May 7, 1968 T. T. T. JERILA 3,381,333

SELF-LATCHING MECHANISM FOR HINGES

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FIG. 1.

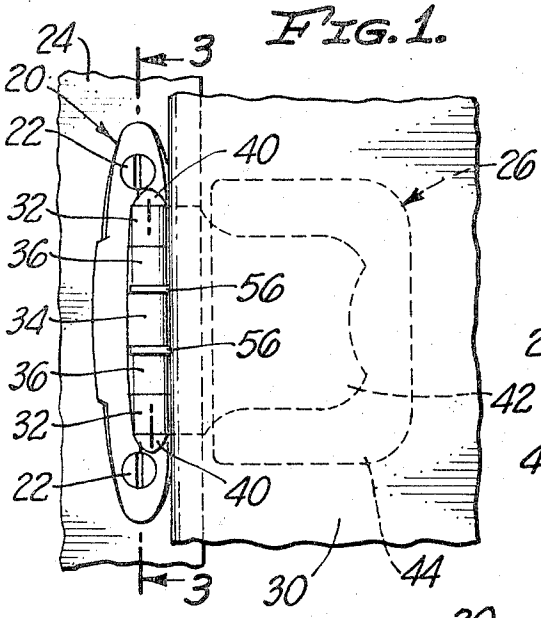



FIG. 2.

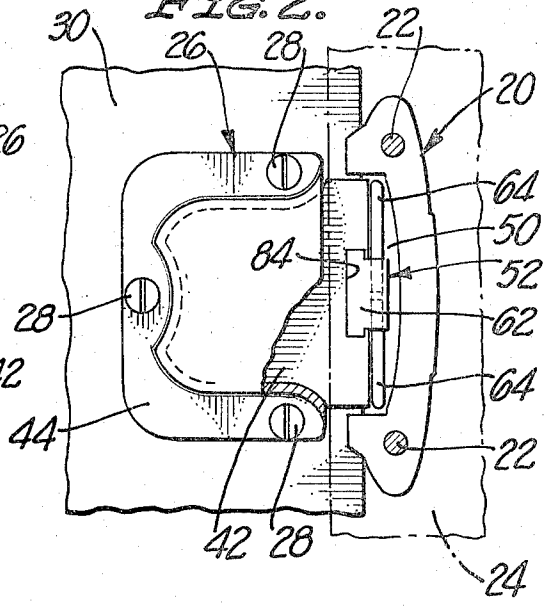



FIG. 3.

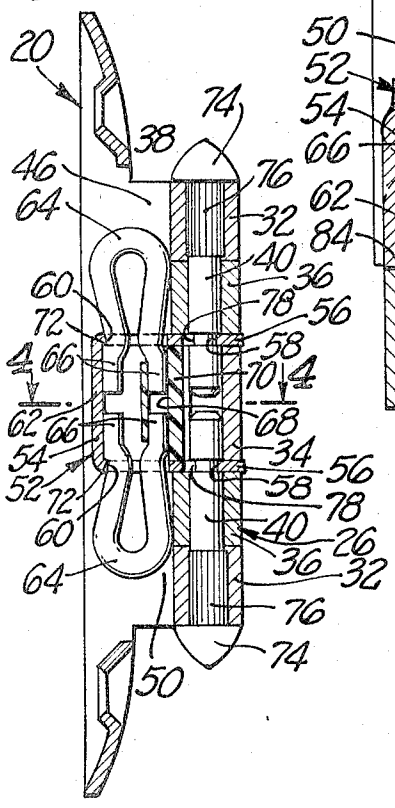



FIG. 4.

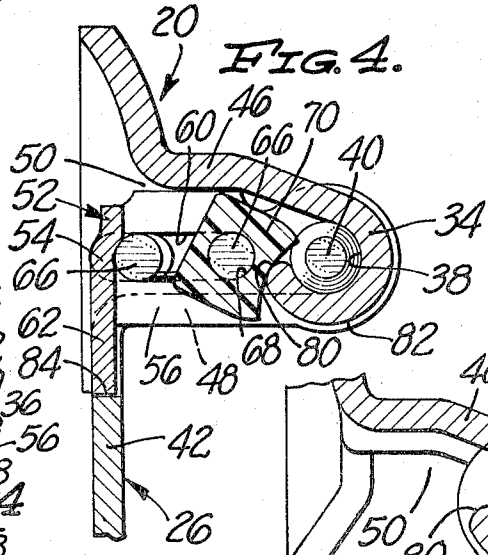
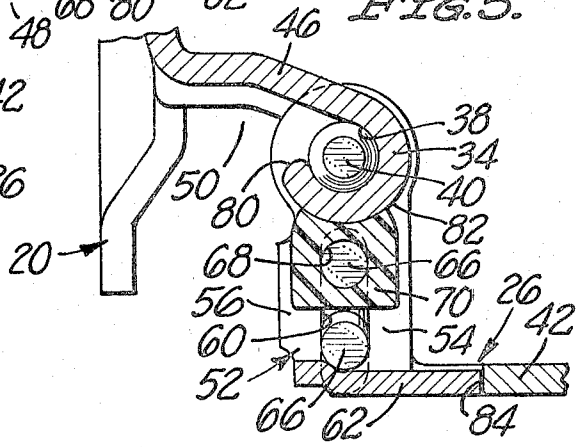



FIG. 5.




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FIG. 6.

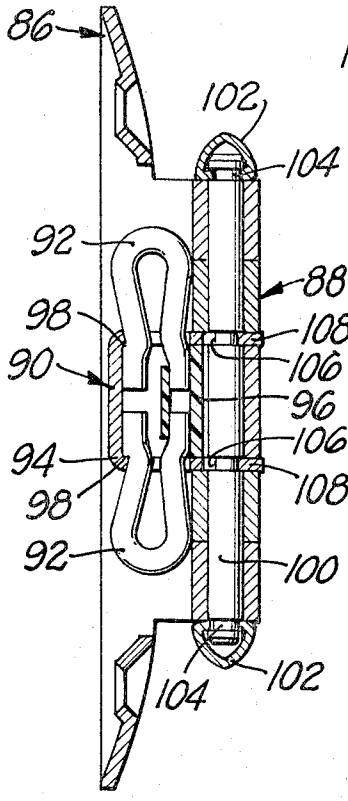



FIG. 7.

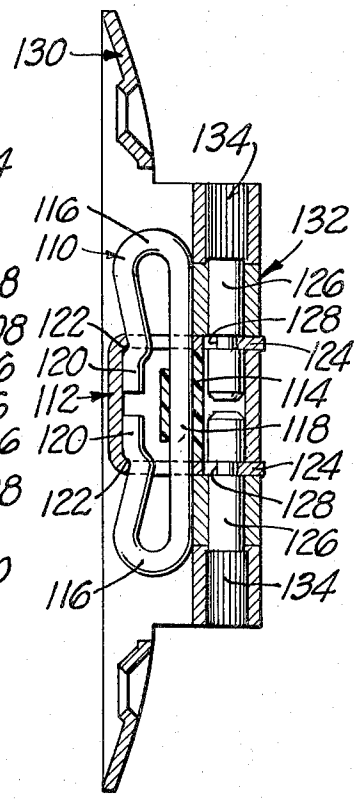



FIG. 8.

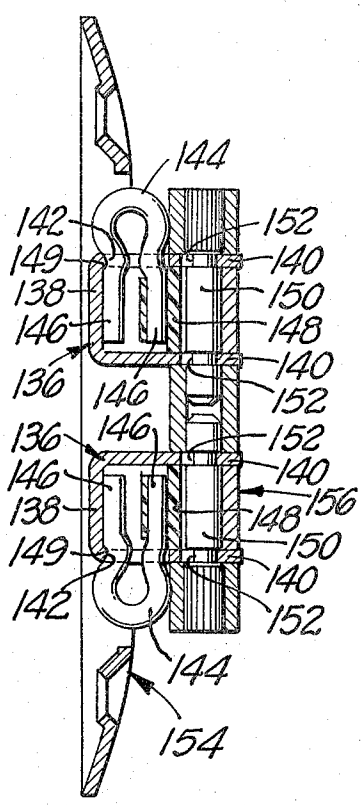



FIG. 9.

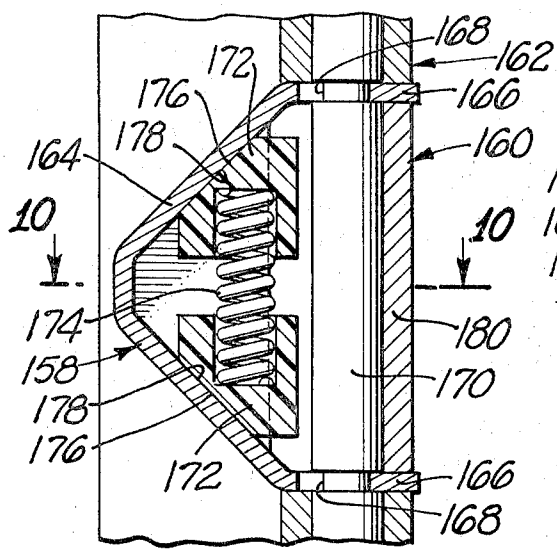
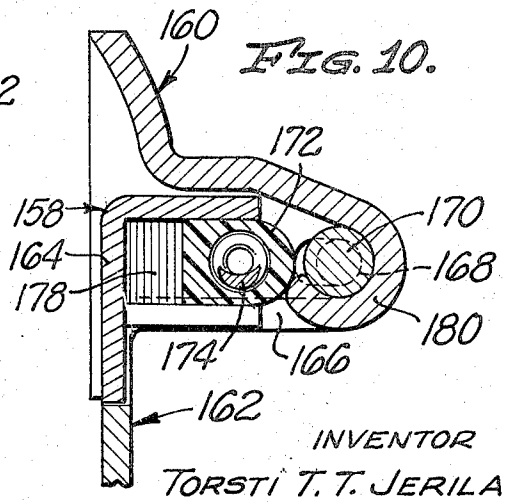



FIG. 10.




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3,381,333

# SELF-LATCHING MECHANISM FOR HINGES

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15 Claims. (Cl. 16—139)

This invention relates to a self-latching mechanism for hinges and constitutes improvements over the copending application, Ser. No. 580,779, filed Sept. 20, 1966, entitled, "Self-latching Hinge," of which I am a co-inventor. More particularly, this invention relates to a self-latching mechanism for hinges wherein said hinges are automatically resiliently urged toward a closed position, with said mechanism permitting movement of said hinge members toward open positions. The improvements of the present invention are concerned with means associated with the hinge pin for more positively retaining hinge members and self-latching mechanism assembled with said hinge pin, means for more positively retaining the spring means of the self-latching mechanism in the assembly of said self-latching mechanism, and means for providing various forms of springs and latch members for the self-latching mechanism.

As set forth in said copending application, Ser. No. 580,779, self-latching hinges include self-latching mechanisms having a part thereof movable with one hinge member and at least one latch member resiliently urged into engagement with the hinge knuckles of the other hinge member, all arranged for urging the hinge members into a closed position, while permitting movement thereof toward open positions. One of the hinge members may be secured to a doorframe and the other to a door and the self-latching mechanism is usually arranged so that as the door approaches the closed position, such self-latching mechanism takes over and resiliently urges the door to fully closed position, thereby eliminating the necessity of other latch means between the door and doorframe. In the normal hinged movement of the door relative to the doorframe beyond the point at which the self-latching mechanism is operable to urge the door toward the fully closed position, the self-latching mechanism will permit the normal hinged movement of the hinge members and, therefore, the normal hinged movement of the door relative to the frame for normal functioning of the door, that is, the door will normally remain in a given open position in which it is placed.

It is, therefore, an object of my invention to provide a self-latching mechanism for hinges of the foregoing general type in which means is provided engageable between the hinge pin and the self-latching mechanism for retaining the hinge pin assembled in the hinge member knuckles and with the self-latching mechanism when once placed in said assembly. As a result, once the hinge pin is properly assembled with the hinge members and self-latching mechanism, the retention of said proper assembly will be assured and it is impossible for accidental displacement of the various components to occur during use of the particular hinge, which could destroy the proper functioning thereof. Furthermore, such hinge pin locking feature is adaptable to a variety of hinge member and self-latching mechanism constructions, whether the latch members of the self-latching mechanisms are singular or multiple, whether the springs of the self-latching mechanisms are of various variable forms or whether the hinge pins are of singular or multiple parts.

It is a further object of my invention to provide a self-latching mechanism for hinges wherein the spring means of the self-latching mechanism required for urging the latch member or members into engagement with certain of the hinge member knuckles for the functioning of said self-latching mechanism are positively engaged in the particular self-latching mechanisms and are positively prevented from accidental disassembly from said mechanisms during use of the hinges. The spring locking feature of the present invention is automatically operable again at the time of proper assembly of the particular spring in the particular self-latching mechanism so as to prevent accidental disassembly of the spring from said self-latching mechanism once properly assembled. Also, this spring locking feature is freely applicable for a variety of forms of spring and whether the particular spring may be of unitary form or in several parts, and whether said spring might provide actuation for one or several latch members.



Other objects and advantages of the invention will be apparent from the following specification and the accompanying drawings which are for the purpose of illustration only, and in which:

FIG. 1 is a fragmentary, front elevational view of an embodiment of a hinge including my self-latching mechanism improvements of the present invention showing hinge members hingedly connecting a door to a doorframe;

FIG. 2 is a fragmentary, rear elevational view of the hinge of FIG. 1, with the door removed and the fastening means for one of the hinge members shown in vertical section;

FIG. 3 is an enlarged, vertical, sectional view taken along the broken line 3—3 in FIG. 1 and with the hinge members removed from the door and frame;

FIG. 4 is an enlarged, fragmentary, horizontal, sectional view taken along the broken line 4—4 in FIG. 3 and showing the hinge members in closed position;

FIG. 5 is a view similar to FIG. 4, but showing the hinge members in an open position;

FIG. 6 is a view similar to FIG. 3, but showing a further form of hinge incorporating certain of the improvements of the present invention;

FIG. 7 is a view similar to FIG. 3, but showing a still further form of hinge incorporating certain of the principles of the present invention;

FIG. 8 is a view similar to FIG. 3, but showing a still further form of hinge incorporating certain of the improvements of the present invention;

FIG. 9 is a fragmentary, vertical, sectional view showing a still further modified form of self-latching hinge mechanism incorporating certain of the improvements of the present invention; and

FIG. 10 is a fragmentary, horizontal, sectional view taken along the broken line 10—10 in FIG. 9.

Referring to FIGS. 1 through 5, a self-latching hinge incorporating certain of the improvements of the present invention is shown and includes a first hinge member, generally indicated at 20, secured by usual fasteners 22 to a representative frame 24 and a second hinge member, generally indicated at 26, secured by usual fasteners 28 to a representative door 30 for hingedly mounting the door on the frame. The first hinge member 20 includes axially aligned outer and intermediate hinge knuckles 32 and 34 receiving interfitting and axially aligned therewith hinge knuckles 36 of the second hinge member 26, all of which hinge knuckles co-operate to form an axially extending hinge pin opening 38 for reception of a pair of hinge pin halves 40, to be hereinafter more particularly described and being of importance to certain of the principles of the present invention. The second hinge member 26 may be formed of the usual demountable type, including a tongue 42 slidably received in a keeper 44, said tongue being selectively releasable in the usual manner from the keeper 44 for the complete removal of the door 30 from the frame 24.

Each of the first and second hinge members 20 and 26 is formed with outwardly projecting connecting portions 46 and 48, respectively, spacing the hinge knuckles 32,

34 and 36 outwardly to form a latch carriage chamber 50 between said hinge members and within which is received a latch carriage assembly, generally indicated at 52. The latch carriage assembly 52 includes a carriage 54 of generally U-shaped configuration having axially spaced mounting legs 56 forming axially aligned hinge pin openings 58 and spring slots 60. The carriage mounting legs 56 are integrally connected by a depending, T-shaped engagement portion 62.

More particularly to the improvements of the present invention, the latch carriage assembly 52 further includes generally U-shaped spring halves 64, each having re-entrant end parts 66 received axially through the spring slots 60 of the carriage mounting legs 56, as best seen in FIG. 3. One of the end parts 66 of each of the spring halves 64 bears resiliently against the carriage engagement portion 62 and the other is received axially in a spring opening 68 of a latch member 70, said latch member being positioned between the carriage mounting legs 56. Further, each of the end ports 66 of the spring halves 64 is angularly configured, with particularly those end parts bearing against the carriage engagement portion 62 forming notches 72 receiving engaged therein the carriage mounting legs 56 adjacent the ends of the spring slots 60 to thereby axially engage the spring halves 64 with the carriage mounting legs 56 and retain the spring halves against axially outward displacement from the carriage 54 once such spring halves have been assembled with said carriage and the latch member 70.

Also more particularly to the improvements of the present invention, the hinge pin halves 40 having end caps 74 which may be integral or separately pressed thereon and knurled surfaces 76 press-fit in the outer hinge knuckles 32 of the first hinge member 20, are each formed with an annular recess 78 particularly located for radial alignment with the carriage mounting legs 56. Thus, when the hinge pin halves 40 are assembled through the hinge pin opening 38, with each extending axially through one of the first hinge outer hinge knuckles 32 and second hinge knuckles 36, said hinge pin recesses 78 will be properly axially spaced and radially aligned with the carriage mounting legs 56, with said hinge pin halves extending through the hinge pin openings 58 of the carriage mounting legs. The normal resilient urging of the carriage engagement portion 62 away from the hinge pin halves 40 by the spring end parts 66 bearing resiliently radially between said carriage engagement portion and the latch member 70, forcing said latch member radially against the intermediate hinge knuckle 34 of the first hinge member 20, will cause the carriage mounting legs 56 to engage in said hinge pin recesses 78 outwardly adjacent the hinge pin openings 58 of the carriage mounting legs, thereby retaining the hinge pin halves 40 against axial displacement from the various hinge member hinge knuckles 32, 34 and 36, as well as from the carriage 54 once such hinge pin halves are assembled therewith, as shown in FIG. 3.

The latch member 70 is preferably formed of a relatively abrasion resistant, plastic material and, as stated, bears radially against the intermediate hinge knuckle 34 of the first hinge member 20, as resiliently urged by the spring halves 64, said latch member co-operating with said intermediate hinge knuckle to provide the self-latching feature. As fully disclosed in said copending application, Ser. No. 580,779, the intermediate hinge knuckle 34 of the first hinge member 20 is only partially wrapped in the order of 250° to 270° to provide knuckle end surface 80 preferably projecting approximately 50° to a straight radial line and against which the latch member 70 acts, as well as over knuckle outer surface 82. Also, as disclosed in said copending application, when the assembly of the latch carriage assembly 52 in the latch carriage chamber 50, the T-shaped carriage engagement portion 62 is received in a matching T-shaped slot 84 of the second hinge member 26, as best seen in FIG. 2, so that the latch carriage assembly is hingedly movable with the second hinge member to move the latch member 70 relative to and along the intermediate hinge knuckle 34 of the first hinge member 20 during hinged movement between said hinge members.

In operation of the self-latching mechanism, when the first and second hinge members 20 and 26 are in the closed position, the latch member 70 bears against the knuckle end surface 80 of the intermediate hinge knuckle 34, as resiliently urged by the spring halves 64, thereby resiliently retaining said hinge members in the closed position and eliminating the necessity of further latches between the frame 24 and door 30, said positioning of the first and second hinge members being shown in FIG. 4. When the door 30 is moved outwardly toward an open position relative to the frame 24, thereby moving the second hinge member 26 hingedly outwardly relative to the first hinge member 20, the latch member 70 moves over the knuckle end surface 80 and onto the knuckle outer surface 82, as shown in FIG. 5, and as permitted by the slight compression of the spring halves 64. Obviously, as soon as the latch member 70 is fully against the knuckle outer surface 82, the second hinge member 26 is no longer resiliently urged toward closed position relative to the first hinge member 20 and the second hinge member, as well as the door 30, will remain in the selected open position without an opening force being maintained thereagainst.

A modified form of the hinge incorporating certain of the self-latching mechanism improvements of the present invention is shown in FIG. 6 and in most respects is virtually the same as the form shown in FIGS. 1 through 5 and hereinbefore described. The form of FIG. 6 includes a first hinge member, generally indicated at 86, a second hinge member, generally indicated at 88, and a latch carriage assembly 90, said latch carriage assembly having the same spring halves 92 axially engaged in a carriage 94 and radially resiliently urging a latch member 96. The spring halves 92 are engaged in the carriage 94 against axial displacement therefrom by similar notches 98.

In the modified form of FIG. 6, however, the first and second hinge members 86 and 88, along with the latch carriage assembly 90, are retained in overall assembly and for the hinged movement by a single hinge pin 100 having end caps 102 engaged therewith in end grooves 104 thereof. Axially spaced annular recesses 106 are formed in the hinge pin 100 radially aligned with axially spaced mounting legs 108 of the carriage 94. Thus, again, the carriage mounting legs 108 radially engage in the hinge pin recesses 106 to secure the hinge pin 100 from axial displacement relative to the first and second hinge members 86 and 88, as well as the latch carriage assembly 90.

A further modified form of the hinge incorporating certain of the self-latching mechanism improvements of the present invention is shown in FIG. 7, wherein, rather than the separate spring halves previously described, a single spring 110 is incorporated in a latch carriage assembly 112 for actuating a latch member 114. The single spring 110 is formed with oppositely depending, U-shaped end portions 116, an integral axially extending latch engagement portion 118 and re-entrant ends 120. The latch engagement portion 118 is received through the latch member 114 and the ends 120 are angularly formed, with notches 122 receiving carriage mounting legs 124 for retaining the spring 110 and the ends 120 thereof against axial displacement from the carriage mounting legs 124.

Hinge pin halves 126 in this FIG. 7 modified form are, again, formed with annular recesses 128 properly axially spaced for radial engagement by the carriage mounting legs 124 to retain said hinge pin halves against axial displacement relative to first and second hinge members 130 and 132, as well as the latch carriage assembly 112. Outer

ends 134, in this case, terminate at the termination of the first hinge member 130, eliminating the necessity for any covering caps. The hinge pin outer ends 134 are, again, however, knurled for press-fitting in the first hinge member 130.

A still further modified form of the hinge incorporating certain of the improvements of the present invention is shown in FIG. 8, wherein a latch carriage assembly 136 is formed by separate, axially spaced carriages 138, each being generally U-shaped and having axially spaced mounting legs 140, the outermost of which is formed with a radial spring slot 142. Oppositely depending, generally U-shaped springs 144 are received, one through each of the carriage spring slots 142, with spring end parts 146 mounting latch members 148 positioned between the carriage mounting legs 140 of each of the carriages 138. The spring end parts 146 are formed with notches 149, similar to before, for engagement with the carriage mounting legs 140 to axially retain the springs 144 against displacement from the carriages 138.

Hinge pin halves 150 of this FIG. 8 form are each provided with axially spaced recesses 152 appropriately axially located for engagement radially by the respective carriage mounting legs 140. Otherwise, the hinge pin halves 150 are each formed with appropriate knurling and terminate within a first hinge member 154, said hinge pin halves thereby hingedly connecting said first hinge member to a second hinge member 156. Thus, the hinge pin halves 150 are retained from axial displacement upon assembly thereof with the first and second hinge members 154 and 156 by the double engagement of the carriages 138 in the hinge pin recesses 152 and the latch members 148 act in the self-latching function at axially spaced points against the first hinge member 154 in a similar manner as before.

Still another modification of the hinge incorporating certain of the improvements of the present invention is shown in FIGS. 9 and 10 in which a considerably different latch carriage assembly 158 is actionable for the self-latching function between a first hinge member 160 and a second hinge member 162. The latch carriage assembly 158 includes a carriage 164 having axially spaced mounting legs 166 radially engaged in recesses 168 of a hinge pin 170, which hinge pin hingedly connects the first and second hinge members 160 and 162. A pair of latch members 172 are positioned axially spaced within the carriage 164 separated by a compression spring 174 resiliently forcing angled latch member surfaces 176 against matching angled carriage surfaces 178, the reaction to which is to force the latch members 172 radially against a hinge knuckle 180 of the first hinge member 160.

Thus, the self-latching function is provided similar to the other forms in end result, but by a different arrangement wherein merely the single compression spring 174 through the angular engagement between the latch members 172 and the carriage 164 forces said latch members radially into the self-latching engagement with the hinge knuckle 180. Further, the hinge pin recesses 168 engaged by the carriage mounting legs 166, again, retain the hinge pin 170 from axial displacement relative to the first and second hinge members 160 and 162.

According to the improvements of the present invention, therefore, I have provided various forms of single or double hinge pins which are retained from axial displacement in the assembly of the first and second hinge members and the self-latching mechanism provided by the latch carriage assemblies, said retainment of the hinge pins being accomplished by an engagement between the latch carriage assemblies and engagement means on the hinge pins. Furthermore, I have provided various forms of springs forming parts of the latch carriage assemblies which are positively retained in said latch carriage assemblies in proper position for actuating the latch members thereof by the special configurations of said springs, which axially engage with the carriages of said assemblies, this spring retention feature being applicable whether the springs are formed in separate halves or unitary, and even though each half of a spring might be incorporated with a separate latch carriage assembly. Still further, I have provided a uniquely operable form of latch carriage assembly incorporating merely a simple compression spring, while providing a perfectly operable self-latching mechanism possible of incorporation in many hinges.

I claim:

1. In a self-latching hinge, the combination of: first and second hinge members having axially aligned hinge knuckles forming an axially extending hinge pin opening; hinge pin means received in said hinge pin opening of said hinge members connecting said hinge members for hinged movement between open and closed positions; self-latching means operably connected between said hinge members for resiliently urging said members toward a closed position and permitting selective movement toward an open position; and means resiliently urged into engagement between said hinge pin means and self-latching means for retaining said hinge pin means against axial movement relative to said hinge members wherein said engagement means includes a portion of said self-latching means radially engaged in a recess of said hinge pin means.

2. A self-latching hinge as defined in claim 1 in which said self-latching means includes a carriage having a hinge pin receiving portion thereon, a hinge pin opening in said hinge pin receiving portion, said hinge pin means being received through said carriage hinge pin opening; and in which said engagement means includes a part of said hinge pin receiving portion in said hinge pin opening engaged in an annular recess formed on said hinge pin means.

3. A self-latching hinge as defined in claim 1 in which said engagement means includes axially spaced portions of said self-latching means radially engaged in axially spaced recesses of said hinge pin means.

4. A self-latching hinge as defined in claim 1 in which said hinge pin means includes a pair of axially separate hinge pins, each of said hinge pins having a radially opening recess formed therein; and in which said engagement means includes axially spaced portions of said self-latching means engaged in said hinge pin recesses.

5. A self-latching hinge as defined in claim 1 in which said self-latching means includes a carriage having axially spaced hinge pin receiving portions thereon, said hinge pin receiving portions having hinge pin openings therein and receiving said hinge pin means axially therethrough; and in which said engagement means includes parts of said carriage hinge pin receiving portions at said hinge pin openings engaged radially in annular recesses formed in said hinge pin means.

6. A self-latching hinge as defined in claim 1 in which said self-latching means includes a carriage, latch means radially engaged with certain of said hinge knuckles of said hinge members, spring means engaged between said latch means and carriage for resiliently urging said latch means into said hinge knuckle engagement; and in which said spring means includes U-shaped end portions having reentrant end parts engaged with said carriage, certain of said end parts being angularly configured axially engaged with said carriage preventing axial movement of said spring means out of said carriage.

7. In a self-latching hinge, the combination of: first and second hinge members having axially aligned hinge knuckles forming an axially extending hinge pin opening; hinge pin means received in said hinge pin opening of said hinge members connecting said hinge members for hinged movement between open and closed positions; self-latching means operably connected between said hinge members for resiliently urging said members toward a closed position and permitting selective movement toward an open position; said self-latching means including a carriage, latch means radially engaged with

certain of said hinge knuckles of said hinge members, spring means engaged between said latch means and carriage for resiliently urging said latch means into said hinge knuckle engagement; and said spring means including U-shaped end portions having reentrant end parts engaged with said carriage, certain of said end parts being angularly configured forming notch means axially engaged with said carriage preventing axial movement of said spring means out of said carriage.

8. A self-latching hinge as defined in claim 7 in which said self-latching means carriage includes axially spaced radiallly slotted legs; in which said spring U-shaped end portions each extend through one of said carriage slotted legs, with said end parts of each being angularly configured and axially engaging the respective of said carriage legs.

9. A self-latching hinge as defined in claim 7 in which said self-latching means carriage includes axially spaced radially slotted legs; and in which said spring U-shaped end portions are axially separated end portions, one of said spring end portions being engaged through each of said carriage slotted legs, at least one of said end parts of each of said spring end portions being angularly configured axially engaged with the respective of said carriage legs preventing axial movement of said spring end portions out of said carriage slotted legs.

10. A self-latching hinge as defined in claim 7 in which said self-latching means carriage includes axially spaced radially slotted legs; and in which one of said spring end portions is engaged axially through each of said carriage slotted legs, at least one of said end parts of each of said spring end portions being radially notched, with the respective of said carriage slotted legs being engaged in said end part notches.

11. A self-latching hinge as defined in claim 7 in which said latch means of said self-latching means includes a pair of latch members; and in which said spring means of said self-latching means includes axially separate U-shaped end portions each having an end part engaged with one of said latch members, each of said spring end portions having at least one end part angularly configured axially engaged with said carriage preventing axial movement of said spring end portion out of said carriage.

12. A self-latching hinge as defined in claim 7 in which said self-latching means carriage includes axially spaced pairs of axially spaced legs, said legs all having axially aligned hinge pin openings formed therethrough and receiving said hinge pin means; in which said latch means of said self-latching means includes a pair of latch members, one of said latch members being positioned between each of said pairs of carriage legs radially engaged with certain of said hinge knuckles; and in which said spring means of said self-latching means includes axially separate U-shaped end portions, one of said spring end portions being received in each of said pairs of said



carriage legs, with one of said end parts thereof engaged with the respective of said latch members, at least one of said end parts of each of said spring end portions being radially notched and receiving a part of one of said carriage legs therein.

13. In a self-latching hinge, the combination of: first and second hinge members having axially aligned hinge knuckles forming an axially extending hinge pin opening; hinge pin means received in said hinge pin opening of said hinge members connecting said hinge members for hinged movement between open and closed positions; self-latching means operably connected between said hinge members for resiliently urging said members toward a closed position and permitting selective movement toward an open position; and said self-latching means including a carriage, at least a pair of axially spaced latch members radially engaged with certain of said hinge knuckles of said hinge members, resilient means compressively engaged with said latch members and resiliently urging said latch members into engagement with said hinge knuckles, said resilient means engagement mounting said latch members for limited independent radial movement with respect to each other.

14. A self-latching hinge as defined in claim 13 in which said self-latching means carriage includes spaced legs having axially aligned hinge pin openings formed therethrough and receiving said hinge pin means; and in which said hinge pin means includes a pair of axially spaced annular recesses, said annular recesses receiving said carriage legs adjacent said carriage leg hinge pin openings therein.

15. A self-latching hinge as defined in claim 13 in which said self-latching means carriage has axially opposed angled surfaces, said carriage surfaces angling oppositely radially toward said hinge knuckles; in which said latch members of said self-latching means have matching angled surfaces slidably abutting said carriage angled surfaces, one of said latch members being slidably engaged with one of said carriage angled surfaces, with said latch members being axially spaced; and in which said resilient means of said self-latching means includes at least one compression spring engaged axially between said latch members forcing said latch members slidably against said carriage angled surfaces and thereby urging said latch members radially into engagement with said hinge knuckles.


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