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3,204,154

ELECTROMAGNETIC DOOR HOLDER AND STOP

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Fig. 1.

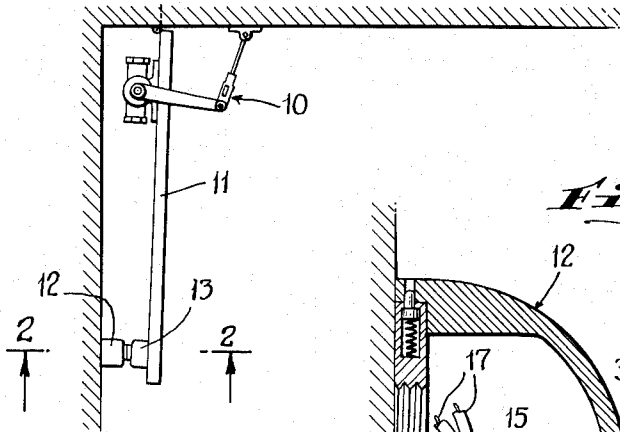


Fig. 2.

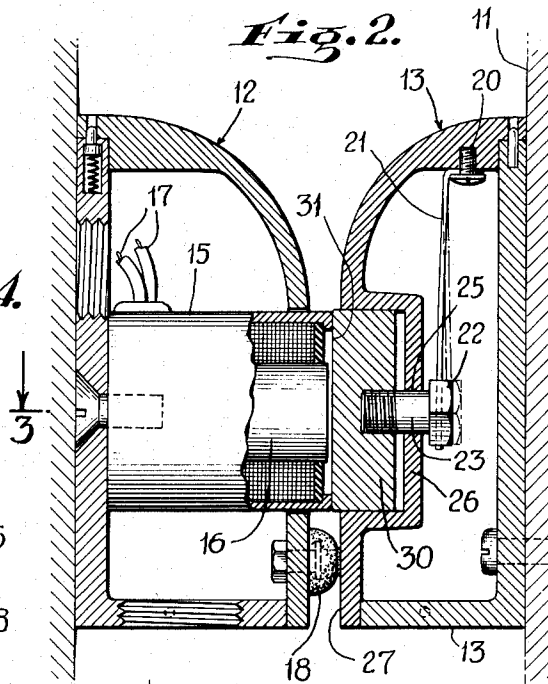


Fig. 4.

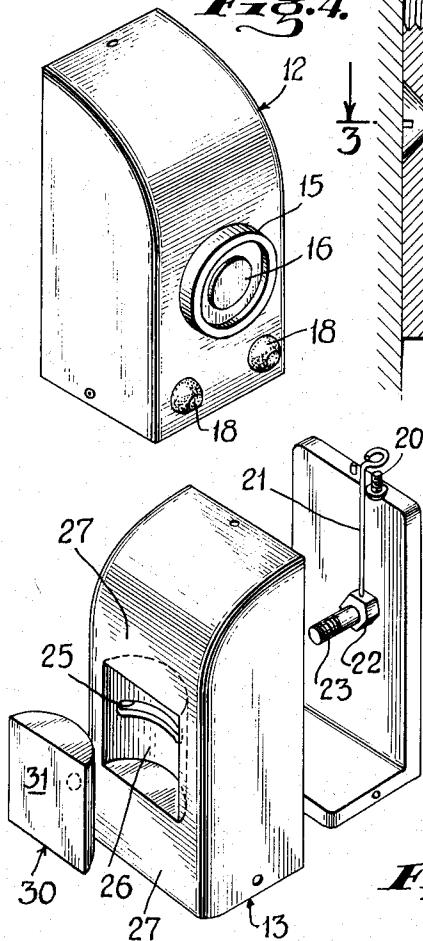


Fig. 3.

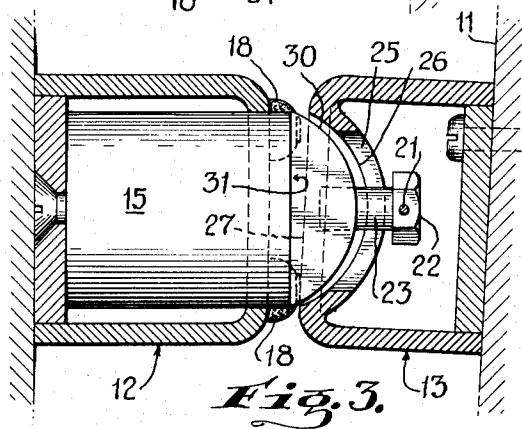


Fig. 5.

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ELECTROMAGNETIC DOOR HOLDER AND STOP

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5 Claims. (Cl. 317-159)

This invention relates to a magnetic door holder of that type adapted to hold a door in open position. More particularly, my invention relates to a door holder of the class described in which an electromagnetic device holds a door in open position until the electric circuit of the device is particularly conditioned by a signal from a fire detection system, a smoke detector, a manual switch or the like.

Holders of the particular class are well known in the art, and generally comprise an armature preferably mounted on the door, and an electromagnetic core preferably mounted on the door frame, the opening movement of the door bringing the armature against the core to hold the door in open position so long as the electromagnetic core is energized. Upon breaking of the circuit of the electromagnet, the door is closed generally by a door closer.

As a feature of my invention, I utilize an armature that is not allowed to be moved forcefully against the electromagnet through opening of the door. Thus, the armature of my invention is adapted to float and to be held yielding inwardly of a casing that mounts the armature on the door. When this casing is brought against the casing of the electromagnet, the electromagnet will attract the armature thereto to hold the door open, generally against the closing force of a conventional door closer. If no closer is utilized the yielding means between the armature and its casing will actually be the mechanism through which the door is held in open position until the door is pulled to tension the spring and bring the armature against a stop.

As a further particular feature of the invention, bumpers, or the equivalent thereof, are utilized to prevent the forceful movement of the armature casing on the door against the core casing of the door frame. Therefore, the construction may serve effectively as a door stop as well as a door holder, it being understood that with the electromagnet being inoperative, the openings movement of the door will be stopped yieldingly by rubber bumpers or the like between the two casings. Of course, as those skilled in the art will appreciate, the casings may be reversed as to location, if that is desired, without in any way affecting the operation of my invention.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings,

FIG. 1 is a plan view showing my invention applied to a door and holding the door in open position against the force of a door closer.

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FIG. 2 is a section taken along line 2-2 of FIG. 1.

FIG. 3 is section taken along line 3-3 of FIG. 2.

FIG. 4 is a perspective view of the casing in which is contained the door holding electromagnet.

FIG. 5 is an exploded view of the casing containing the armature and illustrating the armature and its mounting means.

Referring now more particularly to the drawings, I show at 10 a door closer adapted to move a door 11 into closed position. Maintaining the door in open position against the force of the door closer 10 is a door holder assembly comprising a casing 12 and a casing 13. Casing 12, which is secured to a door frame or wall is well shown in perspective in FIG. 4, and in section in FIG. 2 and 3. Mounted within the casing 12 is an electromagnet 15 having a core 16 that is rendered magnetic upon the closing of a suitable circuit through the electromagnet 15 utilizing the wires 17, all as will be well understood by those skilled in the art.

Secured on the outside of the casing 12 are two rubber bumpers 18 cooperable with casing 13, mounted on the door 11 as is well shown. Within the casing 13, there is secured through a screw 20, a relatively heavy wire spring 21 that in turn is adapted to carry at its lower end a bolt head 22 from which extends a threaded bolt portion 23. The threaded bolt portion 23 protrudes through a slot 25 in an arc-shaped wall 26 of a semi-cylindrical depression formed in the forward wall 27 of the casing 13.

Threaded bolt 23 engages the threaded bore of a semi-cylindrical metal armature 30, best shown in perspective in FIG. 5. Normally, the armature 30 will be held with its rear surface against the wall 26 by the bolt 23 through the action of spring 21. Armature 30 functions as the armature of the magnetic core 16, and may slide on the surface 26 so that its outer plane surface 31 may assume various angular positions of adjustment. In addition, the armature 30 may move outwardly away from the surface 26 under the influence of the magnetic core 16 merely through stressing the spring 21. In other words, armature 30 normally lies against the surface 26, being held there yieldingly by the spring 21. The plane surface 31 then lies substantially flush with the forward face 27 of the casing 13.

With electric power not functioning to excite the magnetic core 16, should the door be fully opened, the rubber bumpers 18 of the casing 12 will be contacted by the forward surface 27 of casing 13 whereby yieldingly to bring the door 11 to a stop without actual physical contact between the metal of the two casings. Thus, my mechanism will function as a door stop when it is not desired to hold the door open.

Should the casings be brought into the juxtaposed position of FIGS. 1, 2, and 3, the electromagnet 15 be excited, the core 16 will draw armature 30 toward it as shown in FIG. 2 against the resistance of the spring 21.

If, with the parts as shown in FIG. 2, closer 10 is operating to press the door in closing direction, the casing 13 will actually move to the right in FIG. 2 until the rear surface of wall 26 is against the head 22 of the bolt 23. Thereafter, the armature 30 through bolt 23 and head 22 will hold the casing 13 and the door 11 against the force of closer 10. On the other hand, if the closer 10 is not utilized or is not operating, the armature 30 may remain in its FIG. 2 position and the pressure of spring 21 will be effective to hold the door open with the casing surface 27 against at least one of the rubber bumpers 18.

In FIG. 3, it will be noted that the armature 30 has been attracted to the electromagnet of the casing 12, but that the two casings 12 and 13 are not in parallel alignment. However, due to the unique mounting of

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the armature 30, that armature has stressed the spring 21 somewhat to permit the exact alignment of the armature with the electromagnet so that there may be an effective functioning of the electromagnet to hold the door in open position.

I believe that those skilled in the art will fully appreciate the rather considerable merits of my invention, through which I obtain a desirable yielding door stop together with magnetic holding, while avoiding the harsh and possibly damaging action of direct contact of the casings carried by the door and the wall with which it is associated.

I now claim:

1. In a magnetic holder, a first casing adapted to be secured to a wall and having an electromagnetic core, a second casing adapted to be secured in position on a door to move into juxtaposed relation to the first casing when the door opens, an armature movably mounted on the second casing, yielding means normally pressing said armature to a predetermined inward position on its mounting relatively to said second casing, said armature being movable outwardly from said predetermined position, said electromagnetic core being effective when energized to pull said armature outwardly and against said core as the casings become juxtaposed, so as to hold the door open while a closing pressure applied to the door, as by a door closer, will stress said yielding means to hold the armature projected outwardly of the second casing.

2. In a magnetic holder, a first casing adapted to be secured to a wall and having an electromagnetic core, a second casing adapted to be secured in position on a door to move into juxtaposed relation to the first casing when the door opens, an armature mounted for bodily linear and angular movements on the second casing, yielding means pressing said armature to a predetermined inward position on its mounting relatively to said second casing, said electromagnetic core when energized being effective through yielding of said yielding means to pull said armature outwardly of the second casing and against said core while simultaneously adjusting the angular position of the armature relatively to the core as the casings become juxtaposed, so as to hold the door open through magnetic contact between the core and armature.

3. In a combined door stop and magnetic holder, a first casing adapted to be secured to a wall and having an electromagnetic core, a second casing adapted to be secured in position on a door to move into juxtaposed relation to the first casing when the door opens, stop means preventing contact between said casings when the door is in an open limit position, an armature movably mounted on the second casing, yielding means normally pressing said armature to a predetermined inward position relatively to said second casing so that the door when moving to open limit position will not move the armature forcibly against the electromagnetic core, said armature being movable outwardly from said predetermined position, said electromagnetic core when energized

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being effective to pull said armature outwardly and against said core through yielding of said yielding means as the casings become juxtaposed, so as to hold the door open through magnetic contact between the core and armature.

4. In a magnetic holder, a first casing adapted to be secured to a building wall and having an electromagnetic core, a second casing adapted to be mounted in position on a door to move toward the second casing as the door opens, said second casing having a front wall, an armature arranged at the outer side of said front wall, support means extending from said armature through an opening in the front wall of the second casing and into the interior of that casing, spring means secured to said support means in the second casing to support said armature for movement in linear and angular directions relatively to said front wall, means limiting movements of the armature in a direction away from said front wall, and said electromagnetic core when energized being effective through yielding of said spring means to pull said armature against the core while simultaneously adjusting the angular position of said armature relatively to said core as the door moves to open position.

5. In a combined door stop and magnetic holder, a first casing adapted to be secured to a wall and having an electromagnetic core, a second casing adapted to be secured in position on a door to move into juxtaposed relation to the first casing when the door moves to an open limit position, a yielding stop mounted on one casing and engaging the other casing whereby to hold the casings out of contact with each other while the door is in open limit position, an armature mounted on the front of the second casing for inward and outward and also angular movements relatively to that casing, a part on said armature extending through an opening into the interior of the second casing, a spring connected to said part and pressing said armature to a predetermined inward position relatively to said second casing, said electromagnetic core effective when energized to pull said armature outwardly of its casing and against said core through yielding of said spring as the casings become juxtaposed, said core adjusting the angular position of the armature on its mounting whereby to effect full magnetic contact between said core and armature, and surfaces coacting on said part of the armature and on the second casing to limit outward movement of said armature while pulled by said core, so as to hold the door when the door is moved slightly from its open limit position, as by closing pressure applied by a door closer.

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