Sept. 1, 1953 W. J. WHITE 2,650,388

HINGING MEANS

Filed Aug. 1, 1950 4 Sheets-Sheet 1

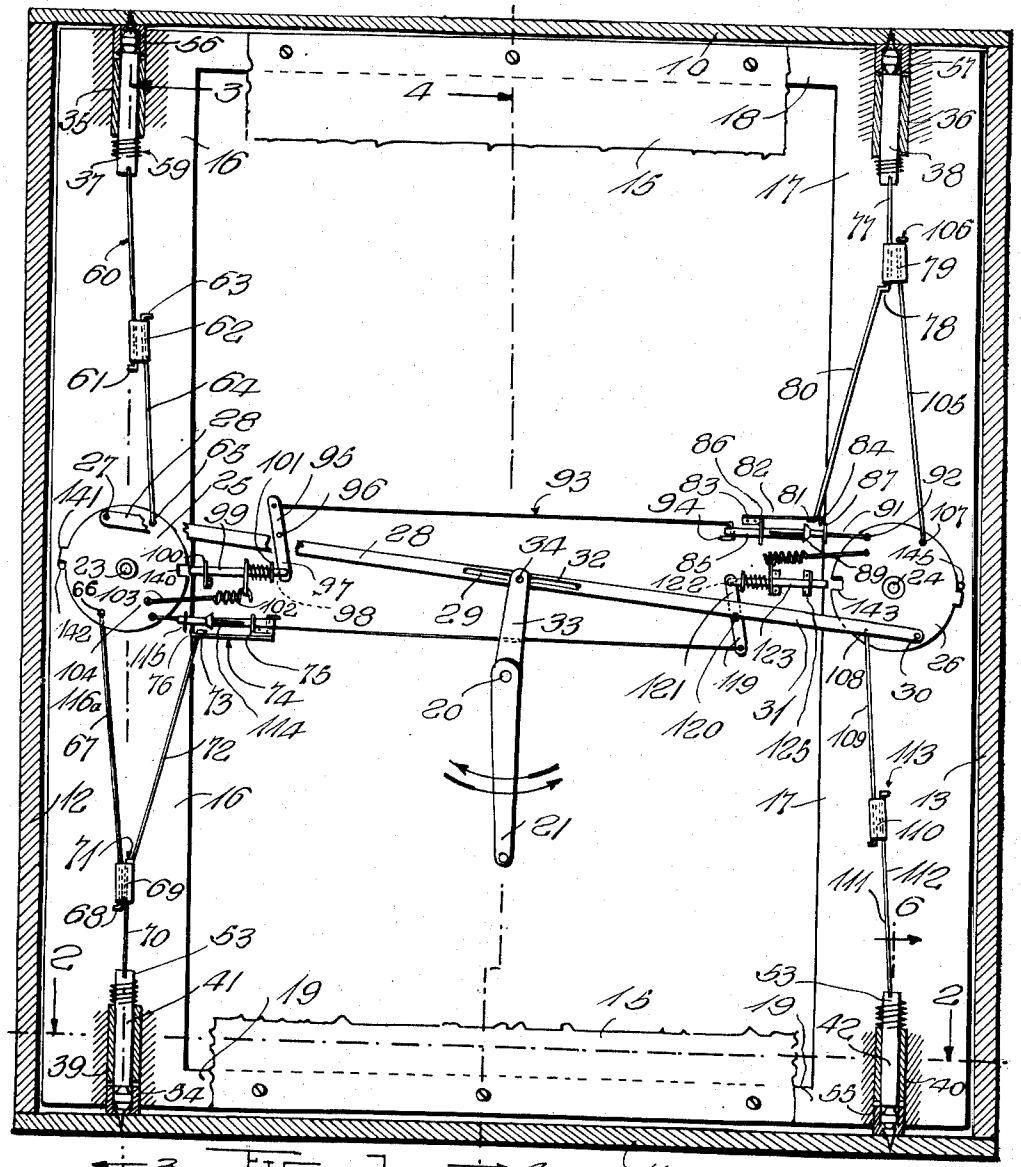


FIG. 1

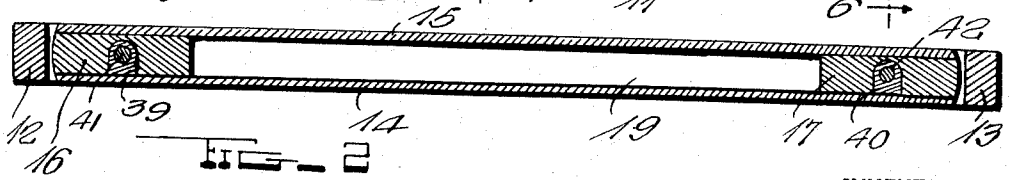


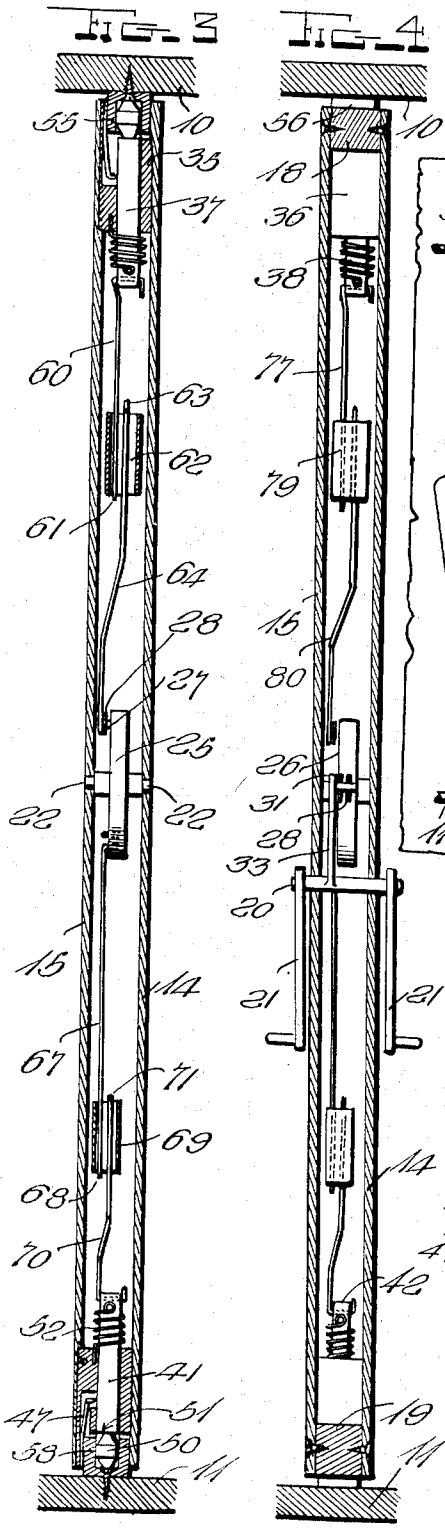
FIG. 2

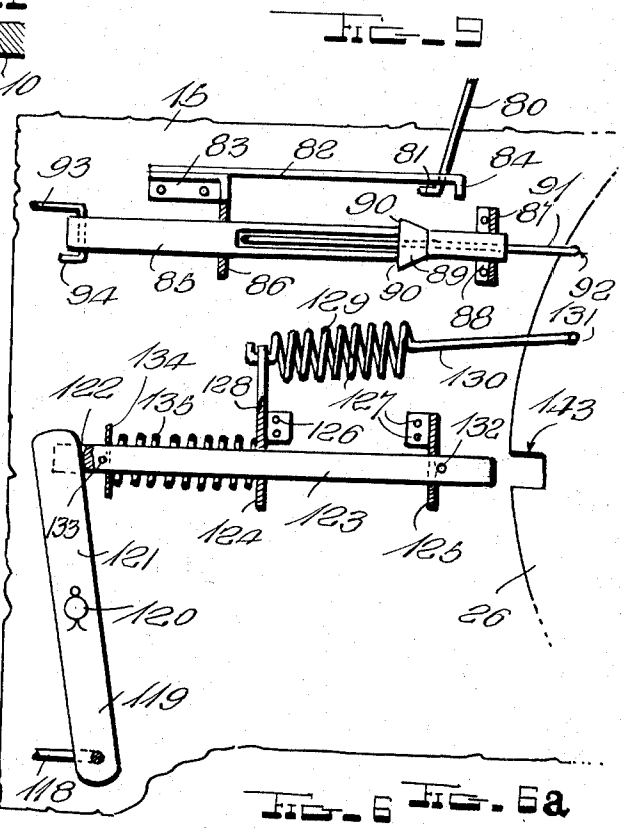
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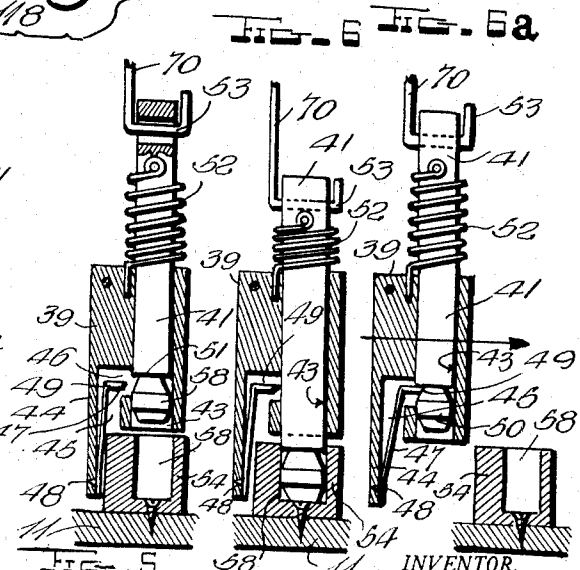
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HINGING MEANS

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HINGING MEANS

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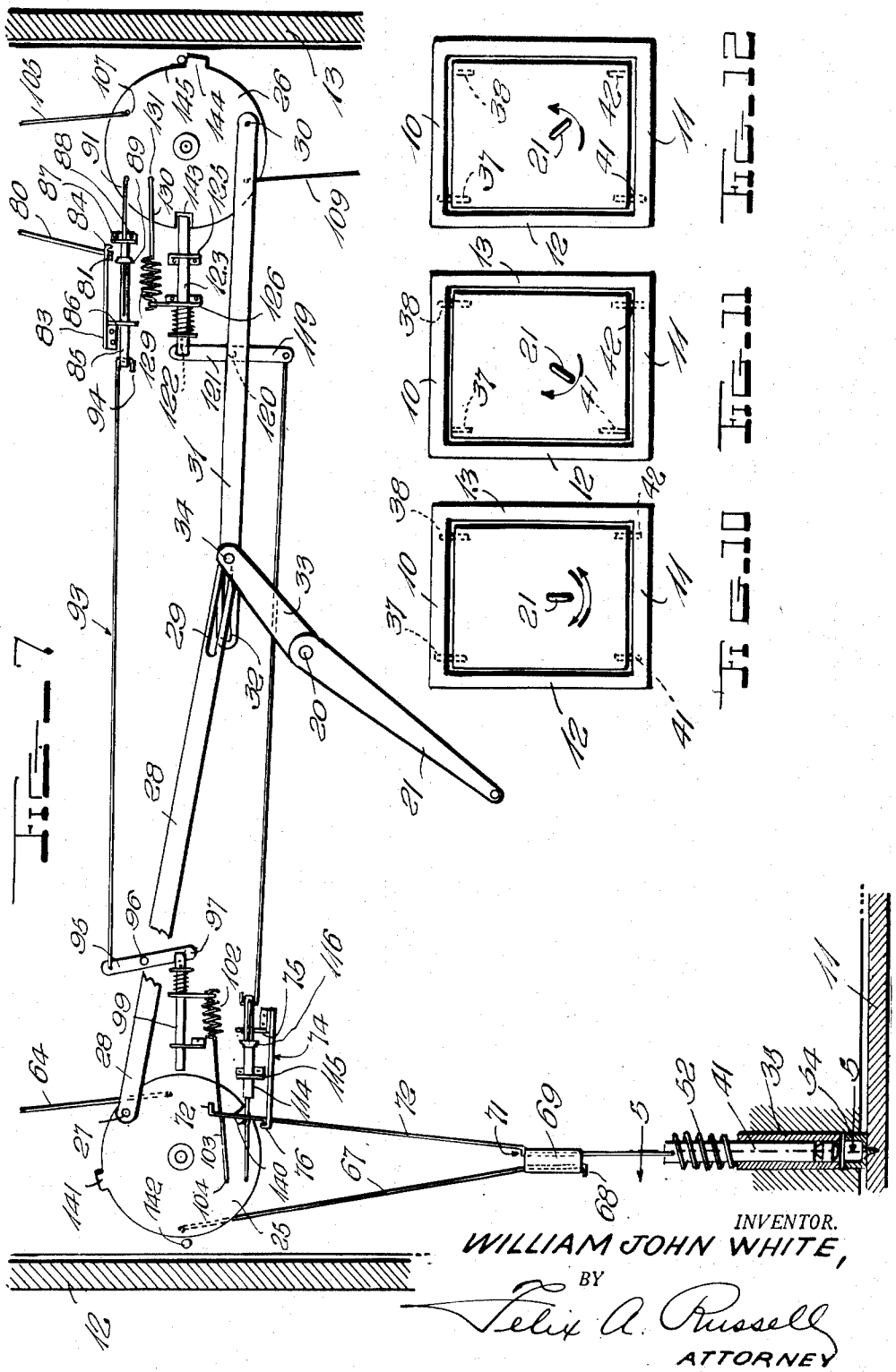


FIG. 7

FIG. 10

FIG. 11

FIG. 12

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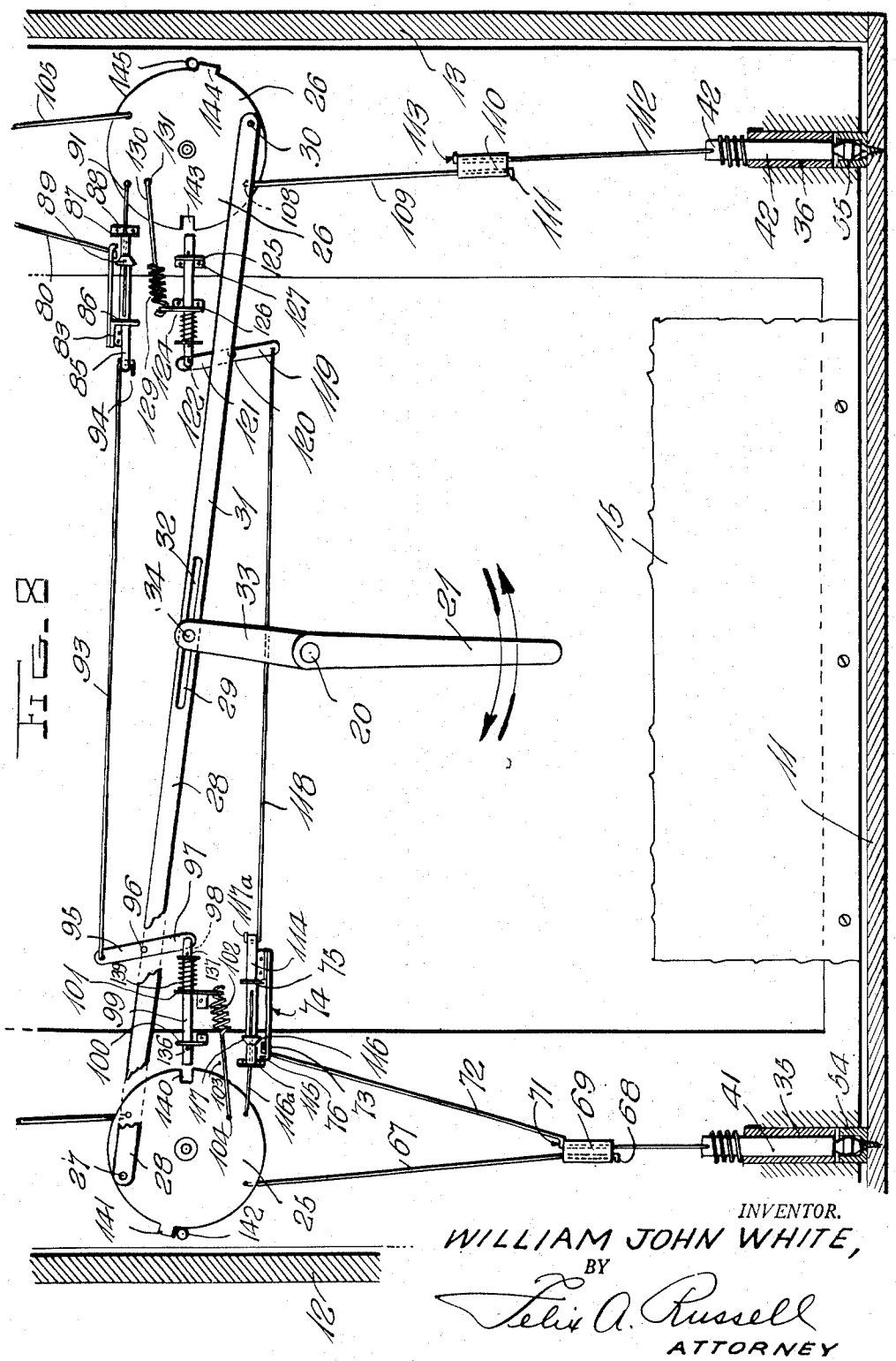


FIG. XI

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HINGING MEANS

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6 Claims. (Cl. 16—147)

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The present invention relates to combined hinges and latching means for doors and it consists in the combinations, constructions and arrangements of parts herein decribed and claimed.

Generally there is provided a door construction which includes an upper and lower hinge pin at either side thereof and a centrally mounted handle connected with such hinge pins in such manner that a simple turning movement of the handle in one direction will retract the hinge pins on one side of the door while a movement in the other direction of the handle will cause a retraction of the other set of hinge pins. Means is also provided for locking the pins upon one side of the door in their outer positions when the pins upon the one side of the door are retracted thus making it impossible to remove the entire door through the action of the aforesaid handle. The invention possesses many other novel features which will be brought out in the specification herebelow.

It is accordingly an object of the invention to provide a door construction having upper and lower hinge pins upon either side thereof and a handle for selectively releasing the pins upon one side of such door.

Another object of the invention is the provision of a mechanism of the character set forth wherein means is provided for automatically locking the pins upon one side of the door in their outward positions when the pins upon the other side of said door are retracted.

A further object of the invention is the provision, in a mechanism of the character set forth, of a novel latch means for a spring hinge forming a part of the invention.

A still further object of the invention is the provision of a mechanism of the character set forth which is relatively simple in construction, inexpensive to manufacture and yet effective and efficient in use.

Other and further objects of the invention will become apparent from a reading of the following specification taken in conjunction with the drawings, in which:

Figure 1 is a front elevational view, partly broken away, of an embodiment of the invention,

Figure 2 is a sectional view taken along line 2—2 of Figure 1,

Figure 3 is a sectional view taken along line 3—3 of Figure 1,

Figure 4 is a sectional view taken along line 4—4 of Figure 1,

Figure 5 is an enlarged fragmentary sectional view taken substantially along line 5—5 of Figure 7,

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Figure 6 is an enlarged fragmentary sectional view, partly in elevation, taken substantially along line 6—6 of Figure 1,

Figure 6*a* is a view similar to Figure 5 but showing the door in opened condition.

Figure 7 is an enlarged fragmentary vertical sectional view illustrating the operational mechanism within a door embodying the present invention, and illustrating the positions of the various devices when the hinge pins, forming a part of the invention, upon one side of the door are in retracted position,

Figure 8 is a view similar to Figure 7 but showing the mechanism in its condition when all hinge pins are in their normal outward positions,

Figure 9 is an enlarged vertical sectional view illustrating certain details of construction, and

Figures 10 to 12, inclusive, are schematic views illustrating the operation of a door embodying the present invention.

Referring more particularly to the drawings, there is shown therein a door frame having upper and lower transverse members 10 and 11, respectively, and side members 12 and 13. A door is shown disposed in the door frame and includes a front panel 14 which is interconnected with a rear panel 15 by means of a pair of vertically extending side members 16 and 17 which are, in turn, interconnected at their upper and lower ends with transverse members 18 and 19, respectively.

Centrally disposed in the door at a convenient height is a shaft 20 which extends through both of the panels 14 and 15 and has mounted thereon at either end thereof operating handles 21. Of course, in certain cases such as, for example, a domestic refrigerator box, one of the handles 21 may be omitted without in any manner changing the remainder of the mechanisms.

Spaced transversely from the shaft 20 adjacent each side of the door and journalled transversely in the front and rear panels, as indicated at 22, is a pair of axles 23 and 24 which have respectively affixed thereto discs 25 and 26. Adjacent the outer periphery of the disc 25 there is pivotally connected, as indicated at 27, the outer end of a link 28 which is provided with a longitudinally extending slot 29 adjacent its inner end. Pivoted to the disc 26 adjacent its periphery, as indicated at 30, is the outer end of a link 31 whose inner end is provided with a longitudinally extending slot 32.

Affixed to the shaft 20 and extending generally in an upward direction therefrom between the panels 14 and 15 is an arm 33 to whose upper end is affixed a forwardly extending pin 34 which

extends transversely through the slots 29 and 32.

In housings 35 and 36 mounted in the members 16 and 17, respectively, adjacent the outer ends of the door there are vertically slidable hinge pins 37 and 38 and in like housings 39 and 40 positioned vertically below the housings 35 and 36 and in the lower end of the door there are mounted hinge pins 41 and 42.

Since each of the housings 35, 36, 39 and 40 is of identical construction, only the construction of housing 39 and its associated pins 41 will be described in detail and reference to Figures 5, 6 and 6a is made for this purpose. It will therein be seen that the housing 39 is provided with a vertically extending cylindrical opening 43 for the reception of the pin 41 and that the body of the housing 39 is provided with a rearward extension 44 which is hollow, as indicated at 45, and which hollow portion 45 communicates by a slot 46 with the interior of the recess 43. An upwardly extending flat spring 47 is affixed to the lower end of the extension 44, as indicated at 48, by metal screws or the like and the upper end of the spring 47 is provided with an outwardly and horizontally directed latch member 49. The pin 41 is provided at its outer end with a head 50 which is integrally formed therewith and inwardly of which is an inwardly directed annular shoulder 51. A tension spring 52 interconnects the inner end of the housing 39 and the pin 41 which it surrounds and the inner end of the pin has connected thereto, as indicated at 53, the outer end of a link hereinafter to be referred to.

Affixed to the transverse member 11 is a pair of upwardly extending sockets 54 and 55 which are adapted to register vertically with the housings 39 and 40, respectively, and affixed to the transverse member 10 is a pair of downwardly directed socket members 56 and 57 which are adapted to register vertically with the housings 35 and 36. Each of the socket members 54 to 57, inclusive, is provided with a recess for the reception of the associated hinge pins 37, 38, 41 and 42. In the case of the socket member 54, this recess is indicated at 58.

Connected with the lower end of the hinge pin 37, as indicated at 59, is a rod 60 which extends substantially vertically downwardly and which is provided at its lower end with an integrally formed horizontally extending dog 61. The rod 60 extends through a collar 62 the lower end of which abuts against the dog 61 and the upper end of which abuts against a dog 63 which extends horizontally and which is integrally formed with a vertically extending rod 64 whose lower end is pivotally connected, as indicated at 65 to the disc 25 adjacent the periphery thereof and to the inner and upper half thereof. To the lower outer half of the disc 25 and adjacent the periphery thereof there is pivotally connected, as indicated at 66, the upper end of a rod 67 whose lower end is provided with an integrally formed dog 68 which abuts the underside of a collar 69. A rod 70 is connected to the upper end of the hinge pin 41, as heretofore indicated at 53, and extends through the collar 69 and is provided with an integrally formed relatively small horizontally extending portion 71 which abuts against the upper end of the collar 69. Integrally formed with the horizontal portion 71 is an upwardly and inwardly extending arm 72 which is provided at its upper end with an integrally formed head 73 which extends horizontally. The arm 72 extends through a horizontally extending flat latch spring 74 whose inner end is mounted upon a bracket 75 attached to the panel 15. The outer end of the spring 74 is provided with an integrally formed upwardly extending latch dog 76.

Attached to the lower end of the hinge pin 38 is a downwardly and vertically extending rod 77 provided with an integrally formed relatively small horizontally extending portion 78 which abuts the lower side of a collar 79 and which extends then downwardly and inwardly to form an arm 80 having at its lower extremity a dog 81. The rod 77 extends through the collar 79 and also extends through a flat latch spring 82 mounted at its inner end upon a bracket 83 affixed to the panel 15 and provided at its outer end with a latch dog 84.

A horizontally extending pin 85 extends slidably through a plate 86 carried by the bracket 83 and a plate 87 carried by a bracket 88 affixed to the panel 15. A dog 89 is mounted upon the pin 85 between the plates 86 and 87 and is provided with shoulders 90 upon its inner side. A rod 91 interconnects the outer end of the pin 85 and the upper and inner section of the disc 26, as indicated at 92 and the inner end of the pin 85 is connected by a link 93, as indicated at 94, with the upper arm 95 of a bell crank lever which is pivoted upon a pin 96 adjacent the disc 25 and inwardly therefrom in the door. The bell crank lever is provided with an integrally formed lower arm 97 which extends into a slot 98 formed in the inner end of a horizontally extending rod 99 which is slidably mounted in a pair of spaced brackets 100 and 101 likewise affixed to the panel 15. To the lower end of the bracket 101 there is affixed one end of a tension spring 102 whose other end is connected with a rod 103 which is, in turn, pivotally connected with the lower inner section of the disc 25, as indicated at 104.

A substantially vertically extending rod 105 extends upwardly through the collar 79 and is provided with a head 106 at its upper end which head abuts against the upper side of the collar 79 and the rod 105 is pivotally connected to the upper outer section of the disc 26 adjacent its periphery, as indicated at 107.

To the lower inner segment of the disc 26 and adjacent the periphery thereof there is pivotally connected, as indicated at 108, a dependent rod 109 which extends through a collar 110 and which terminates in a head 111 which abuts against the underside of the collar 110. A rod 112 is connected to the upper end of the hinge pin 42 and extends upwardly through the collar 110 and is provided with a head 113 which abuts against the upper side of the collar 110. A pin 114 extends slidably through the bracket 75 and through a bracket 115 spaced outwardly therefrom and has mounted thereon a dog 116 having a shoulder 117 upon its inner face. The pin 114 is connected with the lower inner segment of the disc 25 by a link 116a, and is connected at its inner end, as indicated at 117a with a horizontally extending rod 118 whose other end is connected to the lower arm 119 of a bell crank lever pivoted upon a pin 120 adjacent the disc 26 but inwardly therefrom. The upper arm 121 of the bell crank lever extends into a slot 122 formed in the inner end of a locking member or rod 123 which extends through a pair of spaced brackets 124 and 125 affixed to the panel 15, as indicated at 126 and 127, respectively.

To an upward extension of the bracket 124, indicated at 128, there is connected a tension spring 129 which is, in turn, connected with a

rod 130 whose other end is connected with the upper inner segment of the disc 26, as indicated at 131. Outwardly of the bracket 125 the locking member 123 has mounted therein a stop member 132 which is adapted to limit the inward movement of the locking member 123 and adjacent the inner end of the locking member 123 there is provided a transversely extending pin 133 against which abuts a stop member 134 which is slidably mounted upon the locking member 123. A compression spring 135 surrounds the locking member 123 and bears against the stop member 134 and against the bracket 124.

The locking member 99 is provided with a stop pin 136 similar to the member 132 carried by the locking member 123 and with a stop member 137 and pin 138 similar to members 134 and 123 carried by the locking member 123. A compression spring 139 is mounted upon the locking member 99 and is similar in construction and its mounting to the compression spring 135 associated with the locking member 123.

The disc 25 is provided with a notch 140 in its periphery and upon the inner side thereof while upon the outer side thereof there is provided an outwardly extending dog 141 which is adapted to abut against the upper side of a pin 142 mounted in the door. The disc 26 is provided with a notch 143 in its periphery and upon its inner side while a dog 144 extends outwardly from the periphery of the disc 26 upon its outer side and the dog 144 is adapted to bear against the underside of the pin 145 also mounted in the door.

In operation, it will be apparent that when the handle 21, as viewed in Figure 1 of the drawings, is moved to the left, that is to say in a clockwise direction around the shaft 20 as an axis that such action will cause the arm 33 to likewise move in a clockwise direction or the right as viewed in Figure 1. This action causes the arm 28 to be moved to the right due to the engagement of the pin 34 in the right end of the slot 29. At the same time as this action is occurring the pin 34, being unimpeded by the link 31 will move to the right in the slot 32. The movement to the right of the link 28 will cause a clockwise movement of the disc 25 through an arc of approximately 60° thus moving the rod 64 downwardly and carrying the collar 62 likewise in a downward direction which action causes the rod 60 to likewise be brought in a downward direction due to the fact that the collar 62 is in engagement with the head 61 thereof. This action, in turn, will cause the hinge pin 37 to move downwardly out of engagement with the socket member 56 and against the action of its associated spring 52.

During this operation, it will be apparent that the arm 67 will be moved in an upward direction thus carrying with it by means of the head 68 the collar 69 which since it abuts against the horizontal portion 71, will cause the arm 70 and hence the hinge pin 41 to move in an upward direction out of the socket member 54 and against the action of the spring 52.

During these actions the upper end of the arm 72 will become disengaged from the flat spring 74 thus allowing the spring 74 to move upwardly whereupon its head 76 will engage upon the inner side of the shoulder 117 which has been brought to its outermost extremity by the action of the link 116a moving the latch member 114 to the left, again as viewed in Figure 1 of the drawings. This will cause the rod 118 to move to the left thus pivoting in a clockwise direction the bell crank lever 119—121 to thus move the pin 123 inwardly so that it will engage in the notch 143 in the disc 26 against the action of the compression spring 135. The door may then be opened upon the left side thereof, again as viewed in Figure 1, while the hinge pins 38 and 42 remain engaged in their respective socket members 55 and 57 to thus act as hinges for the door. It will be seen that the action of the pin 123 engaging in the notch 143 will prevent the pins 38 and 42 from becoming accidentally disengaged from their respective socket members. When the door is thus opened the flat springs 47 carried by the housings 35 and 39 will be freed from their abutment with the associated socket members and will thus be allowed to have their heads 49 engage in the annular shoulders 51 to thus latch the pins 37 and 41 in their innermost positions thus ensuring that the same will be cocked when the door is returned to its normal closed position.

When the door is so returned to its closed position, the socket members 54 will again abut against the springs 47 thus releasing the heads 49 from the shoulders 51 and allowing the springs 52 to again project the pins 37 and 41 into their respective sockets 58. This action will cause a downward movement of the arm 70 and hence the horizontal portion 71 thus causing the head 73 of the arm 72 to again engage the flat spring 74 thus releasing its head 76 from the shoulder 117 and thus allowing the springs 129 and 135 to return the pin 123 to its normal disengaged position from the notch 143 in the disc 26.

To open the door from its other side, it is only necessary to move the handle 21 to the right as shown in Figure 1 thus causing the arm 31 to be moved to the left while the arm 28 remains in position, the pin 34 meantime traveling to the left in the slot 29. This action will cause the same action heretofore described to take place with regard to the hinge pins 38 and 42 and also with respect to the locking of the disc 25 and hence locking of the hinge pins 37 and 41 in their outermost positions. It will be apparent that instead of a dual handle as shown in Figure 4 of the drawings, a single handle may be mounted upon the shaft 21 upon that side of the door which is normally approached. It will also be apparent that whenever either pair of hinge pins at one side of the door may be engaged in their outward positions that the pins upon the other side of the door are held in locked inward position and that also the action of the door is wholly controlled by the movement of the handle or handles 21. This is illustrated in Figures 10, 11 and 12 wherein in Figure 10 there is illustrated the normal closed position of the door, while in Figure 11 the door is shown as being hinged upon its right side as viewed in this figure and, in Figure 12, the door is shown schematically as it would appear when the hinges upon the left side of the door are being utilized.

While but one form of the invention has been shown and described herein, it will be readily apparent to those skilled in the art that many minor modifications may be made without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. An apparatus of the character described comprising, in combination with a door and frame therefor, vertically slidable pins mounted in the upper and lower ends of said door adjacent each corner thereof, a pin-receiving socket for each of said pins, said sockets being affixed

to said frame and adapted to register vertically with said pins when said door is in closed condition, a handle for said door, means operable by said handle for selectively retracting the pins adjacent one side of the door into said door whereby the remaining pins may be utilized as hinges, door controlled means for locking said retracted pins in retracted position while said door is in opened condition and for unlocking said pins when the door is closed, said means for normally maintaining said pins in said sockets including a housing for each of said pins, and spring means urging each pin in a direction outwardly from said door, and said locking and unlocking means including an annular groove in each of said pins, a spring latch carried by each of the housings and normally engageable in said groove of its associated pin when said pin is in retracted position and abutting its associated socket when said door is closed to thereby move the same out of engagement with said groove.

2. An apparatus of the character described comprising, in combination with a generally rectangular door having open and closed positions and a frame therefor; a plurality of vertically movable pins disposed in the upper and lower portions of the door adjacent each corner thereof; a plurality of projecting sockets carried by the frame and adapted to receive the pins when the door is in the closed position and to prevent movement of the door past the closed position; opening means for the door comprising manually operable pin retracting means for selectively and simultaneously retracting the upper and lower pins adjacent either side of the door from their respective sockets, the unretracted pins thereby serving as hinges; a first locking means operated by the pin retracting means for locking the unretracted pins in their unretracted positions; and a second locking means actuated by engagement with the sockets and responsive to movement of the door from its closed position for retaining the retracted pins in their retracted positions while the door is in its open position.

3. An apparatus as in claim 2 further comprising spring means normally maintaining all of the pins retractably in their sockets when the door is in the closed position.

4. An apparatus as in claim 2 wherein the pin retracting means comprises two revoluble discs disposed at opposite sides of the door, each disc having a notch in the periphery thereof, and link means connected to each disc for simultaneous retraction of the pins above and below the disc upon rotation thereof; and wherein the first locking means comprises two members movable

into the peripheral notches of the disc, and link means interconnecting the discs and the movable members, rotation of one disc causing one of the movable members to enter the notch in the other disc by the action of the link means, whereby retraction of one of the discs will prevent retraction of the pins on the other side of the door by preventing rotation of the other disc.

5. An apparatus of the character described comprising, in combination with a generally rectangular door having open and closed positions; a plurality of vertically movable pins disposed in the upper and lower portions of the door adjacent each corner thereof; a plurality of sockets carried by the frame and adapted to receive the pins when the door is in the closed position; two revoluble discs disposed at opposite sides of the door, each disc having a notch in the periphery thereof; opening means for the door comprising manually operable means for selectively rotating one of the discs; further link means connecting each disc with the pins above and below the same, whereby rotation of the disc will cause retraction of the pins connected therewith; and locking means comprising a locking member associated with and movable into the notch in each of the discs, each locking member being mechanically connected to the other disc, whereby rotation of one of the discs to effect retraction of the pins at one side of the door causes the locking member at the other side of the door to enter the notch in the other disc thereby preventing rotation of the last-named disc.

6. An apparatus as in claim 5 further comprising spring actuated latch means mechanically connected to retain each of the locking members in locking engagement with its associated disc; and latch releasing means connected to at least one of the pins on each side of the door and actuable to release the latch means retaining the disc on the opposite side of the door in its locked condition upon restoration of a retracted pin on the same side of the door to its unretracted position.

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