

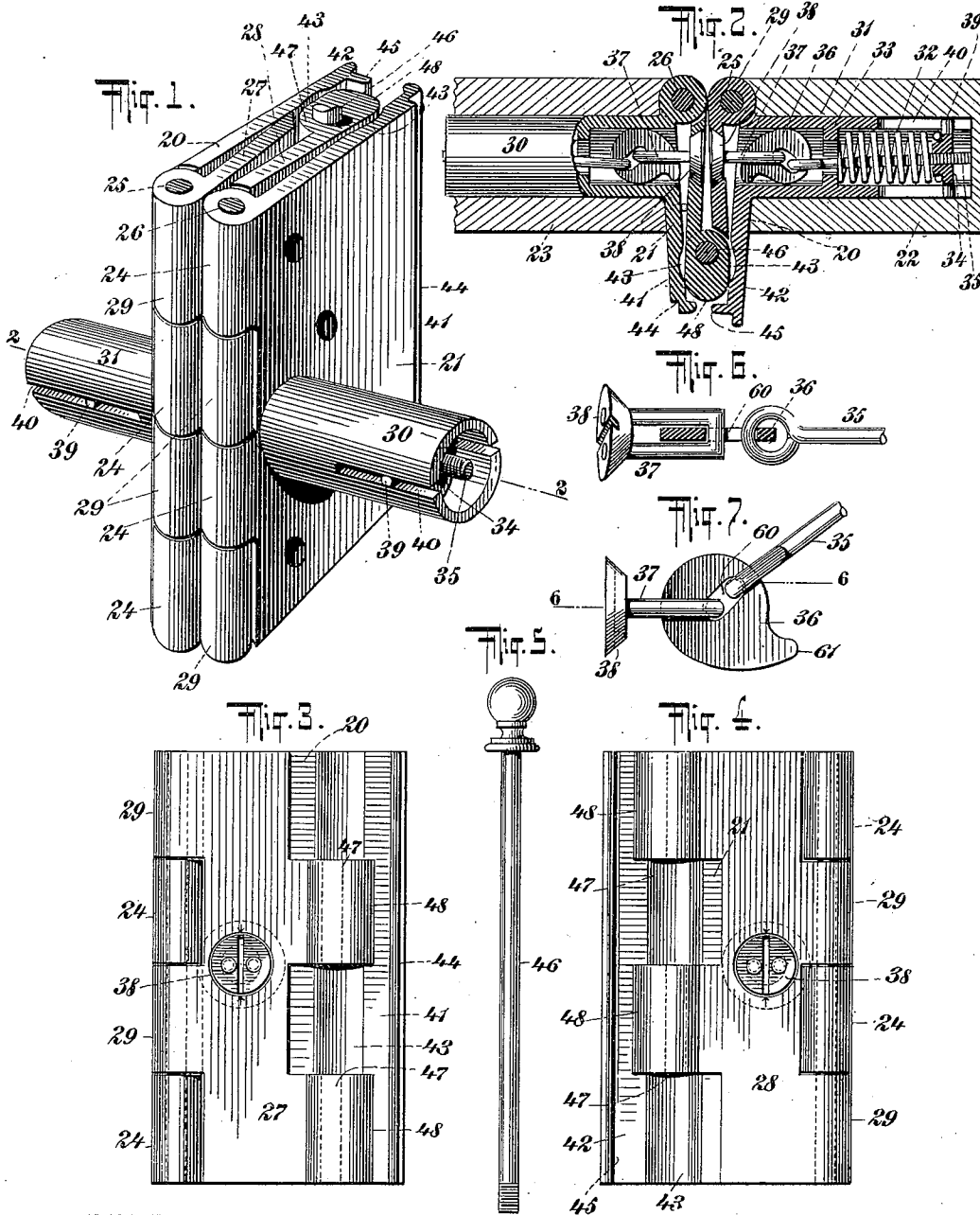
No. 663,504.

Patented Dec. 11, 1900.

G. G. LAUREYNS.
DOOR CHECK AND CLOSER.
(Application filed Sept. 23, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

Gustav H. H. H.
John F. H. H.

INVENTOR

Gustav G. Laureyns

BY

Chas. C. Hill
ATTORNEY

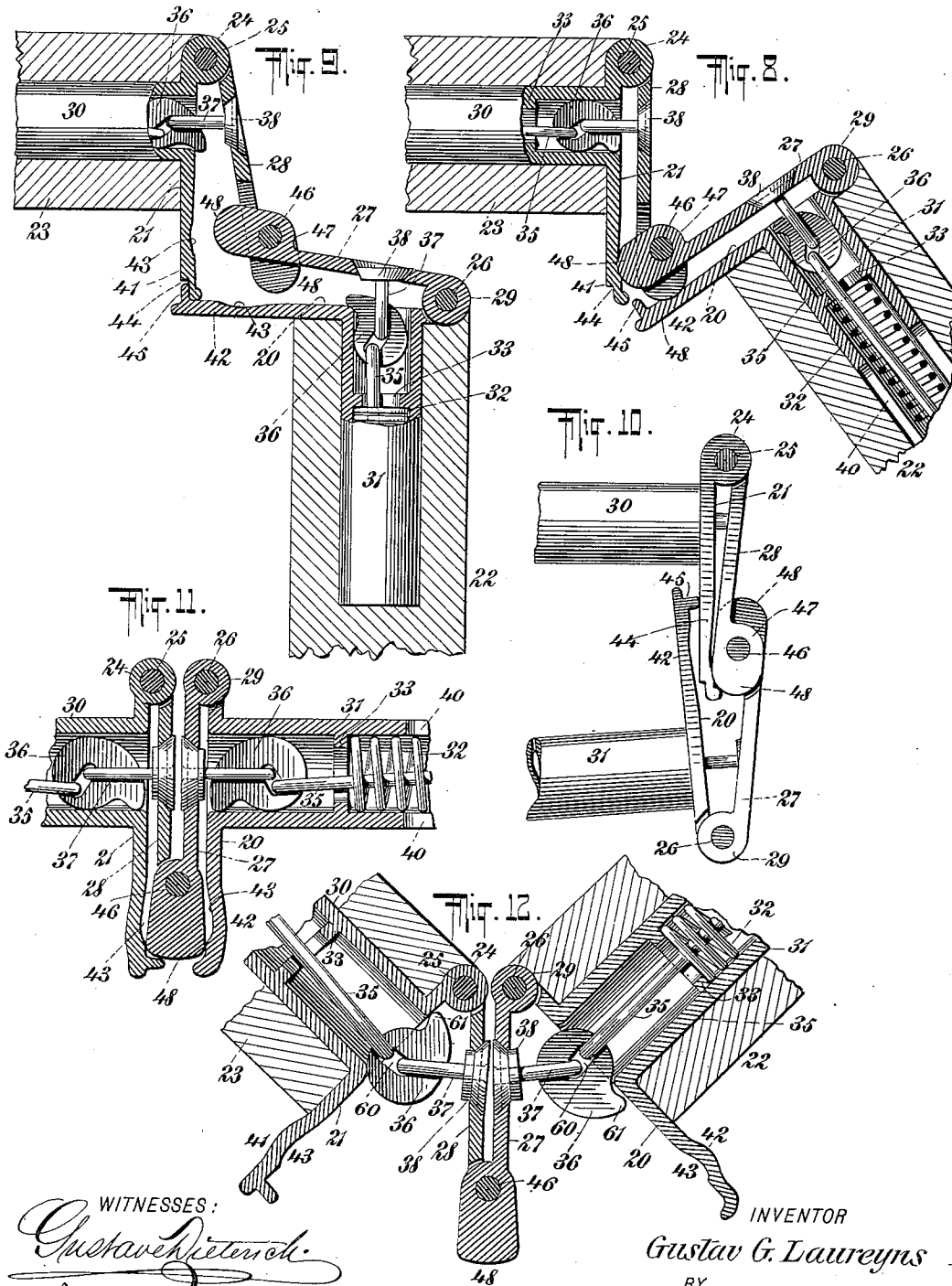
No. 663,504.

Patented Dec. 11, 1900.

G. G. LAUREYNS.
DOOR CHECK AND CLOSER.
(Application filed Sept. 23, 1899.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:
Gustav Hietrich
Anton Schumacher

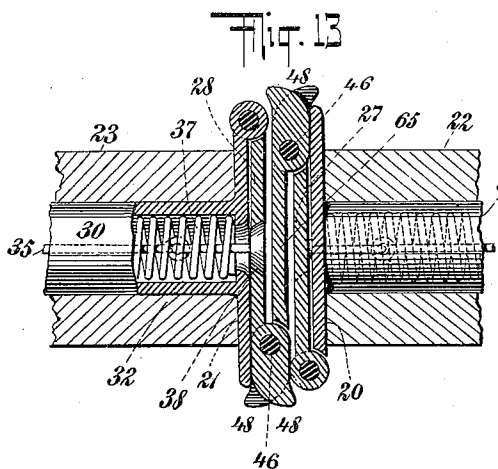
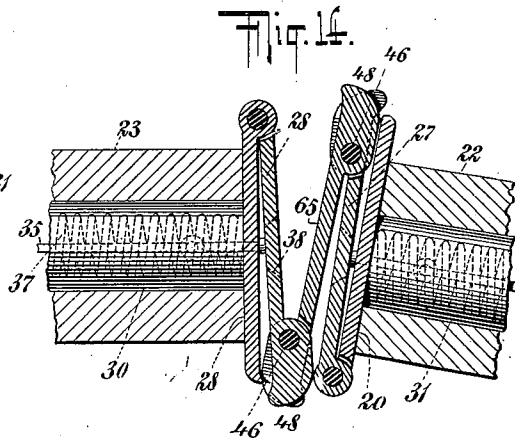
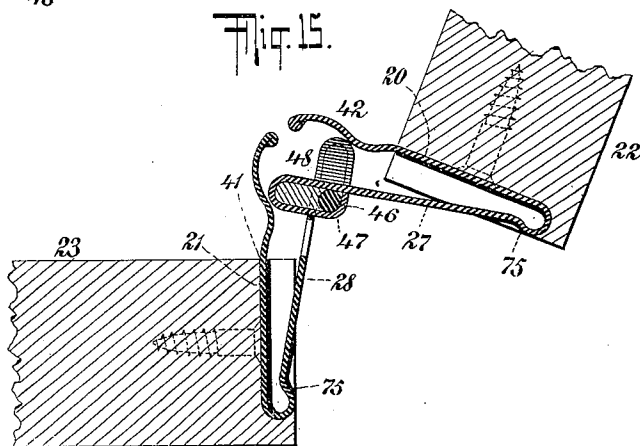
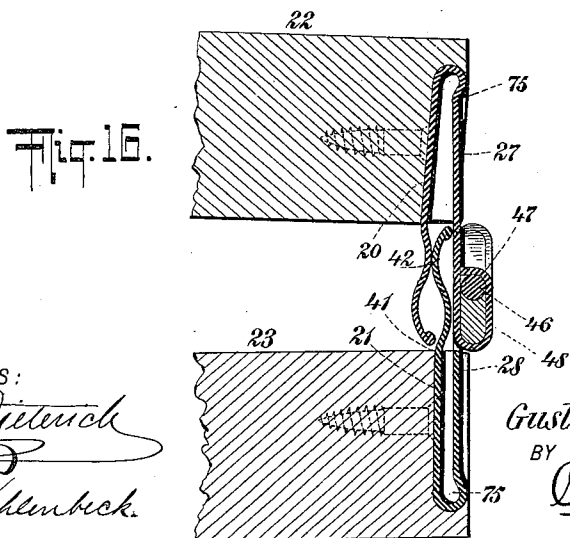
INVENTOR
Gustav G. Laureyns
BY
Chas. C. Gill
ATTORNEY

G. G. LAUREYNS.
DOOR CHECK AND CLOSER.

(Application filed Sept. 23, 1899.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES:
Gustav Ditsch
John Kehlbeck

INVENTOR
Gustav G. Laureyns
BY *Chas. C. Gill*
ATTORNEY

UNITED STATES PATENT OFFICE.

GUSTAV G. LAUREYNS, OF NEW YORK, N. Y., ASSIGNOR OF TWO-THIRDS TO
CHARLES F. SIMES AND HENRY C. TUM SUDEN, OF SAME PLACE.

DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 663,504, dated December 11, 1900.

Application filed September 23, 1899. Serial No. 731,375. (No model.)

To all whom it may concern,

Be it known that I, GUSTAV G. LAUREYNS, a citizen of the United States, and a resident of New York, (Brooklyn,) in the county of Kings and State of New York, have invented certain new and useful Improvements in Door Checks and Closers, of which the following is a specification.

The invention relates to improvements in door checks and closers; and it consists in the novel features and combinations of parts hereinafter described, and particularly pointed out in the claims.

In its preferred embodiment my invention consists in a hinge comprising, in addition to the leaves and pintle or pintles, a spring for closing the door and mechanical means for effecting a check to the action of the spring during the closing of the door, the said means serving to prevent a too sudden or violent closing of the door, but permitting the door to close firmly until latched.

One of the main features of the hinge resides in the checking devices, and these consist in a cam or arm projection carried by a spring or yielding plate and a substantially rigid resistance or contact plate for said cam or arm projection, (or a series of two or more sets of said elements,) the said cam or arm projection being connected with or formed on the yielding plate and adapted to turn against said resistance or contact plate during the opening and closing of the door.

The hinge comprising my invention also possesses other novel features of construction and combinations of parts, all of which will be hereinafter fully described and claimed.

While the checking features of the hinge constitute an important part of the invention, I do not desire that this application shall be wholly limited to a hinge possessing such features, since the hinge shown, described, and claimed herein embraces novel features, as a spring-hinge *per se* without regard to the means provided for checking or controlling the action of the spring or springs. The value and desirability of the spring-hinge is, however, enhanced by the addition to the hinge of the means I provide for checking and controlling the action of the spring or springs, and therefore in the preferred embodiment of

my invention the hinge will possess the cam or arm projection upon the spring-actuated plate for coöperation with a substantially rigid resistance or contact plate.

Another important feature of my invention is that the hinge, whether used with or without the checking features, has its leaves so disposed that at certain positions of the door said leaves at their outer portions may be caused to interlock with or engage one another, and thus be caused to form a means in connection with the springs for holding the door open.

The nature of the invention and satisfactory means for carrying the same into effect will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a hinge constructed in accordance with and embodying the invention. Fig. 2 is a horizontal section of same, partly broken away, on the dotted line 2 2 of Fig. 1. Fig. 3 is a detached inner face view of one portion of the hinge. Fig. 4 is a like view of the other portion of the hinge. Fig. 5 is an elevation of the pintle by which the two portions of the hinge shown in Figs. 3 and 4 may be connected together to constitute the complete hinge. Fig. 6 is an enlarged perspective view, partly in section, of a detailed portion of the hinge, said section being on the dotted line 6 6 of Fig. 7. Fig. 7 is a side elevation of same. Fig. 8 is a view of the hinge substantially corresponding with Fig. 2, but illustrating the position the parts of the hinge will assume upon the partial opening of the door. Fig. 9 is a like view of same, showing the position of the parts of the hinge when the door has been opened to about a right-angular relation to the side wall and is being held open by the hinge. Fig. 10 is a top edge view of the hinge and illustrates the position the parts thereof will assume when the door has been fully opened and turned substantially parallel with the wall to which it may be hinged. Fig. 11 is a view substantially conforming with that presented in Fig. 2, but illustrating a slightly-modified form of cam or arm projection to engage the coacting sur-

faces of the leaf of the hinge. Fig. 12 is a view of the hinge substantially corresponding with Fig. 11, but illustrating the position the parts will assume when the door is opened in a direction reverse to that in which it is illustrated in Figs. 8 and 9. Fig. 13 is a like view of a five-leaf hinge shown in closed condition; this hinge being intended for a double-acting door. Fig. 14 is a like view of same, but illustrating the hinge in a partly-open position. Fig. 15 is a like view of a modified form of the hinge, this hinge being intended as a cheap hinge for light doors and shown in a partly-open position; and Fig. 16 is a like view of same shown held in its wide-open position by the springs, which normally act as closing-springs.

In the drawings, 20 21 designate the leaves of the hinge, and these leaves will, as usual, be provided with suitable screw-holes (shown in Fig. 1) to facilitate the application of the hinge to the door 22 and door-frame 23, as shown. The leaves 20 21 are formed at one edge with the corresponding knuckles 24 24 to receive the pins 25 26, by which the plates 27 and 28 are secured to the leaves 20 21, respectively, said plates 27 and 28 being provided with knuckles or bearing-sleeves 29 in vertical alinement with the aforesaid knuckles 24 to receive said pins 25 26. The leaves 20 21 are preferably formed with the sleeves 30 31, extending at right angles to said leaves and adapted to be embedded within sockets formed in the door 22 and frame 23, respectively, as indicated in Fig. 2, and to receive the springs 32, which operate to close the door and impart to the hinge the attribute of a spring-hinge. The sleeves 30 and 31 as to their form, construction, and inclosed parts correspond with one another, and within each of said sleeves is provided a shoulder 33, which forms a stop for the front end of the springs 32. The spring 32 is confined between the shoulder 33 and nut 34, and the latter is mounted upon a threaded stem 35, which at its front end is connected with a cam 36 and through the medium of said cam with a loop 37, carried by a stud or screw-head 38, the latter being seated against the inclined walls of an aperture formed in the plates 27 28 and being capable of being turned axially, so as to adjust the pressure of the spring 32. The cams 36 perform special functions and will be employed or not as occasion may require. When the cams 36 are not employed, the stem 35 for the spring 32 and nut 34 will be connected directly to the loop 37. The purpose of the cams 36 will be hereinafter described, and at this place it is only desired to explain that by turning the head 38 axially the stem 35 is thereby rotated axially and the nut 34 caused to travel thereon. When the head 38 and stem 35 are turning in one direction, the nut 34 will be caused to ride on said stem and toward the hinge-leaves, thereby compressing the spring 32 and increasing its force. When the head 38 and

stem 35 are turned axially in a reverse direction, the nut 34 will ride on the stem 35 in a direction from said spring 32, and thus the force of the said spring will be lessened. It will be evident, therefore, that the strength of the spring 32 may be adjusted at will simply by the rotation of the stud or screw-head 38, connected with the stem 35. The nut 34 is prevented from rotating with the stem 35 by reason of the fact that said nut is formed with a pin 39, which is free to travel longitudinally within the slot 40, cut in the sleeves 30 31. The engagement of the pin 39 with the slot 40 prevents the rotation of the nut 34 without interfering with the longitudinal travel of the said nut upon the stem 35.

The leaves 20 21 of the hinge preferably extend outward beyond the vertical edges of the door 22 and door-frame 23, as indicated in Fig. 2, and these outwardly-extending portions of the leaves 20 21 form plates 41 42, which are utilized in the accomplishment of several results clearly explained hereinafter and which are of special outline, as indicated, the outline varying somewhat with the special character of the result sought. The extensions or plates 41 42 on their facing sides are preferably formed with the recesses 43, and at their outer edges the plate or extension 41 is formed with the recess 44 on its outer face, while the extension or plate 42 is formed with a rib 45 on its inner face to at the proper time enter said recess, as shown in Fig. 9, or to leave and pass beyond the same, as shown in Fig. 10.

The plates 27 28 substantially correspond with one another and at their outer meeting edges are connected by the pintle 46, which passes through the knuckles or bearings 47, formed on the said plates. Extending outward beyond the pintle 46 the plates 27 28 are formed with the cam or arm projections 48, which preferably are formed integrally with the knuckles or bearings 47, said cams or projections 48 then constituting simply extensions of the plates 27 28 outward beyond the pintle 46. The plate 27 is formed with the two bearings 47 and cams or projections 48, and the plate 28 is likewise formed with two bearings 47 and cams or projections 48, the bearings 47 of the plate 28 being adapted to pass upon the bearings 47 of the plate 27 in the manner usual with the knuckles of hinges, and thus the cams or projections 48 of the plates 27 and 28 are in vertical alinement with one another, and when the hinge is in a normal position, such as that shown in Figs. 1 and 2, the said cams or projections are wholly directly below one another. The cams or projections 48 during the major part of the opening and closing movement of the door cooperate with the extensions or plates 41 42 of the leaves 20 21, said cams or projections 48 during the opening of the door turning from below one another in the manner shown in Fig. 8 and against the adjacent faces of the said plates 41 42 and during the closing

of the door reversing their motion and closing below one another, while at the same time moving against the said adjacent faces of the extensions or plates 41 42. The plates 27 and 28 are subject to the action of the springs 32, and said plates are respectively at their inner edges hinged to the leaves 20 and 21 by means of the pins 25 and 26, while at their outer edges the plates 27 and 28 are hinged upon the pintle 46 and confined intermediate the leaves 20 and 21 and their plates or extensions 41 42. In the absence of the pintle 46 the plates 27 and 28 will be respectively held against the leaves 20 and 21 by means of the springs 32, and hence it will be observed that in hanging a door the plates 27 and 28 will not swing out, but be firmly held by the springs 32, and that therefore no inconvenience will be experienced, the hanging of the door being accomplished by simply passing the pintle 46 downward through the bearings 47 of said plates 27 28. When it is desired to remove the door from its frame or casing, it will simply be necessary in order to free the door to withdraw the pintle 46. The hinge is thus composed, in effect, of two halves, which are wholly independent of one another except when connected by the pintle 46, which may be applied or removed at will without disturbing the springs 32 or otherwise disarranging the respective parts of the hinge. One half of the hinge is shown in a normal condition in Fig. 3 and the other half in Fig. 4, the two halves thus shown being adapted to be brought into engagement with one another by means of the pintle 46. (Shown in Fig. 5.) During the opening of the door in the direction illustrated in Fig. 8 the cams or projections 48 on the plates 27 28 move against the extensions or plates 41 42 and cause said plates 27 28 to turn on the pins 25 and 26, moving outward, as shown in Fig. 8, from the leaves 20 and 21, and thereby pulling on the stems 35 and compressing the springs 32. During the closing of the door the cams or projections 48 close below one another and pass into a substantially parallel relation with the extensions or plates 41 42, allowing the plates 27 and 28 to reverse their motion on the pins 25 and 26 and approach the leaves 20 and 21 under the action of the springs 32, the springs thus serving to close the door.

In the absence of any special formation as to the surfaces of the extensions or plates 41 and 42 the hinge presented constitutes an effective spring-hinge, in that the cams or projections 48, cooperating with the extensions or plates 41 42, serve as a means for enabling the springs 32 to be put under pressure during the opening of the door and to exert their force in moving the door to its closed position. The cams or projections 48 act as levers for turning the plates 27 and 28 outward from the leaves 20 21 to compress the springs 32, and they also serve to aid in controlling the action of the springs.

It is my purpose not only to provide a novel spring-hinge for the door, but in addition to afford means for controlling the action of the springs 32, and particularly for checking the door in its closing action, so that the door while being positively closed and latched may not bang, and hence I provide the cams 36, hereinbefore described, and also suitably conform the surfaces of the extensions or plates 41 and 42 in order that, as hereinafter more fully described, certain functions may be attained whereby the efficiency of the spring-hinge may be increased without any sacrifice as to the utility of the article as a spring-hinge *per se*. I wish here to have it understood, however, that the checking-cams 36 will only be employed under certain conditions and that they will be omitted under usual conditions in cases in which the hinges are applied to single-acting doors, as hereinafter explained.

The extensions or plates 41 42, cooperating with the cam or arm projections 48 without regard to the recesses 43, result in the production of a hinge in which the springs 32 are checked or controlled in their closing action upon the door to prevent any violent action of the springs.

When the door is in its closed position, the cam or arm projections 48 are substantially parallel with the extensions or plates 41 42, as illustrated in Figs. 1 and 2; but as the door opens, as shown in Fig. 8, the said cam or arm projections 48 turn toward a right-angular position with respect to said extensions or plates 41 42. It is during the closing action of the door that the cam or arm projections 48, cooperating with the extensions or plates 41 42, serve to control and check the action of the springs 32. During the closing of the door the springs 32 exert their force directly against the plates 27 28 and cause the outer surfaces of the cam or arm projections 48 to press firmly against the adjacent surfaces of the plates or extensions 41 42 while closing the door. During the closing movement of the door the cam or arm projections 48 turn from their right-angular position with respect to the extensions or plates 41 42 and gradually reach a position in which they are substantially parallel with said plates or extensions. During the closing of the door the springs 32 gradually become weakened owing to the release of pressure thereon; but notwithstanding this fact the door at its closing-point will be acted upon with sufficient firmness to insure the latching of the door, the position or leverage of the cam or arm projections 48 at the closing-point of the door being such as to compensate for the reduced force at that time of the springs 32. As the door gradually closes the outer edges of the cam or arm projections 48 gradually move outward toward the outer portions of the extensions or plates 41 42, and thus as the door is reaching its closed position the longer leverages of the cam or arm projections 48 are acting against or being

acted upon by the plates or extensions 41 42, and thereby, although the springs 32 have become weakened, the door will close with sufficient force to insure of its becoming latched.

5 During the opening of the door the outer portions of the cam or arm projections 48 gradually turn toward a right-angular position with respect to the extensions or plates 41 42, and the more nearly they approach that position the leverage force exerted by them will decrease, and the pressure of the springs 32 in point of closing efficiency will become lessened owing to the direction of pressure, and consequently the active force of the springs

10 32 in their closing action upon the door is as the cam or arm projections 48 more nearly reach a right-angular position with respect to the plates 41 42 checked or prevented from exerting its otherwise full pressure.

20 The extensions or plates 41 42 constitute resistance-plates, against which the cam or arm projections 48 may act during the opening and closing of the door, said plates 41 42 being substantially rigid and said cam or arm projections 48 being carried by plates 27 28, which are yieldingly but firmly held by the springs 32. By means of the cam or arm projections 48 on the yielding plates 27 and 28, combined with the extensions or plates 41 42

25 of the leaves 20 and 21, the important result is obtained that the door is not only closed, but that it is checked and controlled in its closing action by the relation of the said cam or arm projections 48 with respect to the extensions or plates 41 42, aided by the friction created by the movement of said cam or arm projections against said extensions or plates.

As the door opens and closes the angle or direction of pressure with respect to the cam or arm projections 48 and their coacting resistance-plates 41 42 varies with the change of position of the parts, and hence all of the resultant forces and pressures affecting the various structural parts vary in intensity,

30 changing from a maximum pressure at the time the door is closed to the minimum when the door is opened; but the relation of the several parts is such that the resultant motion is maintained nearly constant. Thus

35 without respect to the details of form which may be imparted to the surfaces of the extensions or plates 41 42 with the view of securing special results the hinge above described possesses the qualities of a spring-hinge and a checking-hinge, the springs being controlled or checked in their closing action upon the door.

The special form and construction of the coacting surfaces of the cam or arm projections 48 and plates or extensions 41 and 42 effect certain results and increase the efficiency and desirability of the hinge as a whole, and in this regard I will first refer to the recesses 43, formed at the facing sides of the plates or extensions 41 42. As to the recesses 43 it may be said that as the door is opened the

outer edges of the cam or arm projections 48 will pass into said recesses and while entering said recesses relieve a part of the force of the springs 32 from the door and permit of the

70 ready opening of the latter without the use of undue exertion. During the opening of the door the recesses 43 act as a release for the cam or arm projections 48, since in the absence of said recesses said cam or arm projections would be closely confined between plain surfaces and greater force would be required to open the door against the stress of the springs 32 than when at a predetermined point the confinement of said cam or arm projections is in part relieved by their entry into the recesses 43. When the door is reaching its open position and the cam or arm projections 48 are leaving the recesses 43, the impetus the door will then have attained will be

80 such as to counterbalance any extra pressure the surfaces of the plates 41 42 may then afford in resisting the cam or arm projections 48. It is during the automatic closing action of the door, however, that the more important functions of the recesses 43 are performed. During the automatic closing of the door the cam or arm projections 48 will enter the recesses 43, and thus decrease somewhat the resistance to the action of the springs 32 and permit the door to readily and quickly close to a definite point, and then the cam or arm projections 48 will be more greatly confined by meeting the outer edges of said recesses 43 and in being compelled to leave said recesses, this greater confinement of the cam or arm projections 48 upon the door reaching its closed position operating to increase the resistance between said cam or arm projections and said extensions or plates 41 42, with the result of checking the force of the springs 32, and thus preventing the door from closing with undue violence. It will be observed upon reference to Fig. 2 that the extensions or plates 41 42 gradually converge toward one another, and thus at the outer ends of the recesses 43, there is less freedom between the plates for the cam or arm projections 48 than there is at the inner edges of the said recesses 43. Thus while the door may open readily it is prevented from closing with undue suddenness. The checking of the springs 32 when the door is reaching its closed position may be increased by giving to the outer edges of the recesses 43 a rather abrupt curvature, as indicated in Fig. 11, rather than a gradual curvature, since by the abrupt curvature of the recesses 43 the cam or arm projections 48 are more thoroughly retarded in their movement from said recesses. Without regard, however, to the recesses 43 the converging arrangement of the extensions or plates 41 42 is of advantage in that by reason thereof the door is permitted to open under a reasonable amount of force applied thereto, and during the closing of the door the cam or arm projections 48 are caused to enter the more con-

finned space between the outer portions of the said extensions or plates 41 42 and check the pressure of the springs 32.

It has been described above that the extension or plate 41 is formed with the recess 44 and that the extension or plate 42 is provided with the rib 45, and these cooperating features are of advantage, as will now be explained. During the ordinary opening of the door the rib 45 will pass at the inner side of the outer edge of the plate 41, as may be understood from reference to Fig. 8, and when the door 22 has been opened to a position about at right angles to the wall or frame 23 the outer edge of the plate 41 will contact with the outer edge of the plate 42, and thus serve as a temporary stop for checking the further outward motion of the door, should that result be desired. The rib 45 and recess 44 perform an important function, however, after the door has been moved to its right-angular position should it be desired that the door shall remain open in that position, since in that event the attendant may by grasping the door-knobs while facing the outer edge of the door pull the door toward himself sufficiently for the rib 45 to move outward beyond the edge of the plate 41 and pass upon the outer side edge of said plate 41 and into the recess 44, the parts then having the position shown in Fig. 9, in which position the door will stand open and the position of the parts of the hinge will prevent the springs 32 from closing the door. Thus the hinge is not only a spring-hinge and a checking-hinge, but possesses the means for holding the door in an open position. The rib 45 and the edge of the plate 41, which it engages, constitute simply interlocking or interengaging projections, and these projections, which may vary in outline, constitute, in conjunction with the springs 32 and their connections, the means for automatically holding the door in its open right-angular position. The hinge shown in Fig. 9 is illustrated as applied to a right-hand door; but the projections formed by the rib 45 and the edge of the plate 41 would perform their functions fully if the hinge were applied to a left-hand door. Should it be desired to open the door 22 to a position substantially parallel with the door frame or casing 23, it will simply be necessary to continue the movement of the door from the position in which it is shown in Fig. 9 to that in which it is illustrated in Fig. 10, in which it will be seen that the leaves 20 and 21 lap upon one another and come as nearly into alinement with one another as their special form and circumstances will permit. When the door is opened to the position in which it is shown in Fig. 10, the springs 32 will hold it in position, and hence no additional means need be employed for maintaining the door in its wide-open position. The door may, however, under manual pressure be readily closed.

The form of the hinge shown in Fig. 11

differs from the form of the hinge shown in Figs. 1 to 10, inclusive, simply in the form of the outer edges of the cam or arm projections 48 and in the form of the outer portions of the extensions or plates 41 42, this difference in the form of parts referred to not being material or altering their functions. In Fig. 11 the more angular form of the edges of the cam or arm projections 48 renders the hinge when in action a little more sensitive; but since this is a detail which will vary with individual judgment in the manufacture of the goods it will be unnecessary to further refer to the same.

Fig. 12 illustrates the hinge as applied to a double-acting door and with the door moved open in a direction reverse to that in which the door is shown in Figs. 8 and 9. When the hinge is applied to a double-acting door, the cam or arm projection 48 and cooperating extensions or resistance-plates 41 42 perform their functions, hereinbefore described, when the door is swung inward in the direction shown in Fig. 8; but when the door is moved in a reverse direction, as indicated in Fig. 12, the cam or arm projections 48 cease to be operative, and the checking of the springs in their closing action upon the door is wholly accomplished by the cams 36, which during such opening of the door are turned from without the sleeves 30 31 in the manner illustrated in Fig. 12 and during the closing of the door are restored into the said sleeves to the position illustrated in Figs. 2 and 11. The cams 36 are formed with the slot 60, which is at an angle to the longitudinal line of the cams and also of the sleeves 30 and 31, and hence during the outward movement of the said cams from the sleeves 30 31 the said cams are given a partial rotation, whereby when the door is opened they reach a position transversely to the longitudinal line of said sleeves, the toe 61 of the cams acting as a fulcrum against the edge of the said sleeves. When the door is open, the springs 32 exert a force to draw the cams 36 against the edges of the sleeves 30 31, and as the door closes the said cams not only have a frictional contact with the edges of said sleeves, but are turned to enter said sleeves and to a degree divide the efficient force of the springs, whereby said springs are controlled in their closing action upon the door and the door is closed firmly, but under control.

I have illustrated the cams 36 in the hinge shown in Figs. 1 to 12, inclusive, so as to indicate that the hinge may be applied to a double-acting door and controlled in its closing movement whether said door is opened inwardly or outwardly. The hinge shown in Figs. 1 to 12, inclusive, however, is well adapted for a single-acting door, and when used in connection with a single-acting door the cam or arm projections 48 and their cooperating resistance-plates or extensions 41 42 will alone be made use of for controlling the action of the springs 32. Thus the cams 36

are not essential to the hinge illustrated unless said hinge is to be employed upon a double-acting door and it is desired that the door shall be controlled as to its closing action whether opened in one or the other direction.

I prefer to construct the hinge shown in Figs. 1 to 12, inclusive, with the omission of the cams 36 when the hinge is to be employed for single-acting doors, since thereby I obtain the benefit of the two sets of cam or arm projections 48 in connection with the two resistance-plates 41 42.

For a more expensive hinge I shall prefer to duplicate the cam or arm projections 48 at the opposite sides of the hinge, as shown in Figs. 13 and 14, which illustrate a hinge more especially intended for double-acting doors. The hinge shown in Figs. 13 and 14 differs from the hinges shown in Figs. 1 and 2 in that the yielding plates 27 28 instead of being pivoted together extend in opposite directions and are pivoted to the opposite edges of an intermediate plate 65, having at its opposite ends the cam or arm projections 48. I prefer the employment of the hinge shown in Figs. 13 and 14 for double-acting doors, since by reason of the construction shown I am enabled to rely upon the cam or arm projections 48 for the checking of the door, whether moving in one direction or the other, in lieu of, as with respect to the hinge of Fig. 12, having to employ the cams 36 for checking the action of the springs when the door is moving in one of its directions.

The modified form of hinge illustrated in Figs. 15 and 16 is intended to meet the demand for a cheap hinge for light doors. This hinge dispenses with the springs 32 illustrated in connection with the other hinges shown, and in lieu thereof the parts of the hinge are stamped up from spring metal, whereby the plates 27 and 28 of the hinge are rendered yielding and constitute in a portion of themselves the springs, (numbered for convenience 75,) whereby the cam or arm projections 48 are pressed in yielding contact with the extensions or resistance-plates 41 42 during the closing of the door, said springs 75 operating to effect the closing of the door.

It will be unnecessary to specifically further describe the hinges shown in Figs. 13 to 16, inclusive, since they possess parts which correspond with the parts of the hinge shown in Figs. 1 to 12, inclusive, and their construction and operation will therefore be fully understood without further detailed explanation.

In the form of the hinge illustrated in Figs. 1 to 12, inclusive, the yielding plate 27 possesses two of the cam or arm projections 48 and the yielding plate 28 likewise possesses two of the cam or arm projections 48; but my invention is not limited to the employment of any special number of the cam or arm projections 48 on the yielding plates 27 and 28, nor to the duplication of the cam or

arm projections 48 on each of the plates of the hinge.

My invention in its broader scope is not confined to the details shown, but comprises a hinge having a cam or arm projection upon the yielding plate and a substantially rigid resistance or contact plate for coöperation with said cam or arm projection during the opening and closing of the door, the relation of the parts being such that during the closing of the door the said parts will move against one another and toward a parallel relation with respect to one another.

The modifications illustrated in Figs. 13 to 16, inclusive, are presented with the view of indicating that the invention is not limited to the special details of form and construction illustrated in Figs. 1 to 12, inclusive, and that the parts of the hinge may, as to their details of form and construction, be modified without departing from the spirit of the invention.

The leaf members 20 and 21 are hereinbefore described as extending outward beyond the vertical edges of the door 22 and door-frame 23, whereby the outwardly-extending portions constituting the resistance-plates 41 and 42 are formed. I desire it to be understood, however, that the invention is not limited to the making of the resistance-plates 41 and 42 integral with the leaf members 20 and 21, since it is immaterial whether the resistance-plates 41 and 42 are in the same piece of metal with the leaves 21 and 22 or are made in separate pieces of metal and secured to the door 22 and door-frame 23 in the position in which such plates are illustrated in the drawings, the making of the resistance-plates 41 and 42 in separate pieces from the leaf members 20 and 21 not in any wise affecting the results accomplished by my invention. The invention is not therefore limited to details of form or construction, and these will be modified at will to suit the various sizes of the hinges which may be manufactured, the nature of the metals which may enter into their manufacture, and the sizes of the doors to which the hinges are to be applied. It is to be understood also that the invention is not limited in every instance to the employment of the cam or arm projections 48, since the hinge as a spring-hinge, without regard to the said cam or arm projections, possesses both novelty and utility and is desirable for use in preference to the various forms of spring-hinge heretofore produced. The absence of the cam or arm projections from one or both of the intermediate plates 27 28 would not interfere with the operation of the cams 36, the proper hanging of the door, nor the automatic holding of the door open in its right-angular position or in its position substantially parallel with the wall, and as a simple spring-hinge the device presents features of great advantage in that the springs are substantially invisible, easy of control and adjustment, and exert their force in a direc-

tion which effectually acts directly against the leverage weight of the door. When, however, the checking features are added to the hinge, additional advantageous results are attained, as above explained, and the springs are held under control during substantially the entire automatic closing movement of the door.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a hinge, the leaf members one having a resistance-plate, the pintle, and the intermediate plates connected with said leaf members and receiving said pintle and one thereof having the cam or arm projection adjacent to said pintle, said cam or arm projection being adapted to firmly press against said resistance-plate during the opening and closing of the door, combined with means for acting on one of said intermediate plates to press said cam or arm projection against said resistance-plate and to close the door; substantially as and for the purposes set forth.

2. In a hinge, the leaf members one having a resistance-plate, the pintle, and the intermediate plates connected with said leaf members and receiving said pintle and one thereof having the cam or arm projection adjacent to said pintle, said cam or arm projection being adapted to firmly press against said resistance-plate during the opening and closing of the door, combined with the concealed spring connected with one of said intermediate plates to press said cam or arm projection against said resistance-plate and close the door; substantially as and for the purposes set forth.

3. In a hinge, the leaf members one having a resistance-plate, the pintle, and the intermediate plates connected with said leaf members and receiving said pintle and one thereof having the cam or arm projection adjacent to said pintle, said cam or arm projection being adapted to firmly press against said resistance-plate during the opening and closing of the door, combined with the concealed spring for one of said intermediate plates, the stem extending lengthwise of said spring and having a nut to engage the end thereof, and the swiveled stud extending through said intermediate plate and connected with said stem for adjusting said spring, the said spring being adapted to act on said intermediate plate to press said cam or arm projection against said resistance-plate and to close the door; substantially as and for the purposes set forth.

4. In a hinge, the leaf members one having a resistance-plate, the pintle, and the intermediate plates connected with said leaf members and receiving said pintle and one thereof having the cam or arm projection adjacent to said pintle, said cam or arm projection being adapted to firmly press against said resistance-plate during the opening and closing of the door, combined with the spring acting on one of said intermediate plates to press said cam or arm projection against said resistance-plate and to close the door, and means for ad-

justing the force of said spring; substantially as and for the purposes set forth.

5. In a hinge, the leaf members one having a resistance-plate, the pintle, and the intermediate plates connected with said leaf members and receiving said pintle and one thereof having the cam or arm projection adjacent to said pintle, said cam or arm projection being adapted to firmly press against said resistance-plate during the opening and closing of the door, combined with the concealed spring for one of said intermediate plates, the stem extending lengthwise of said spring and connecting the latter with said intermediate plate, and the cam interposed in said stem and adapted to have a partial axial rotation during its movement into and out of the socket containing said spring and during such movement to engage the surrounding surfaces of said socket; substantially as and for the purposes set forth.

6. A hinge comprising the leaf members having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door, combined with means for independently acting on said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door; substantially as and for the purposes set forth.

7. A hinge comprising the leaf members having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door, combined with the independent springs concealed within the door and casing and connected with said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door; substantially as and for the purposes set forth.

8. A hinge comprising the leaf members having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door, combined with the independent concealed springs for said intermediate

plates, the stems extending lengthwise of said springs and having the nuts to engage the end thereof, and the swiveled studs passing through said intermediate plates and connected with said stems for adjusting said springs, the said springs being adapted to act on said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door; substantially as and for the purposes set forth.

9. A hinge comprising the leaf members having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door; combined with springs acting on said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door, and means for independently adjusting the pressure of said springs; substantially as and for the purposes set forth.

10. A hinge comprising the leaf members having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door, combined with the concealed springs for said intermediate plates, the stems connecting said springs with said intermediate plates, and the cams interposed in said stems and adapted to have a partial axial rotation during their movement into and out of their sockets and to engage the surrounding surfaces of said sockets; substantially as and for the purposes set forth.

11. In a hinge, the leaf members one having the resistance-plate provided with the recess, the pintle, and the intermediate plates connected with said leaf members and receiving said pintle and one thereof having the cam or arm projection adjacent to said pintle, said cam or arm projection being adapted to turn against said resistance-plate and into said recess during the opening and closing of the door, combined with means for acting on one of said intermediate plates to press said cam or arm projection against said resistance-plate and to close the door; substantially as and for the purposes set forth.

12. In a hinge, the leaves having the resistance-plates provided in their facing sides with the recesses, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being piv-

otally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates and into said recesses during the opening and closing of the door, combined with means for acting on said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door; substantially as and for the purposes set forth.

13. In a hinge the leaves having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door, combined with means for independently acting on said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door, the said resistance-plates being arranged to converge toward one another at their outer ends; substantially as and for the purposes set forth.

14. In a hinge the leaves having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door, combined with means for independently acting on said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door, the said resistance-plates being adapted to contact with one another at their outer edges when the door is open, and one of said plates being provided with a rib to normally lie at one side of the edge of the other resistance-plate when the door is open and adapted to engage the other side of said edge when it is desired to have the door stand open; substantially as and for the purposes set forth.

15. In a hinge the leaves having the resistance-plates, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at said end having the cam or arm projections, said intermediate plates at their other end being pivotally connected with the ends of said leaves, and said cam or arm projections being adapted to turn against said resistance-plates during the opening and closing of the door, combined with means for independently acting on said intermediate plates to press said cam or arm projections against said resistance-plates and to close the door, the said resistance-plates being extended outward sufficiently for them to lap upon and engage one another when the door is opened as nearly as may be toward a position parallel to the

wall to which the door is hung; substantially as and for the purposes set forth.

16. A hinge comprising hinged leaves capable of opening and closing toward one another during the opening and closing of the door, and one of said leaves containing a socket-opening, combined with the concealed spring, the stem extending from the other of said leaves through said socket-opening and spring and engaging the end of said spring, and the cam 36 interposed in said stem and normally located in said socket adjacent to the opening thereof and adapted during the closing of the door to engage the walls of said socket to control the action of said spring; substantially as and for the purposes set forth.

17. A hinge comprising the leaves, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at their other end being pivotally connected with the ends of said leaves, combined with the independent door-closing springs concealed in the door and door-casing, the stems extending from said intermediate plates through socket-openings in said leaves and also through said springs and engaging the outer ends of the latter, and the cams 36 interposed in said stems and normally located in said sockets adjacent to the openings thereof and adapted during the closing of the door to engage the walls of said sockets to control the action of said springs; substantially as and for the purposes set forth.

18. A hinge comprising the leaves, the intermediate plate hung upon the pintle and in pivotal connection with said leaves, the cam or arm projection adjacent to said pintle, and the resistance-plate against which said cam or arm projection firmly presses during the movement of the door, combined with the door-closing spring connected with said intermediate plate and serving to maintain the firm contact of said cam or arm projection with said resistance-plate during the movement of the door; substantially as and for the purposes set forth.

19. In a door closing and checking device, the concealed spring embedded in the framing, the stem extended lengthwise of the same and connected therewith, and means for holding the outer end of said stem so that as the

door opens, said stem being thus held, the spring will be compressed, combined with the checking-cam interposed in said stem and adapted to have a partial axial rotation against contacting surfaces during the movement of the door; substantially as and for the purposes set forth.

20. In a door closing and checking device, the concealed springs embedded in the door and door-casing, the stems extended lengthwise of the same and connected therewith, and means engaging the outer or facing ends of said stems so that as the door opens the said springs will be compressed, combined with the checking-cams interposed in said stems and adapted to have a partial axial rotation against contacting surfaces during the movement of the door; substantially as and for the purposes set forth.

21. A hinge comprising the leaves, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at their other end being pivotally connected with adjacent ends of said leaves, combined with springs for acting on said intermediate plates to close the door, the outer edges of said leaves being provided with the projections to be interlocked with one another for holding the door open; substantially as and for the purposes set forth.

22. A hinge comprising the leaves, and the intermediate plates pivotally connected together at their outer end by the pintle of the hinge and at their other end being pivotally connected with adjacent ends of said leaves, combined with springs for acting on said intermediate plates to close the door, the said leaves being extended outward sufficiently for them to lap upon and engage one another when the door is opened as nearly as may be toward a position parallel with the wall to which the door is hung; substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 21st day of September, A. D. 1899.

GUSTAV G. LAUREYNS.

Witnesses:

CHARLES C. GILL,
GUNDER GUNDERSON.