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ELECTROMAGNETIC DOOR CHECK

Filed Aug. 26, 1954

3 Sheets-Sheet 1

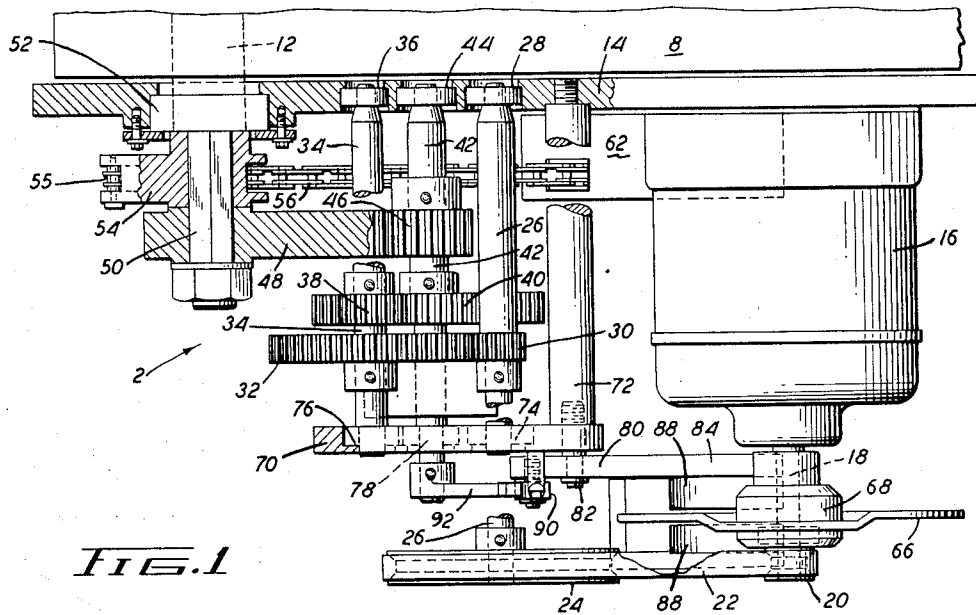


FIG. 1

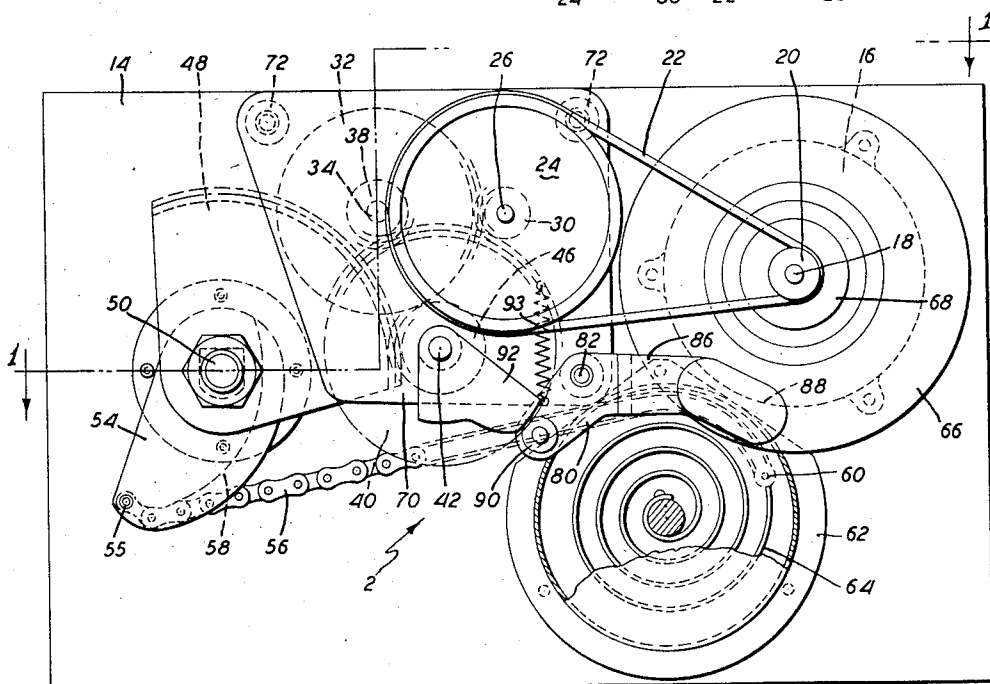


FIG. 2

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3 Sheets-Sheet 3

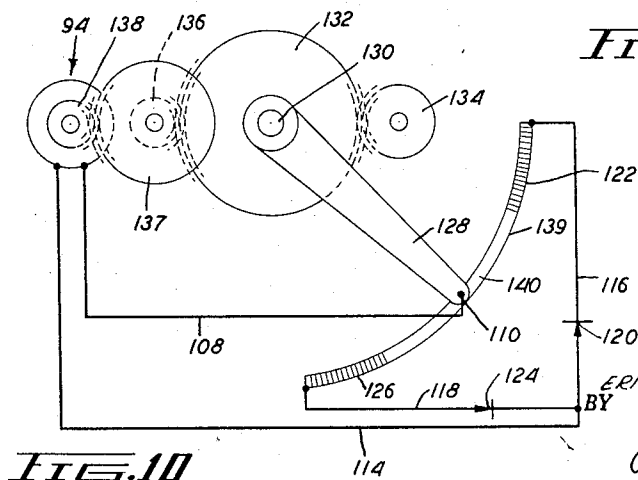
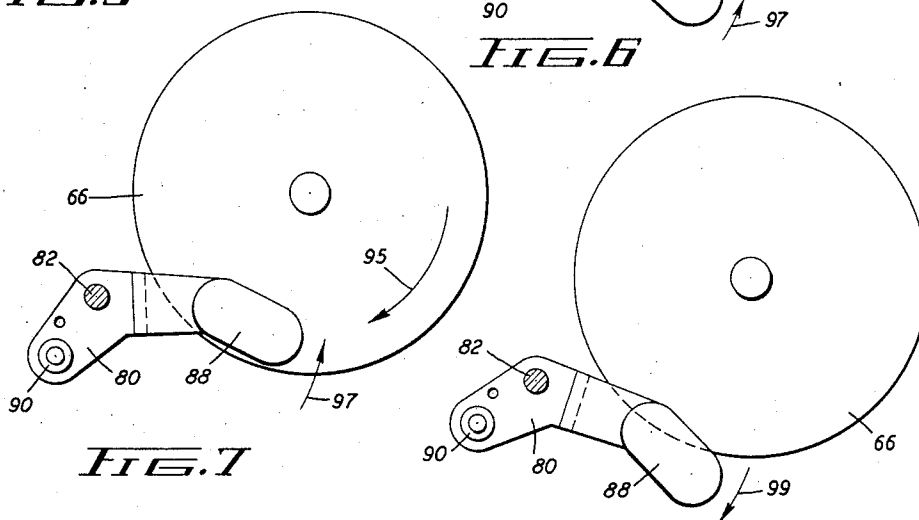
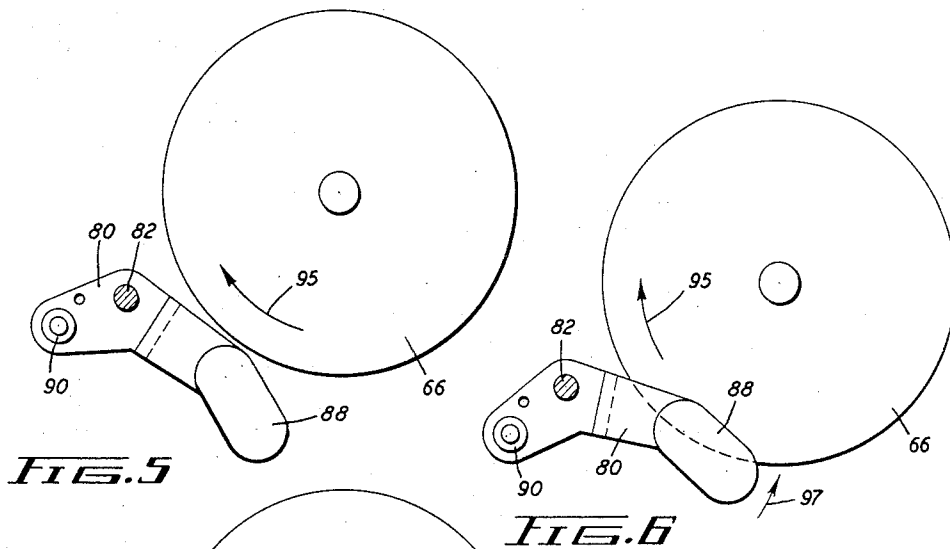


**FIG. 8**

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## ELECTROMAGNETIC DOOR CHECK

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19 Claims. (Cl. 268—65)

The present invention relates to an apparatus for checking the movement of members such as doors and the like, in which the checking action is derived from electromagnetic induction effects.

Most door checking structures suffer from the disadvantage that they involve a pair of elements which must be relatively slidable and which must maintain a snug sealing engagement. Others rely upon stressed mechanical elements the dynamic characteristics of which are notoriously inconstant. After such door checks have functioned a few thousand times deterioration is inevitable. Consequently either readjustment or, in extreme cases, repair of the door check is required if it is to continue to operate in acceptable fashion.

The door check of the present invention, while it comprises a pair of relatively movable elements, does not require those elements to engage or be slidable over one another, nor is repeated cyclical stressing involved. Consequently the life of the door check of the present invention is substantially indefinite, since there is almost nothing to wear out, and frequency of use is not a factor. The operations characteristics of the device will remain uniform, and the necessity for constant adjustment and readjustment is eliminated.

The devices of the present invention function on the principle of electromagnetic inductive reaction. The two operative elements are (1) a source of magnetic field and (2) a conductive element movable in that field. When the element is moved a current will tend to be induced therein. If the current is permitted to flow it will in turn react with the magnetic field in a sense such as to oppose movement of the element through the magnetic field. The element is connected to the door, and consequently resistance to movement of the element through the magnetic field is translated into a checking force active on the door.

Door checking action is desired only when the door approaches a given position, usually one of its terminal positions. No checking action of the door is desired over the major portion of the range of movement of the door, nor is checking action desired when the door is to be moved away from its terminal position. In other words, when a door is moved from open to closed position the movement of the door should be as unimpeded as possible until shortly before the door reaches its closed position, at which time the checking action should commence, that action continuing until the door is completely closed. Upon reverse movement of the door from closed to open position the initial portion of the door's travel, where checking was exerted during closing movement, should be free and unimpeded. In addition, in order that the door may be smoothly brought to a halt without slamming, the checking action should be applied gradually, building up in magnitude as the door approaches its terminal position so that movement of the door will be smoothly decelerated.

By controlling either the magnetic field or the conductive path provided in the element moved through that

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magnetic field, the above requirements can be realized in a positive and reliable manner. If the magnetic field active on the conductive element be varied in accordance with the position of the door, then the electromagnetic reaction, and hence the checking force exerted on the door, will be correspondingly varied. If the conductivity of the path through which the currents induced in the element be altered, the electromagnetic reaction, and hence the intensity of the door checking force, will also change. Either or both of these control methods may be employed in order to make the checking action variable in accordance with the position of the door relative to a given terminal position.

The checking action must also be sensitive to the direction in which the door is moved, so that when the door is approaching a given terminal position it will be checked but when it is leaving that position its movement will be free. There are several ways of accomplishing this result. The element positioned in the magnetic field may be so mechanically connected to the door that it will be moved through that field only when the door is moving toward a given terminal position thereof but not when the door is moving away from that position. When the element is not moved through the field there will be no electromagnetic reaction, and hence no checking action. Alternatively, the conductive path provided for the induced currents may be direction-sensitive and the current inducing instrumentality may be so constructed as to tend to produce direct currents the directions of which will be dependent upon the direction of movement of the element through the magnetic field. Hence the conductive path for the induced currents may be designed to pass currents, and thus produce electromagnetic reaction, only when the door is moving toward a given terminal position.

In one embodiment of the present invention the element adapted to be moved through the magnetic field is in the form of a conductive disk or the like which is rotated only when the door is moving toward a given terminal position. The magnetic field is derived from a magnet movable relative to the conductive disk between an operative position in which the disk is in the magnetic field of the magnet and an inoperative position in which the disk is outside that magnetic field. The magnet is moved to its operative position during the last portion of the movement of the door toward a given terminal position, and as it thus moves the rotating disk will be more and more affected by the magnetic field, eddy currents of increasing magnitude will be induced in that disk, and the reaction of those eddy currents with the magnet will retard rotation of the disk and hence will retard movement of the door, the degree of retardation being determined by the magnitude of the eddy currents and hence by the position of the magnet relative to the disk. When the door is moved away from the terminal position the disk will remain stationary, and consequently there will be no appreciable retardation of the door.

According to another embodiment the source of magnetic field and the rotatable element are integrated into a D. C. generator. The polarity of the voltage induced in the generator will be determined by the direction in which the door is moved. An output circuit is provided which includes a rectifier and preferably includes a variable resistor. The rectifier is so oriented with respect to the polarity of the voltage induced in the generator that when the door is moving toward a given terminal position the rectifier will pass current, but when the door is moving away from that terminal position the rectifier will not pass current. Circuit control means sensitive to the position of the door is also provided, that means being effective to open the output circuit until the door is close to its terminal position. So long as the output

circuit is open no current will flow therethrough and consequently there will be no appreciable electromagnetic reaction in the generator, and hence no checking force exerted on the door. When the door nears the given terminal position the generator output circuit will be closed and the resistor, if present, will have its maximum value. A relatively small current will flow through the output circuit, there will be a relatively small degree of electromagnetic reaction within the generator tending to slow down movement of the rotor thereof, and hence a small retarding force would be exerted on the door. As the door approaches its terminal position the resistance is decreased in value, the current in the output circuit increases, the electromagnetic reaction in the generator increases, and a greater and greater retarding force is exerted on the door. When the door is moved away from the given terminal position, there will be no electromagnetic reaction in the generator because the rectifier in the output circuit will not permit current to flow therethrough.

To the accomplishment of the above, and to such other objects as may hereinafter appear, the present invention relates to a check for a movable member such as a door or the like, as defined in the appended claims and as described in this specification, taken together with the accompanying drawings in which:

Fig. 1 is a front elevational view, partially in cross section, of one embodiment of the present invention, disclosing a system in which an electric motor drives the door in one direction and a spring serves to drive the door in the other direction, Fig. 1 being taken along the line 1-1 of Fig. 2;

Fig. 2 is a bottom plan view of the embodiment of Fig. 1 and showing the parts in the position which they assume when the door is in a first terminal position;

Fig. 3 is a view similar to Fig. 2 but showing the parts in the position which they assume when the door is in a second terminal position;

Fig. 4 is a front elevational view, on a reduced scale and partially cross sectioned, showing the manner in which the unit of Figs. 1-3 may be mounted to operate a door;

Figs. 5, 6, 7 and 8 are schematic views illustrating the relative positions and motions of the operative elements of the door check of Figs. 1-3 at various points of travel in the door. Fig. 5 corresponds to initial movement of the door from the position shown in Fig. 3 toward the position shown in Fig. 2, Fig. 6 corresponds to a position of the door close to the terminal position of Fig. 2, the door checking action having commenced, Fig. 7 corresponds to movement of the door almost to the terminal position shown in Fig. 2, and Fig. 8 corresponds to movement of the door away from the terminal position shown in Fig. 2;

Fig. 9 is a schematic circuit diagram illustrating another embodiment of the present invention; and

Fig. 10 is a fragmentary semi-schematic representation of a mechanical arrangement which may be employed in the system of Fig. 9.

While the invention will be here described specifically in connection with the movement of a door between extreme positions which will be termed "open" (Fig. 3) and "closed" (Fig. 2), it will be apparent that this is for illustrative purposes only. The checking system of the present invention is not limited to use with doors, but could be employed with any element checking of the movement of which in one or more directions is desired. Similarly, the terms "open" and "closed" are merely exemplary of any two desired positions of the moved element. Moreover, while in the specifically disclosed embodiments the door is moved by a motor either of the electrical or spring variety, the invention could be employed with other motors or combinations thereof, and even could be employed when only manual force is em-

ployed on the door to move it from one position to the other.

Turning now to the embodiment of Figs. 1-3, a door moving system generally designated 2 is shown mounted within a recess 4 in the floor 6 directly under a door 8, the door being mounted on shafts 10 and 12 for pivotal movement between closed and open positions. The shaft 12 is operatively connected to the unit 2 so that the latter can drive the door 8 between its open and closed positions.

The unit comprises a base plate 14 on which an electric motor 16 is mounted. The output shaft 18 of that motor has a pulley 20 mounted thereon and a belt 22 connects the pulley 20 with a pulley 24 mounted on shaft 26 the upper end of which is journaled in the base plate 14 at 28. A pinion 30 is mounted on the shaft 26 and meshes with gear 32 mounted on shaft 34 the upper end of which is journaled in the base plate 14 at 36. Pinion 38 is fast on shaft 34 and meshes with gear 40 mounted on shaft 42 the upper end of which is journaled in the base plate 14 at 44. Pinion 46 is mounted on shaft 42 and meshes with sector gear 48 mounted on shaft 50, the upper end of the shaft 50 being journaled in the base plate 14 at 52 and being drivingly connected to the door shaft 12. Consequently rotation of the output shaft 18 of the motor 16 will cause the door to move.

Also mounted on the shaft 50 is arm 54 to which one end 55 of chain 56 is connected, the arm 54 having a curved surface 58 against which portions of the chain 56 are adapted to rest when the arm is moved. The other end 60 of the chain 56 (see Fig. 2) enters housing 62 and is there secured to spring 64.

The position of the parts shown in Fig. 2 may correspond to the closed position of the door as shown in Fig. 4, while the position of the parts shown in Fig. 3 corresponds to the open position of the door. When the motor 16 is energized it will rotate in a direction such as to open the door, thus swinging the arm 54 in a clockwise direction from its position shown in Fig. 2 to that shown in Fig. 3. This will result in a tensioning of the spring 64, and when energization is removed from the motor 16 the spring 64 will act to return the door to its closed position. Thus the system disclosed in Figs. 1-3 is one in which an electric motor 16 serves to open the door and the spring 64 serves to close it and to retain it in closed position.

A disk 66 is mounted on the motor shaft 18 and is operatively connected thereto by means of a one-way overrunning clutch 68 of known construction, the clutch being arranged so that rotation of the motor shaft 18 in a direction such as to open the door will not be transmitted to the disk 66, but rotation of the motor shaft 18 in a direction corresponding to door closing movement will be transmitted to the disk 66. Consequently the disk 66 will be rotated only while the door 8 is closing.

A supporting plate 70 is mounted below the base plate 14 by means of spacer rods 72 and the lower ends of the shafts 26, 34 and 42 are respectively journaled therein at 74, 76 and 78. An arm 80 is pivotally mounted on the plate 70 at 82, one end of the arm 80 extending toward the disk 66 and having a pair of fingers 84 and 86 respectively above and below the disk 66, those fingers carrying permanent magnets 88. The other end of the arm 80, on the other side of the pivotal axis 82, carries a roller 90 which engages with a cam 92 mounted on shaft 42, a spring 93 serving to retain the roller 90 against the cam 92. The cam 92 and arm 80 are so designed that when the door is in its closed position (see Fig. 2) the arm 80 is swung to a position in which the electromagnets 88 overlap the disk 66, one magnet being thereabove and the other magnet being therebelow. This is the operative position of the arm 80 and magnets 88, the disk 66 being effectively in the magnetic field between the magnets 88. When the door is in its open position (see Fig. 3) the arm 80 will be swung clockwise from the posi-

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tion shown in Fig. 2 until the magnets 88 are beyond the periphery of the disk 66. This is the inoperative position of the magnets 88, in which the disk 66 is not effectively within the magnetic field produced by the magnets 88.

The manner in which the door checking force is derived can best be understood from an examination of Figs. 5-8. Fig. 5 starts with the door open, and with the spring 64 acting to close the door. When that occurs the disk 66 will be rotated, as indicated by the arrow 95, but since the magnets 88 are in their inoperative position, no checking force will be developed. The magnets 88 will remain in their inoperative position during most of the travel of the door 8 toward its closed position but when that door has approached its closed position to a predetermined degree, for example, when it is twenty degrees from its closed position, the cam 92 will act on the arm 80 so as to swing it in a counter-clockwise direction (see arrow 97) and thus bring the magnets 88 to the position shown in Fig. 6, in which they partially overlap the disk 66, it being remembered that the disk 66 is rotating. As soon as the disk 66 comes within the effective magnetic field of the magnets 88, eddy currents will be induced therein and, since the disk 66 is formed of some conductive material such as aluminum, a conductive path for the eddy currents will be provided by the disk 66 itself. The eddy currents in turn will react with the magnetic field of the magnets 88 so as to retard rotation of the disk 66 and that retardation will be transmitted through the clutch 68 to the door shaft 12, thus slowing down movement of the door. The extent of the checking action will be determined not only by the position of the magnets 88 relative to the disk 66, that position corresponding to the position of the door, but also by the speed of rotation of the disk 66, that speed corresponding to the rate of movement of the door. Consequently, the faster the door is moving the greater will be the checking force exerted thereon at any given position. In addition, the closer the door comes to its fully closed position, the more will the magnets 88 overlap the disk 66 (compare Figs. 6 and 7), the greater will be the intensity of the magnetic field through which the disk 66 is rotated, and hence the greater will be the checking force exerted on the door for a given speed of movement of the door. Fig. 7 discloses the final position of the operative checking parts, just before the door has reached its closed position. The intensity of the magnetic field operating on the disk 66 will be at a maximum, and hence, for a given speed of rotation of the disk 66, the checking force will be at a maximum.

Fig. 8 discloses the operation of the parts when the door is beginning to open. The cam 92 will pivot the arm 80 in a clockwise direction as viewed in Fig. 2 (see the arrow 99), thus eventually returning it to its inoperative position. However, because of the action of the clutch 68, the disk 66 will not be rotated and hence there will be no appreciable checking action exerted on the door. The movement of the magnets 88 relative to the disk 66, as indicated in Fig. 8, will cause a slight degree of electromagnetic reaction, but the rate of movement is sufficiently slow so that no appreciable checking action will result.

In the embodiment of Figs. 9 and 10 a D. C. generator generally designated 94 is utilized to provide the checking action. That generator 94 comprises a source of magnetic field such as the permanent magnets 96, a rotor 98, and brushes 100 at which the generated voltage is applied. The polarity of that voltage will be dependent upon the direction of rotation of the rotor 98 and the magnitude of that voltage will be dependent upon the speed of rotation of the rotor 98. The rotor is operatively connected to the door, as indicated by the broken line 102, 104, so that the rotor 98 will rotate whenever the door 8 is moved and in a direction and at a speed corresponding to the movement of the door.

An output circuit generally designated 106 is connected

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to the brushes 100. The left hand brush 100 in Fig. 9 is electrically connected by lead 108 to a movable contact 110, that contact 110 being mechanically connected to the door 8 as indicated by the broken lines 104, 112, so as to be positioned in accordance with the position of the door 8. The right hand brush 100 is connected by lead 114 to a pair of parallel branches 116 and 118. The right hand branch 116 comprises rectifier 120 and resistance 122. The left hand branch 118 comprises rectifier 124 and resistance 126. The rectifiers 120 and 124 are oppositely oriented, the resistors 122 and 126 have unconnected ends, and the movable contact 110 is adapted to move between and over the resistors 122 and 126.

A simple mechanical arrangement for accomplishing this result is shown in Fig. 10, the movable contact 110 being mounted on arm 128 fast on shaft 130, that shaft being rotated by gear train 132, 134, the gear 134 being operatively connected to the door 8 in any appropriate manner. Another gear train 136, 137, 138 connects the rotor 98 of the D. C. generator 94 to the door 8. The resistors 122 and 126 are wound on an arcuate support 139 over which the contact 110 travels, the central part 140 of that support being free of wire.

The operation of the system of Figs. 9 and 10 is as follows: Let us assume that when the contact 110 is all the way to the right in Fig. 9 the door is fully closed, and that the door is now moved toward its open position. When it is moved the generator rotor 98 will rotate and will induce a voltage across the brushes 100. The polarity of that voltage will be such, in conjunction with the orientation of the rectifier 120 in branch 116, that no current will flow through the output circuit 106. Hence no appreciable electromagnetic reaction will occur in the generator 94, and no checking action will result. This situation will continue while the contact 110 is moving to the left across the resistor 122 and while the contact 110 is moving in the blank space 140 between the resistors 122 and 126. When the door reaches a predetermined distance away from its open position the contact 110 will engage the outer end of the resistor 126. The rectifier 124, since it is oriented oppositely to the rectifier 120, will now permit current to flow through the left hand branch 118 of the output circuit 106 in response to the voltage induced in the generator 94, but the magnitude of this current will be relatively small because the resistor 126 will be in the circuit. This small current flowing in the output circuit 106 will flow through the rotor 98, a small amount of electromagnetic reaction will occur, and hence a relatively small checking force will be exerted on the door 8. As the door 8 more closely approaches its open position the contact 110 will move along the resistor 126, thus progressively decreasing its effective value, increasing the magnitude of the current flowing in the output circuit 106 for a given speed of rotation of the rotor 98, and hence providing for an increased amount of electromagnetic reaction and hence an increased checking force. When the door is moved in the opposite direction toward its closed position the same sequence will occur, the rectifier 124 preventing current from flowing through the left hand branch 118 of the output circuit 106 even though the contact 110 is in electrical engagement with the resistor 126, because reversed direction of movement of the door 8 will result in reversed polarity of the voltage output from the generator 94.

In the embodiments of Figs. 1-3, checking is provided only in one direction. Checking in both directions can be provided by utilizing, in addition to the disclosed checking structure, a duplicate checking structure which is operative for motion in a direction opposite to that for which the disclosed checking structure is operative. In the embodiment of Figs. 9 and 10 checking is provided in both directions, but if checking is only desired in one direction, either of the branches 116 or 118 could be eliminated.

Consequently, in both of the embodiments here specifically illustrated an effective checking force is exerted on the door by means of instrumentalities which are sensitive to the direction and speed of movement of the door and to the position thereof. They provide a greater checking force at a given position the greater the speed of the door in the proper direction and a greater checking force for a given speed of door movement in the proper direction the closer the door approaches its terminal position. They thus have ideal operating characteristics. They accomplish these characteristics without requiring snug sliding contact between a pair of elements, without relying on maintaining an air or fluid seal between those elements, without depending on a cyclically stressed element to provide the restraining force, and by utilizing parts which may either be purchased as standard components or which may be manufactured to very loose tolerances.

While but two embodiments of the present invention have been here disclosed, it will be apparent that many variations may be made therein, all within the spirit of the invention as described in the following claims.

We claim:

1. A check for a movable member such as a door or the like comprising a source of magnetic field, an element adapted to be moved when the door is moved only in one direction and operatively associated with said magnetic field so that when said door is moved in said direction electromagnetic interaction occurs between said element and said field to produce a door checking action, and means operatively connected to said door, sensitive to the position thereof, and effective to control said electromagnetic interaction solely in accordance with the door position.

2. The check of claim 1, in which said source and said element are mounted to be movable relative to one another between first and second relative positions in which said element is respectively out of and in said magnetic field, said means is effective to cause such relative movement so that said first relative position is assumed for one door position and said second relative position is assumed for another door position, and said element is moved independently of its position relative to said source only when said door is moved from said one position to the other.

3. The check of claim 2, in which said element is formed at least in part of conductive material, whereby eddy currents are induced therein when said element is moved while in said magnetic field.

4. The check of claim 2, in which said element is in the form of a rotatable body of conductive material, a one-way clutch operatively connecting said element to said door, and in which said source is movable relative to said body between a first relative position beyond the periphery of said body, said body thereby being out of said magnetic field, and a second relative position overlapping said body, said body thereby being in said magnetic field, said clutch arrangement causing said body to rotate when said door is moved from said one position to the other, said body remaining stationary when said door is moved in the reverse direction.

5. The check of claim 1, in which said source and said element together comprise a D. C. generator having a voltage output the polarity of which is determined by the direction of movement of said door and hence of said element, and an output circuit electrically connected to said generator, said means being active on said output circuit so as to close said circuit when said door is within a predetermined distance from one position thereof and to open said circuit when said door is beyond said predetermined distance from said one position, said circuit including a rectifier electrically oriented with respect to said generator voltage so as to pass current only when said door is moved in said one direction.

6. The check of claim 5, in which said output circuit

includes a variable resistance, said means being operatively connected to said resistance so as to cause it to decrease in value as said door moves in said one direction.

7. The check of claim 1, in which said source and said element together comprise a D. C. generator having a voltage output the polarity of which is determined by the direction of movement of said door and hence of said element, an output circuit electrically connected to said generator and comprising first and second parallel branches each including a rectifier, the rectifier in each branch being oppositely electrically oriented with respect to said generator voltage so that the rectifier in the first branch will pass current only when said door is moved in a first direction toward one position thereof and the rectifier in the second branch will pass current only when said door is moved in a second direction toward another position thereof, said means being active on said output circuit so as to close said first branch when said door is within a predetermined distance from said one position thereof, open said first branch when said door is beyond said predetermined distance from said one position thereof, close said second branch when said door is within a predetermined distance from said other position thereof, and open said second branch when said door is beyond said predetermined distance from said other position thereof.

8. The check of claim 7, in which each of said branches includes a variable resistance, said means being operatively connected to said resistances in said first and second branches so as to cause them to decrease in value as said door approaches said one position and said other position respectively.

9. In an operating system for a movable member such as a door or the like comprising means operatively connected to said door for moving it between first and second positions, braking means including a rotatable body of conductive material, a one-way clutch operatively connecting said body to said door so as to be rotated only when said door is moving in one direction, a magnet mounted for movement relative to said body between an operative position in which said body is effectively in the field of said magnet and an inoperative position in which said body is effectively out of the field of said magnet, and an operative connection between said door and said magnet for moving said magnet to its operative position as said door moves in said one direction and moving said magnet to its inoperative position as said door moves in the opposite direction.

10. In an operating system for a movable member such as a door or the like comprising a motor operatively connected to said door for moving it from a first position to a second position, a spring operatively connected to said door so as to be tensioned when said door is moved to said second position and effective to return the door to its first position, braking means including a rotatable body of conductive material, a one-way clutch operatively connecting said body to said door so as to be rotated only when said door is moving from said second to said first position, a magnet mounted for movement relative to said body between an operative position in which said body is effectively in the field of said magnet and an inoperative position in which said body is effectively out of the field of said magnet, and an operative connection between said door and said magnet for moving said magnet to its operative position as said door moves to its first position and moving said magnet to its inoperative position as said door moves to its second position.

11. A check for a movable member such as a door or the like comprising a source of magnetic field, an element adapted to be moved when the door is moved in at least one direction and operatively associated with said magnetic field so that when said door is moved in said direction electromagnetic interaction occurs between said element and said field to produce a door checking action,

and means operatively connected to said door, sensitive to the position thereof, and effective to vary the magnitude of said electromagnetic interaction in a gradual manner corresponding to the position of the door as the door moves in a given direction.

12. The check of claim 11, in which said source and said element are mounted to be movable relative to one another between first and second relative positions in which said element is respectively out of and in said magnetic field, said means is effective to cause such relative movement so that said first relative position is assumed for one door position and said second relative position is assumed for another door position, and said element is moved only when said door is moved from said one position to the other.

13. The check of claim 12, in which said element is formed at least in part of conductive material, whereby eddy currents are induced therein when said element is moved while in said magnetic field.

14. The check of claim 12, in which said element is in the form of a rotatable body of conductive material, a one-way clutch operatively connecting said body to said door, and in which said source is movable relative to said body between a first relative position beyond the periphery of said body, said body thereby being out of said magnetic field, and a second relative position overlapping said body, said body thereby being in said magnetic field, said clutch arrangement causing said body to rotate when said door is moved from said one position to the other, said body remaining stationary when said door is moved in the reverse direction.

15. The check of claim 11, in which said source and said element together comprise a D. C. generator having a voltage output the polarity of which is determined by the direction of movement of said door and hence of said element, and an output circuit electrically connected to said generator, said means being active on said output circuit so as to close said circuit when said door is within a predetermined distance from one position thereof and to open said circuit when said door is beyond said predetermined distance from said one position, said circuit including a rectifier electrically oriented with respect to said generator voltage so as to pass current only when said door is moved in said one direction.

16. The check of claim 15, in which said output circuit includes a variable resistance, said means being operatively connected to said resistance so as to cause it to decrease in value as said door moves in said one direction.

17. The check of claim 11, in which said source and

said element together comprise a D. C. generator having a voltage output the polarity of which is determined by the direction of movement of said door and hence of said element, an output circuit electrically connected to said generator and comprising first and second parallel branches each including a rectifier, the rectifier in each branch being oppositely electrically oriented with respect to said generator voltage so that the rectifier in the first branch will pass current only when said door is moved in a first direction toward one position thereof and the rectifier in the second branch will pass current only when said door is moved in a second direction toward another position thereof, said means being active on said output circuit so as to close said first branch when said door is within a predetermined distance from said one position thereof, open said first branch when said door is beyond said predetermined distance from said one position thereof, close said second branch when said door is within a predetermined distance from said other position thereof, and open said second branch when said door is beyond said predetermined distance from said other position thereof.

18. The check of claim 17, in which each of said branches includes a variable resistance, said means being operatively connected to said resistances in said first and second branches so as to cause them to decrease in value as said door approaches said one position and said other position respectively.

19. A check for a movable member such as a door or the like comprising a source of magnetic field, an element adapted to be moved when the door is moved only in one direction and operatively associated with said magnetic field so that when said door is moved in said direction electromagnetic interaction occurs between said element and said field to produce a door checking action, and means operatively connected to said door, sensitive to the position thereof, and effective to control said electromagnetic interaction in accordance with the door position, said means being effective to initiate and increase the magnitude of said electromagnetic interaction in a gradual manner as said door approaches a given position.

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