axis is generally parallel to said mounting surface.

5. An adjustable support as set forth in claim **1** wherein said second member is mounted on said first member for limited axial translation relative thereto.

6. An adjustable armature support assembly for a magnetic door holder and comprising a base having a bore and a generally radially outwardly opening groove communicating with said bore, a generally cylindrical member slidably received in said bore, a ball having a parti-spherical surface and including an outwardly projecting shank, said shank threadably engaging said cylindrical member and retaining said ball at least partially within said groove, a strike having a parti-spherical socket receiving and retaining said ball therein, said strike being angularly movable relative to said ball, said ball and said strike being supported by said cylindrical member for limited angular movement and axial translation relative to said base.

7. An adjustable armature support assembly as set forth in claim **6** wherein said cylindrical member has a radially outwardly opening notch formed therein, said ball being partially disposed with said notch.

8. An adjustable armature support assembly as set forth in claim **6** wherein said shank extends through said cylindrical member and engages the wall of said bore to releasably retain said cylindrical member and said ball in selected angular and axial position relative to said base.

9. An adjustable armature support assembly as set forth in claim **6** wherein said strike has a strike surface and a hole therethrough opening through said strike surface and communicating with said socket to expose a portion of said ball generally diametrically opposite

said shank and means assoicated with the exposed portion of said ball for cooperative engagement with a tool for rotating said shank relative to said cylindrical member.

10. An adjustable support comprising a first member, a second member slidably supported on said first member for angular movement about a pivot axis relative to said first member and for limited axial translation along said pivot axis, said first member defining a generally planar mounting surface, said pivot axis being generally parallel to said mounting surface, means for releasably retaining said second member in selected position relative to said first member, a ball having a parti-spherical surface, means for mounting said ball on said second member with the center of said ball radially off-set from said pivot axis and for movement with said second member and relative to said first member, and a third member having a parti-spherical socket receiving and retaining said ball therein, said third member being angularly movable relative to said ball.

11. An adjustable support comprising a first member having a generally cylindrical bore and a radially outwardly opening groove communicating with said bore, a generally cylindrical second member slidably received in said bore and angularly movable about its axis and relative to said first member, means for releasably retaining said second member in selected position relative to said first member, a ball having a parti-spherical surface, means for mounting said ball on said second member at least partially within said groove with the center of said ball radially off-set from said axis and for movement with said second member and relative to said first member, and a third member having a parti-spherical socket receiving and retaining said ball therein, said third member being angularly movable relative to said ball.

12. An adjustable support as set forth in claim **11** wherein said second member and said ball cooperate with said first member to restrain said third member for limited angular movement and limited axial translation relative to said first member.

13. An adjustable support as set forth in claim **11** wherein said cylindrical member has a radially outwardly opening notch formed therein, said ball being partially received within said notch.

14 An adjustable support as set forth in claim **13** wherein said second member and said ball cooperate with said first member to restrain said third member for limited angular movement and limited axial translation relative to said first member.

15. An adjustable armature support assembly for a magnetic door holder and comprising a base defining a rearwardly facing, generally planar mounting surface and having a bore with the axis thereof generally parallel to said mounting surface and a generally radially outwardly and forwardly opening groove communicating with said bore, a generally cylindrical member slidably received in said bore and having a radially outwardly opening notch therein, a ball having a parti-spherical surface and including an outwardly projecting shank, said shank threadably engaging said cylindrical member within said notch and retaining said ball at least partially within said groove, said shank extending through said cylindrical member and engaging the wall of said bore to releasably retain said cylindrical member and said ball in selected angular and axial position relative to said base, a strike having a substantially planar, generally forwardly facing strike surface and a rearwardly opening parti-spherical socket receiving and retaining said ball therein, said strike being angularly movable relative to said ball, said ball and said strike being supported by said cylindrical member for limited angular movement and axial translation relative to said base.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,781,047 Dated December 25, 1973

Inventor(s) Walter E Surko, Jr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 51, "retian" should be --retain--.

Col. 2, line 19, "currect" should be --current--.

Col. 3, line 6, "recevies" should be --receives--.

Col. 3, line 64, "alignement" should be --alignment--.

Col. 4, line 56, "with" should be --within--.

Signed and sealed this 23rd day of April 1974.

(SEAL)
Attest:

LDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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