Oct. 6, 1936. H. F. REICHARD 2,056,805

CONCEALED HINGE

Filed April 26, 1935 3 Sheets-Sheet 1

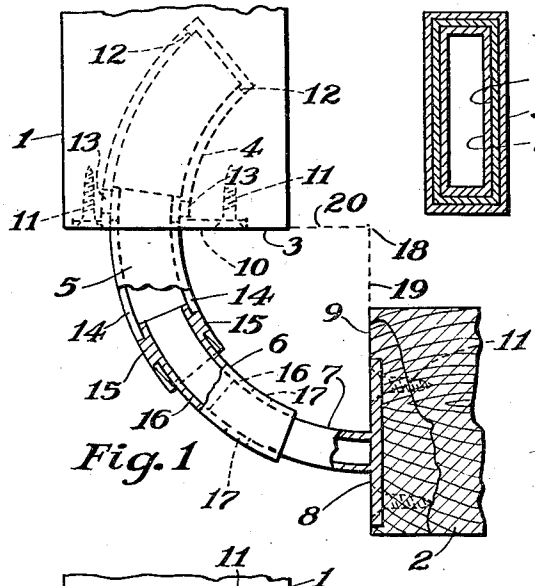


Fig. 1

Fig. 4

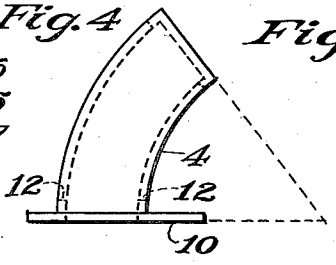


Fig. 3

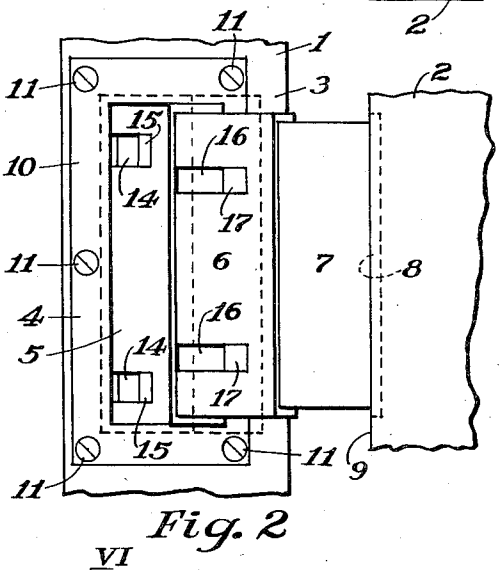


Fig. 2

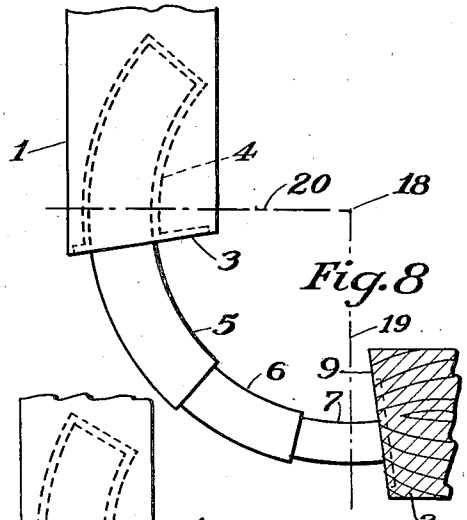


Fig. 8

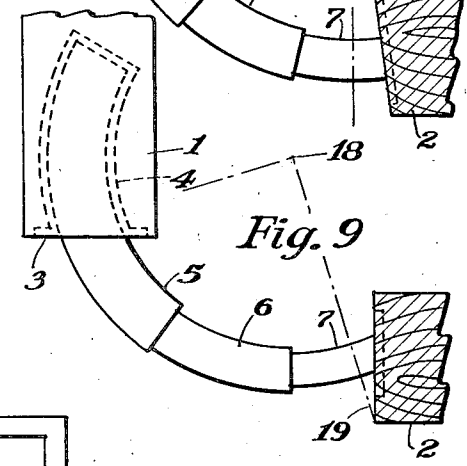


Fig. 9

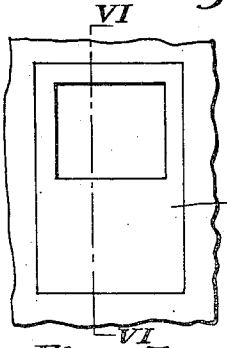


Fig. 5

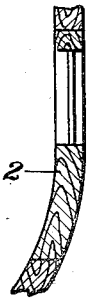


Fig. 6

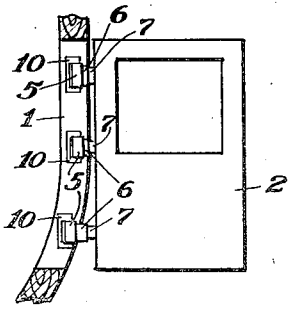


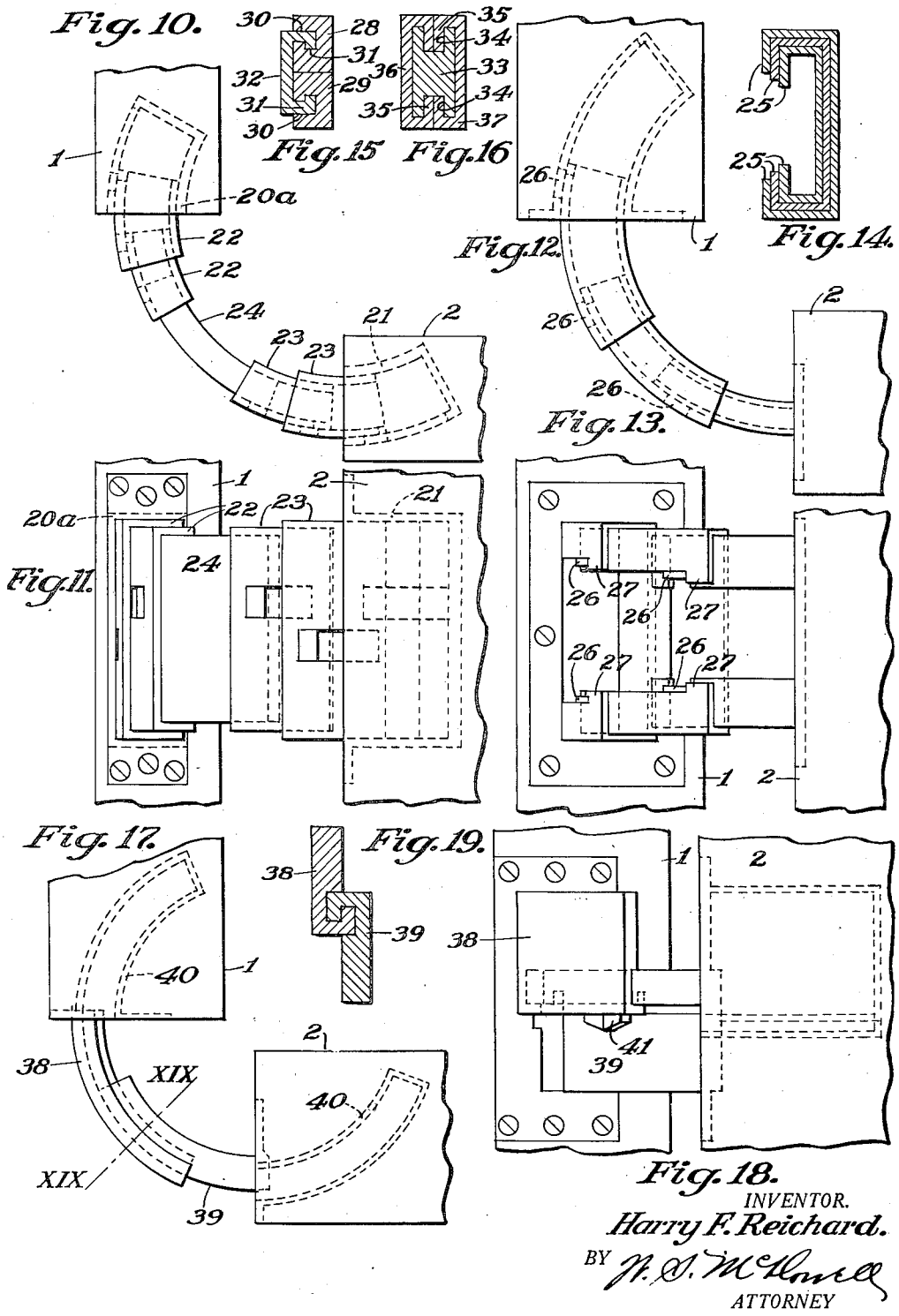
Fig. 7

INVENTOR.
Harry F. Reichard
BY H. S. McConnell
ATTORNEY

Oct. 6, 1936. H. F. REICHARD 2,056,805

CONCEALED HINGE

Filed April 26, 1935 3 Sheets-Sheet 2



Oct. 6, 1936. H. F. REICHARD 2,056,805

CONCEALED HINGE

Filed April 26, 1935 3 Sheets-Sheet 3

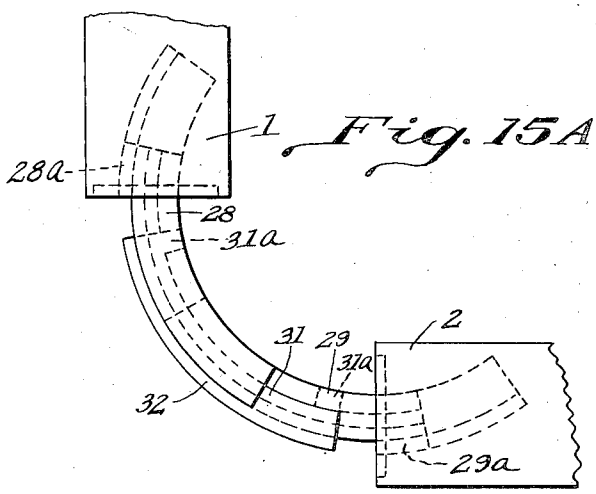


Fig. 15A.

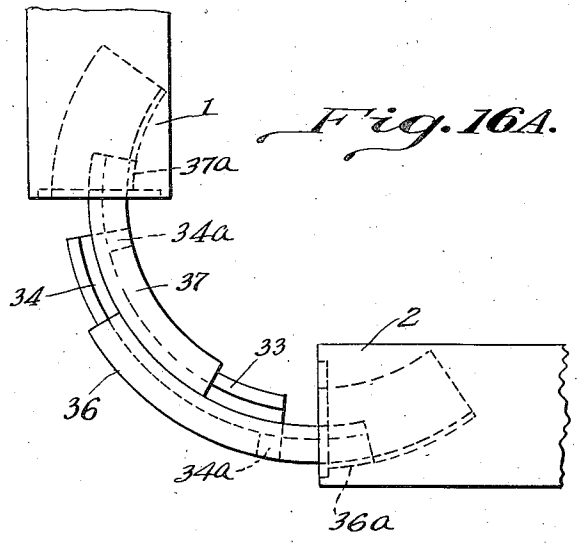


Fig. 16A.

Inventor
Harry F. Reichard

By W. S. M Howell

Attorney

Patented Oct. 6, 1936 2,056,805

UNITED STATES PATENT OFFICE

2,056,805

CONCEALED HINGE

Harry F. Reichard, Columbus, Ohio

Application April 26, 1935, Serial No. 18,396

8 Claims. (Cl. 16—178)

This invention relates to improvements in hinges and, more particularly, to hinges of the multiple section, slidably extensible type from which pivot pins are eliminated.

In the mounting of doors possessing curvature in vertical section such, for example, as the doors of many motor vehicle bodies, it is customary to employ elongated strap hinges which project outwardly and laterally from the doors and their body supports in an unsightly, line destroying and protruding manner. This protrusion of the hinges is due to the necessity for vertically aligning the pintels of the upper and lower hinges in the matter of affording a common hinge axis for door turning movement.

It is an object of the present invention to provide hinges particularly adapted for offset or vertically curved doors wherein the hinges are so constructed as to provide for free pin-less swinging movement of such doors and wherein the hinges are so constructed that when the doors associated therewith occupy positions of closure, the hinges will be concealed from exterior view, thereby overcoming the unsightly and undesired appearance of ordinary automobile door hinges.

Another object of the invention resides in the provision of improved hinge means for vertically curved offset doors comprising upper and lower hinges, each of which being formed to include a plurality of slidably interfitting, arcuate sections which serve to support or guide a door in the opening and closing movements thereof, the arcuate formation of said sections serving to cause a vertically curved door to swing about an imaginary or virtual axis and, further, the said sections being of different radii in the upper and lower hinges in order to adapt the latter to the lateral offsetting of various portions of the door.

Other objects of the invention are: The provision of a hinge of the character set forth comprising slidable interfitting arcuate sections joined respectively with the door and the supporting jamb, the said sections when the door is closed, being arranged in relatively nested order and within one or more sockets provided therefor in either or both the jamb and the door, to the end of concealing the hinge and obtaining free swinging motion on the part of the door; in the provision of a hinge by which a wide throw may be imparted to the door with which it is connected so that the door when in its opened position may be materially spaced from the adjoining portions of the door jamb; in the provision of a hinge which may be readily applied to a door or door jamb of reduced cross sectional thickness, so that thin doors may be supported by the hinge with the same facility and security as will be present in doors of materially greater cross sectional thickness; in the provision of a hinge including a plurality of arcuate telescoping sections, the said sections being of a narrow rectangular form and provided with cooperative slots and pins by which the extension and collapsing of the sections may be controlled; and in the provision of a hinge of strong, substantial and durable construction, well adapted for the mounting of many different kinds of doors, or other swinging closures, where the ordinary exposed, pintle type of hinge is not desired.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawings, wherein:

Fig. 1 is a top plan view, partly in horizontal section, of an arcuate pinless hinge constructed in accordance with the present invention;

Fig. 2 is a front elevation of the hinge, setting forth the latter with the parts thereof in the position disclosed in Fig. 1;

Fig. 3 is a detail plan view of the jamb-carried socket member of the hinge;

Fig. 4 is a vertical transverse sectional view taken through the sections of the hinge when in their nested or collapsed positions;

Fig. 5 is a side elevation of a motor vehicle door to which the hinge construction comprising the present invention is particularly applicable;

Fig. 6 is a vertical sectional view on the line VI—VI of Fig. 5;

Fig. 7 is a similar view but disclosing the door in its open position;

Fig. 8 is a plan view of a slightly modified form of hinge mounting;

Fig. 9 is a similar view showing another manner of mounting the door;

Fig. 10 is a top plan view of a further modification wherein both the door and jamb are provided with sockets for the reception of the arcuate hinge sections;

Fig. 11 is a view in front elevation of the construction disclosed in Fig. 10;

Fig. 12 is a top plan view of a further modified type of hinge wherein the arcuate sections are of a slightly different cross sectional formation from that disclosed in previous figures;

Fig. 13 is a front elevation of the construction set forth in Fig. 12;

Fig. 14 is a transverse cross sectional view through the hinge sections used in the construction depicted in Figs. 12 and 13;

Fig. 15 is a further modified form of cross sec-

tional configuration of the arcuate hinge members;

Fig. 15A is a plan view of a hinge in an extended position, the hinge in this figure having a cross section such as shown in Fig. 15;

Fig. 16 is a similar view of a still further modification;

Fig. 16A is a plan view of a hinge in its extended position, this hinge having a cross section such as shown in Fig. 16.

Fig. 17 is a plan view of a further modified form of the hinge structure comprising the present invention;

Fig. 18 is a front elevation of the hinge disclosed in Fig. 17;

Fig. 19 is a vertical transverse sectional view on the line XIX—XIX of Fig. 17.

Referring to the drawings, and more particularly to Figs. 1 to 9 thereof, the numeral 1 designates a door post, jamb or the portions of a vertical body adjoining a door opening, while the numeral 2 designates a door, or other form of swinging closure. In the post or jamb 1, and in the vertical transverse face 3 thereof, there is provided one or more metallic socketed fittings 4 which are of arcuate formation when viewed in plan and substantially rectangular in vertical transverse cross section. Slidably receivable within the socket 4 are arcuate metallic hinge sections which are designated generally in the drawings by the numerals 5, 6 and 7. In practice, however, the section 5 is formed to be directly telescoped into the socket 4 and possesses the same general configuration both in plan and in vertical cross section. Similarly, the sections 6 and 7 are of corresponding configuration and are telescopically related to each other and to the socket 4 so that when the door 2 is closed, all of the hinge sections will be telescopically nested within the socket 4. The outer end of the section 7 is provided with a securing plate 8 which is mortised within a recess provided in the face 9 of the door 2 which adjoins or registers with the face 3 of the door jamb 1. Similarly, the outer marginal portions of the socket fitting 4 are laterally flanged as at 10 and received within a recess provided in the face 3, in order that the outer portions of the socket fitting will lie flush with the plane of the face 3, securing devices 11, preferably in the form of screws, may be employed for retaining the socket fitting in its operative position.

The socket fitting is formed on its opposite vertical sides with spaced pairs of arcuate slots 12 in which are received corresponding studs, lugs or projections 13 projecting from the opposite vertical sides of the hinge section 5, the said studs or lugs serving to limit the movement of the section 5 relative to the fitting 4. The section 5 is, in turn, provided with corresponding arcuate slots 14 which receive the studs or lugs 15 formed in connection with the section 6, and the section 6 is likewise provided with spaced pairs of arcuate slots 16 in the opposite vertical sides thereof for the reception of studs or projections 17 carried by the hinge section 7. By the provision of these slots and studs, the extension or projection of the sections to open positions may be regulated and the throw of the hinge established. By varying the radii of the hinge sections, any virtual or imaginary axis of turning movement, as indicated at 18, may be provided and variations obtained in the degree of opening movement of the door relative to its supporting jamb. Thus the throw of the door may be varied at will and, as shown in Figs. 5, 6 and 7, when the door 2 is curved vertically, any hinge may be laterally offset with respect to another hinge but by controlling the radii of the hinge sections, a common axis of turning movement will be provided for the door, allowing the latter to turn freely and without binds or undue friction, the hinges, however, being completely concealed when the door occupies its closed position. As shown in Figs. 8 and 9, the axis of turning movement 18 may be disposed as desired with relation to the faces 3 and 9 of the jamb 1 and the door 2, thereby obtaining practical variations in the movement of the door relative to its supporting structure.

In Fig. 8, the faces 3 and 9 are beveled or angular with respect to the corresponding faces provided in the form of my invention disclosed in Fig. 1 and in this form, the door swings past the perpendicular, 90° construction line indicated at 19, while the beveled face 3 projects in advance of the horizontal construction line 20 of the 90° segment. In Fig. 1, the curvature of the hinge sections is such that the face 3 of the door jamb lies in the plane of the horizontal construction line 20, and likewise, the face 9 of the door, when the latter is in its open position, will be disposed in the plane of the perpendicular construction line 19 extending from the turning axis 18, the hinge affording 90° of turning movement to the door about the axis 18.

While the "throw" of this type of hinge can be indefinitely great, so, too, can it be indefinitely small by varying the radius of the hinge arc. Thus a door can be hung to open with no appreciable throw whatsoever, or a combination of a small throw and large throw hinge can be combined in hanging a curved door to reduce the total throw or for other purposes. Furthermore, this can be accomplished without having any portion of the hinges exposed when the door is closed, so that unsightly or undesirable protrusions may be eliminated from a curved door assemblage.

It will be seen that the hinge comprising the present invention makes possible the hanging of a curved door, such as used on automobiles, without exposing any portion of the hinges, or hanging devices, when the door is closed. It is applicable, however, to any door whether straight or curved.

While lugs and raceways are disclosed as limiting and controlling devices for regulating the extension of the hinge sections, such control can, of course, be accomplished in many other ways. For instance, the lugs, such as shown in the accompanying drawings, may take the form of rollers, buttons or other various cross sectional shapes to increase ease of operation by minimizing friction. Any lubricant suitable to metals can of course be employed in reducing friction between the hinge sections during relative movement of the latter.

In Figs. 10 and 11, socket fittings 20*a* and 21 are provided in both the jamb and the door 1 and 2. This construction is utilized and/or is adaptable especially in doors and jambs possessing minimum thickness and in this form of my invention, each of the sockets 20*a* and 21 receive relatively short arcuate telescopic outer sections 22 and 23 and an intermediate section 24. When the door 2 disclosed in Fig. 10 is closed, the sections 22 lie within the confines of the socket 20*a* and the sections 23 within the confines of the socket 21, the intermediate section 24 occupying equally both of said sockets.

In vertical cross section, the sections 22, 23 and 24 may be substantially rectangular and, more-

over, the said sections may be provided with stop lugs occupying arcuate recesses for limiting the extensible movement of said sections.

While the drawings disclose the hinge sections as constituting rectangular tubes, it is obvious that other cross sectional formations may be utilized. For instance, as shown in Figs. 12 to 14 inclusive, they may be but partly rectangular and open along one side to produce stepped vertical ribs **25**, which are provided with laterally turned motion limiting lugs **26** arranged to engage with shoulders **27** formed in connection with said ribs. In Fig. 15, upper and lower hinge sections **28** and **29** respectively are provided which are formed with L-shaped slots **30** opening to one side of said sections. The slots **30** are adapted to receive correspondingly formed ribs **31** provided in connection with an outer hinge section **32**. As shown in Fig. 15A, the upper hinge section **28** is received by the door jamb **1** while the lower section is received by the door **2**. This form of hinge, as in the preferred forms, also employs laterally directed lugs **28***a*, **29***a* and **31***a* to limit the extent of movement of the various sections.

In Fig. 16, an intermediate hinge section **33** is provided which is substantially H-shaped in cross section, having its upper and lower surfaces grooved as at **34**, which grooves are adapted to slidably receive for limited relative movement inturned fingers **35** formed in connection with outer hinge sections **36** and **37**.

In this type of hinge the sections **36** and **37** are received by the members **1** and **2** and the section **33** unites them at their free ends. The laterally directed lugs **34**a, **36***a* and **37***a* prevent the hinge from pulling apart.

In Figs. 17 to 19 inclusive, arcuate slidably interfitting hinge sections **38** and **39** are used which are secured respectively at their ends to the door jamb **1** and the door **2** in a fixed manner. The jamb **1** and the door **2** are each provided with arcuate sockets **40** into which the sections **38** and **39** telescope when the door **2** is closed. Motion limiting lugs **41** are of course provided to limit the movement of the section **39** in an outward direction relative to the stationary section **38**.

In view of the foregoing, it will be seen that the present invention provides a pinless hinge structure for use in the hanging of various types of doors by which efficient support for such doors will be provided, the parts of the hinge structure concealed from exterior view when the door is closed and provision made for suitably controlling the throw of the door when moving from closed to open positions or vice versa. The construction of the hinge is simple, practical and efficient, avoids the appearance of the conventional pintle type of hinge and is particularly applicable to the hanging of doors used in connection with motor vehicle bodies wherein the doors are curved or offset vertically, the construction of the hinge being such as to permit upper and lower hinge units to be offset laterally and vertically with respect to each other and yet provide for the free turning of the door about a definite though constructive axis.

While I have described and illustrated several forms of my invention, nevertheless it will be understood that the same is subject to further variation or modification without departure from its underlying principles, and I therefore reserve the right to employ all such modificaitons that may be said to fall fairly within the scope of the following claims.

What is claimed is:

1. In an extensible, pintleless hinge, a plurality of arcuate substantially hollow telescopic sections, the innermost of said sections being adapted to be directly connected in stationary relationship with a door jamb and the outermost of said sections being adapted to be directly connected with a swinging closure, and interengaging means carried by said sections for limiting the separation thereof during opening movement of said closure, the origin axis of curvature of said sections being adapted to be disposed beyond the confines of said door jamb and closure.

2. A normally concealed and extensible hinge of the pintleless type comprising a plurality of arcuate slidably interfitting sections of hollow rectangular configuration, the section of greatest cross sectional area being adapted to be stationarily mounted within the thickness of a door jamb, and the section of minimum thickness being adapted to be connected with an associated door, said sections being formed to telescope within the section adapted to be carried by the door jamb when the door occupies its position of closure, and means for limiting the extent of separation of said sections when the door assumes an open position.

3. A telescopic hinge comprising a plurality of hollow arcuate metallic sections of progressively decreasing cross-sectional area and formed to be telescoped within the section of greatest cross-sectional area when an associated door occupies a position of closure, and pin and slot connections formed with said sections for limiting their relative extension movement when the associated door is moved to an open position.

4. In mechanism of the character described, an arcuate socket member of hollow rectangular cross-sectional configuration adapted to be stationarily mounted within the confines of a door post, a plurality of arcuate hollow rectangular hinge sections of such length and cross-sectional dimensions as to be entirely received in telescoped order within said socket member when an associated door adapted to be connected with the outermost of said sections occupies its position of closure, and lug and shoulder means formed with said socket member and hinge sections for regulating the extent of separation of said sections when the door is moved to assume its open position.

5. A normally concealed extension hinge comprising a plurality of hollow arcuate sections of substantially rectangular configuration in cross section, said sections being of varying cross-sectional area to telescope one within another, stop members projecting laterally from said sections and receivable within slots provided in adjoining sections to limit the extensible movement of said sections, the innermost of said sections being adapted to be entirely mounted within the confines of a door jamb and the outermost of said sections adapted to be connected with an associated door.

6. An extensible support for swinging closures comprising a plurality of arcuate sections, slidable interfitting connections uniting said sections for relative sliding movement, a jamb-carried socket member in which said sections are substantially entirely receivable when an associated door adapted to be connected with the outermost of said sections occupies a position of doorway closure, and means for limiting the extent of separation of said sections when said door is moved to occupy an open position.

7. A hinge comprising an arcuate socket mem-

ber substantially rectangular in vertical cross section and adapted to be stationarily and substantially entirely disposed within the walls of an associated support, a plurality of correspondingly arcuate hollow rectangular extension sections formed for telescopic reception within the confines of the socket member, one of said sections having its outer portion adapted to be connected with an associated swinging closure, and shoulder and slot means for limiting outward sliding movement of said sections relative to said socket member and to each other.

8. A wide throw pintleless hinge comprising a plurality of hollow interfitting telescopic arcuate sections, one of said sections being adapted to be stationarily mounted and disposed substantially entirely within the confines of an associated support, the outermost of said sections being adapted to be connected with a cooperative closure member, the curvature of said sections being such that said closure member will turn about an imaginary axis disposed beyond said support, and shoulder and slot means formed with said sections for limiting their extension movement in the opening of said closure member.

HARRY F. REICHARD.