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J. H. HARRISON

COMBINED HINGE AND DOORCHECK

Filed May 18, 1926

Fig. 1

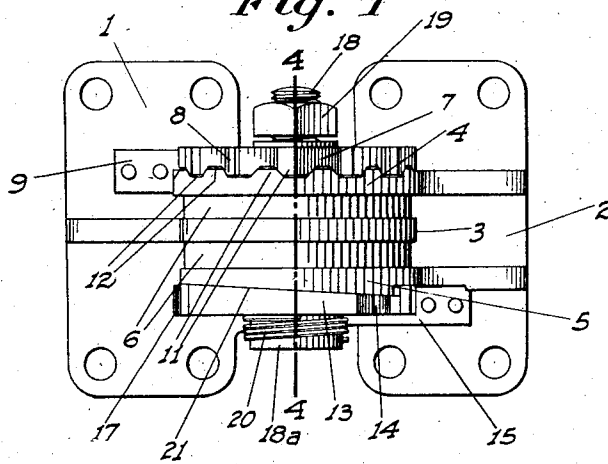


Fig. 2

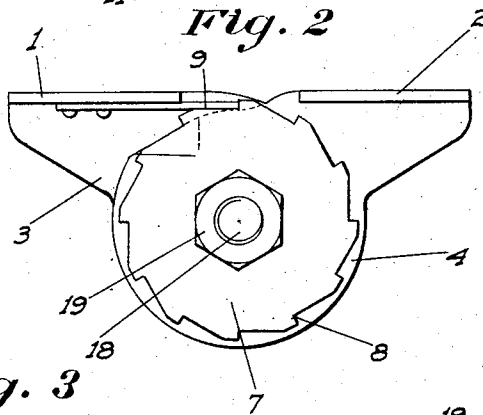


Fig. 3

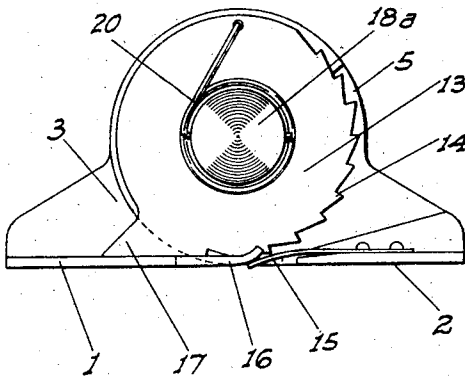
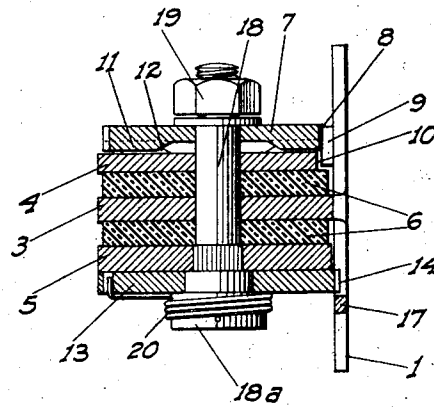


Fig. 4



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COMBINED HINGE AND DOORCHECK.

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This invention relates to door checks and particularly to a check to be used in connection with screen and other doors having spring hinges acting to close the same.

5 The principal object of my invention is to provide a check to prevent slamming of doors of this character constructed in the form of a hinge member to be applied to the door and frame, and so arranged that
10 the slamming of the door will be positively checked while at the same time the desired speed of closing of the door during the major part of the closing movement is not only not interfered with, but may be ac-
15 celerated if desired.

A further object is to construct the device in such a manner that it may be adjusted to function efficiently with different strength
20 of door hinge springs, and with any such spring the device will automatically adjust itself to prevent slamming as efficiently when the door is opened wide (and the spring is under great tension) as when the door is opened only slightly and the spring
25 is under proportionately smaller tension.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is de-
30 signed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

35 In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of my improved door check.

40 Fig. 2 is a top plan view of the same.

Fig. 3 is a bottom plan view of the device.

Fig. 4 is a cross section on the line 4-4 of Fig. 1.

Referring now more particularly to the
45 characters of reference on the drawings, 1 and 2 denote a pair of transversely spaced plates drilled to enable them to be secured onto a door and frame in vertical alinement with the door hinges.

50 The plate 1 has a single ear 3 projecting outwardly therefrom intermediate its ends and toward the other plate, while the plate 2 has similarly projecting upper and lower ears 4 and 5 respectively and between which
55 the ear 3 passes. The different ears are separated by washers 6 of a slightly compressi-

ble nature. Superimposed on the ear 4 is a disc 7 provided with peripheral ratchet teeth 8 to be engaged by a spring pawl 9 projecting tangentially toward the disc from
60 and attached to the plate 1. These teeth are cut in a direction such that they move past the pawl when the plates are turned so that their outer faces approach or are folded onto each other. The diameter of the ear
65 4 is slightly greater than the outer edges of the teeth 8 except for the portion thereof adjacent the plate 2 which is cut inwardly or recessed as at 10, the pawl 9 overhanging the side edge of the ear somewhat. The pur-
70 pose of this arrangement will be seen later.

The adjacent faces of the disc and ear are provided with radial and cooperating ridges and depressions 11 and 12 respectively, there
75 being the same number of these elements as there are teeth 8 and the sides thereof being tapered somewhat. Also these ridges normally have a somewhat free fit vertically in the corresponding depressions.

Disposed under and against the ear 5 is
80 another disc 13 having peripheral ratchet teeth 14 cut therein, these teeth being only on the side of the disc facing the plate 2. These teeth are adapted to be engaged by a
85 spring pawl 15 projecting tangentially from the plate 2. This pawl, when the plates are in alinement with each other or in their unfolded position, is automatically disengaged from the teeth by a rigid trip 16 projecting
90 toward said pawl from the plate 1. These teeth are cut so that when the plates 1 and 2 are turning in the same direction as above the pawl will pass freely over said teeth without operatively engaging the same.

The disc 13 on the side thereof adjacent
95 the plate 1 has a stop 17 projecting therefrom and normally abutting against the plate 1.

These parts are all held in concentric and turnable relation with each other by a central
100 pin or bolt 18 which has an adjustable nut 19 above the disc 7 and an enlarged head 18^a on its opposite end bearing against the disc 13. The pin is turnable in all the parts except the ear 5, with which it has non-turning
105 engagement as indicated in Fig. 4. The pin is therefore stationary relative to the plate 2.

A spiral spring 20 between the pin head and the disc 13 acts to press the stop 17 of
110 said disc against the plate 1. The adjacent surfaces of the ear 5 and disc 13 are oppositely sloped or wedge shaped as shown at

21 in Fig. 1. The slope of these two surfaces is so disposed that when the plates 1 and 2 are in transverse alinement and the stop 17 is bearing against the plate 1, the distance between the opposite faces of the members 5 and 13, or the combined thickness of said members, is the minimum possible.

To install the device the plates are merely secured to the door and its frame at any suitable location and on the same side thereof as the door hinges are located. The parts of the device are so proportioned that the hinge pin 18 will be in alinement with the hinge pins of the door hinges. The nut 19 is then properly adjusted, to leave some clearance between it and the adjacent disc 7 as shown, and with due regard to the strength of the hinge springs. When the doors are closed the plates 1 and 2 are transversely alined; and when the doors are open the plates turn about the pin 18 and fold onto each other. During the latter operation, assuming that the plate 1 is on the door frame and is stationary and that the plate 2 is on the door and relatively movable, the upper disc 7 and ear 4 turn together, the pawl 9 passing by the disc so that there is no tendency to rotate or hold the latter independently of the plate 2. Said disc and ear will of course turn together as long as there is nothing to restrain them since the ridges and depressions thereof are engaged with each other. After a small amount of rotative movement of the plate 2 the enlarged portion of the ear 4 engages the pawl 9 and holds the same clear of the teeth 8. At the same time the lower pawl 15 is passing by the teeth 14 of the disc 13, so that there is no tendency for said disc to rotate, and in fact it is definitely held from rotation by the spring 20 and the stop 17. Since the pin 18 to which one end of the spring is mounted must turn with the ear 5, the spring becomes wound up, but the disc will not turn as the stop 17 is still engaged with the plate 1 as stated. The ear turns however so that with this opening movement of the door and folding movement of the plates, the wedge surfaces of the ear and adjacent disc climb each other, increasing the distance between the opposite faces of said members. This causes the pin 18 to be drawn downwardly and the play between the nut 19 and the disc 7 to be taken up, so that said disc and the ear 4 will be held snugly against each other.

When the opening movement of the door is completed and the door is released so that the spring hinges thereof act to close said door, the parts of the check device function as follows:

The pawl 15 immediately engages a tooth 14, causing the disc 13 and ear 5 to turn together, thus preventing the release of the wedge surfaces and maintaining the tension of the spring, the stop 17 moving away from

the plate 1. The pawl 9 however is not engaged with a tooth 8 at this time, since said pawl is held clear of the plane of the teeth by reason of its being engaged by the enlarged surface of the ear 4. All parts of the check device therefore turn together without any restraint, permitting the hinge springs to close the door quickly as is desirable. When the door is approaching a closed position however the depressed portion 10 of the ear 4 passes under the pawl 9, allowing the latter to approach and engage an adjacent tooth 8. This immediately checks the closing of the door, since the disc 7 is held from free rotation with the ear 4 and the latter can only further rotate by causing the ridges on the ear to move from their seats in the depressions of the disc 7 past the adjacent ridges of said disc to seats in the adjacent disc depressions. This necessitates the compression of the washers 6 or the flexing of the disc 7, and considerable but not impossible resistance is thus offered to the final turning movement of the plate 2 and the closing of the door. The depression 10 of the ear 4 is so located between the point of engagement of the pawl with a tooth and the final closed position of the door or the alined position of the plates, so that said disc is only turned relative to the ear 4 an arcuate distance equal to the pitch of one tooth or the spacing between adjacent ridges of the disc or ear.

Just before the plate 2 and ear complete their turning movement the trip 16 engages the pawl 15 and moves the same clear of the tooth 14 previously engaged by said pawl. This permits the spring 20 to function and causes the disc 13 to be rotated to its original normal position. This retracts the wedge faces of the disc and ear 5, slackens the superimposed parts of the device, and restores the clearance between the nut 19 and disc 7. All parts are then in their original positions ready for further checking operations. This final operation is, as above indicated, timed to occur after the checking means has functioned.

When the door is opened wide the springs of the hinges are placed under considerable tension, so that a quick closing action is imparted to the door and considerable resistance must be provided in the check device to check the closing action and prevent slamming.

If the door is opened only slightly the springs are placed under much lesser tension, and a less resistance must therefore be provided in the check device to permit the same to function without preventing the weaker spring action from moving the door to a fully closed position.

These results are attained without adjusting the nut 19 by reason of the wedge surfaces 21. It will be seen that if the doors are opened wide a great movement of the

wedge surfaces relative to each other takes place, and consequently all clearance between the superimposed parts is taken up. This requires great pressure to cause the disc and ear ridges to move out of one position and into another, thus causing greater friction between the discs and plate to be had. When the door is opened only part way there is a proportionately lesser movement between the wedge surfaces and a smaller amount of clearance is therefore taken up. This enables the disc and ear ridges to shift with a lesser pressure as will be evident. By adjusting the nut the proper operation of the device for different strengths of hinge springs may be provided for, since with heavy or strong springs a greater pressure on the check device is had with a door closing movement from any position than with a relatively light or weak spring from the same relative door positions.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. A combined hinge and door check including members for attachment to a door and its casing, hinge connections between the members, checking means mounted in direct connection with the hinge connections, means associated with said checking means for permitting of unchecked door opening movement, means also associated with said checking means for permitting of unchecked door closing movement to adjacent the fully closed position of the door, and means for then causing the checking means to function with the further closing movement of the door.

2. A structure as in claim 1, and means incorporated with said checking means for causing the said means to be restored to its normal unchecking relationship with the hinge connections by the time the door reaches its fully closed position.

3. A structure as in claim 1, and means incorporated with said checking means for causing the extent of the checking action to be automatically proportioned to the amount of initial door opening movement.

4. A combined hinge and door check including a pair of transversely alined plates for attachment to a door and its frame, cooperating ears projecting from the plates toward each other in overhanging relation, a disc superimposed on one ear, alternating ridges and depressions on the adjacent faces

of said ear and disc, normally maintained in engaging but yieldable relationship, a hinge pin through the ears and disc, means for holding the disc from rotation with the ear and means causing said first named means to function only when the plates are approaching a normal alined position after being turned to a folding position relative to each other about the pin as an axis.

5. A structure as in claim 4, and automatically functioning means acting to regulate the yieldability of engagement of the disc and ear ridges in inverse proportion to the initial extent of folding movement of the plates.

6. A door check including a pair of spaced plates for attachment to a door and its frame, cooperating ears projecting from the plates toward each other in overhanging relation, a disc superimposed on one ear, alternating ridges and depressions on the adjacent faces of said ear and disc, normally maintained in engaging but yieldable relationship, a hinge pin through the ears and disc, ratchet teeth on the disc, a pawl to engage the teeth mounted on the opposite plate to the one the ridged ear is connected, and means preventing engagement of the pawl with the teeth except when the plates are nearly in alined relationship.

7. A door check including a pair of spaced plates for attachment to a door and its frame, cooperating ears projecting from the plates toward each other in overhanging relation, a disc superimposed on one ear, alternating ridges and depressions on the adjacent faces of said ear and disc, normally maintained in engaging but yieldable relationship, a hinge pin through the ears and disc, ratchet teeth on the disc, a pawl to engage the teeth mounted on the opposite plate to the one the ridged ear is connected, the ridged ear projecting outwardly of the disc-teeth except adjacent the plane of the pawl when the plates are in alinement; said pawl overhanging the edge of the disc whereby to be engaged by the enlarged portion of the ear and lifted clear of the teeth when the plates are turned from said alined relationship.

8. A door check including a pair of spaced plates for attachment to a door and its frame, cooperating ears projecting from the plates toward each other in overhanging relation, a disc superimposed on one ear, alternating ridges and depressions on the adjacent faces of said ear and disc, normally maintained in engaging but yieldable relationship, a hinge pin through the ears and disc, means for holding the disc from rotation with the ear functioning only when the plates are approaching a normal alined position after being turned to a folding position relative to each other about the pin as an axis, a nut on the pin above the disc

in normal clearance relation therewith, means for taking up said clearance as the plates are folded, whereby the nut and disc will be in close relationship, and means maintaining the members in such close relationship until the plates have returned to their normal alined position.

9. A door check including a pair of spaced plates for attachment to a door and its frame, cooperating ears projecting from the plates toward each other in overhanging relation, a disc superimposed on one ear, alternating ridges and depressions on the adjacent faces of said ear and disc, normally maintained in engaging but yieldable relationship, a hinge pin through the ears and disc, means for holding the disc from rotation with the ear functioning only when the plates are approaching a normal alined position after being turned to a folding position relative to each other about the pin as an axis, a nut on the pin above the disc in normal clearance relation therewith, means for taking up said clearance as the plates are folded, and in proportion to the amount of folding action, and means for maintaining the nut and disc in the relative positions attained with such folding action until the plates have returned to said normal alined position.

10. A door check including a pair of spaced plates for attachment to a door and its frame, cooperating ears projecting from the plates toward each other in overhanging relation, a disc superimposed on one ear, alternating ridges and depressions on the adjacent faces of said ear and disc, normally maintained in engaging but yieldable relationship, a hinge pin through the ears and disc, means for holding the disc from rotation with the ear functioning only when the plates are approaching a normal alined position after being turned to a folding position relative to each other about the pin as an axis, a nut on the pin above the disc in normal clearance relation therewith, another disc mounted on the pin and engaging an ear of the same plate as that from which the ridged ear projects, a head on the pin bearing against said other disc, the adjacent faces of the latter disc and the adjacent ear being cut on a slope and abutting against each other, whereby when the said last named ear and disc are turned relative to each other the thickness of the same together will be increased and the pin moved longitudinally, means whereby the said last named disc will be held from turning with the ear during a folding movement of the plates, means then causing said last named ear and plate to turn together as the plates are unfolded, means releasing said last named disc from turning engagement with the ear only when the plates arrive at their normal alined position, and spring means

acting to then restore said last named disc to its normal position.

11. A door check including a pair of spaced plates for attachment to a door and its frame, cooperating ears projecting from the plates toward each other in overhanging relation, a disc superimposed on one ear, alternating ridges and depressions on the adjacent faces of said ear and disc, normally maintained in engaging but yieldable relationship, a hinge pin through the ears and disc, means for holding the disc from rotation with the ear functioning only when the plates are approaching a normal alined position after being turned to a folding position relative to each other about the pin as an axis, a nut on the pin above the disc in normal clearance relation therewith, another disc mounted on the pin and engaging an ear of the same plate as that from which the ridged ear projects, a head on the pin bearing against said other disc, the adjacent faces of the latter disc and the adjacent ear being cut on a slope and abutting against each other, whereby when the said last named ear and disc are turned relative to each other the thickness of the same together will be increased and the pin moved longitudinally, means whereby the said last named disc will be held from turning with the ear during a folding movement of the plates, a pawl on the plate to which said last named ear is attached, ratchet teeth on the last named disc engaged by said pawl only with the unfolding movement of the plates, a trip projecting from the other plate positioned to engage and release the pawl from the teeth when the plates arrive at their normal alined position, and a spring then acting to restore said last named disc to its normal position.

12. A combined hinge and door check including members for attachment to a door and its casing, hinge connections between the members, checking means mounted in direct connection with the hinge connections for imparting a checking action to the door as it approaches a closed position, and means incorporated with said checking means for causing the latter to be restored to its normal unrestraining relationship with the hinge connections by the time it reaches its fully closed position.

13. A combined hinge and door check including members for attachment to a door and its casing, hinge connections between the members, checking means mounted in direct connection with the hinge connections for imparting a checking action to the door as it approaches a closed position, and means incorporated with said checking means for causing the extent of the checking action to be automatically proportioned to the amount of initial door opening movement.

14. A door check comprising a pair of

plates for attachment to a door and its casing, vertically spaced ears projecting from one plate, an ear projecting from the other plate to extend between the other ears, a 5 hinge pin through said ears and turnable with the first named ears, a disc on the pin superimposed on one of the first named ears, cooperating and alternating ridges and depressions on the adjacent faces of the disc 10 and ear normally maintained in engaging but yieldable relationship, and means for holding the disc from rotation with the ear for a predetermined extent of movement of the plates and ears relative to each other and 15 about the pin as an axis.

15. A door check comprising a pair of plates for attachment to a door and its casing, vertically spaced ears projecting from one plate, an ear projecting from the other plate to extend between the other ears, a hinge pin through said ears, and turnable with the first named ears, a disc on the pin superimposed on one of the first named ears, cooperating and alternating ridges and depressions on the adjacent faces of the disc and ear normally maintained in engaging but yieldable relationship, means for holding the disc from rotation with the ear for a predetermined extent of movement of the plates and ears relative to each other and about the pin as an axis, and a disc turnable on the pin and disposed under one of said first named ears; the adjacent faces of said last named disc and ear engaging each other and being disposed in a plane not at right angles to the axis of the pin. 20 25 30 35

In testimony whereof I affix my signature.

JOHN H. HARRISON.