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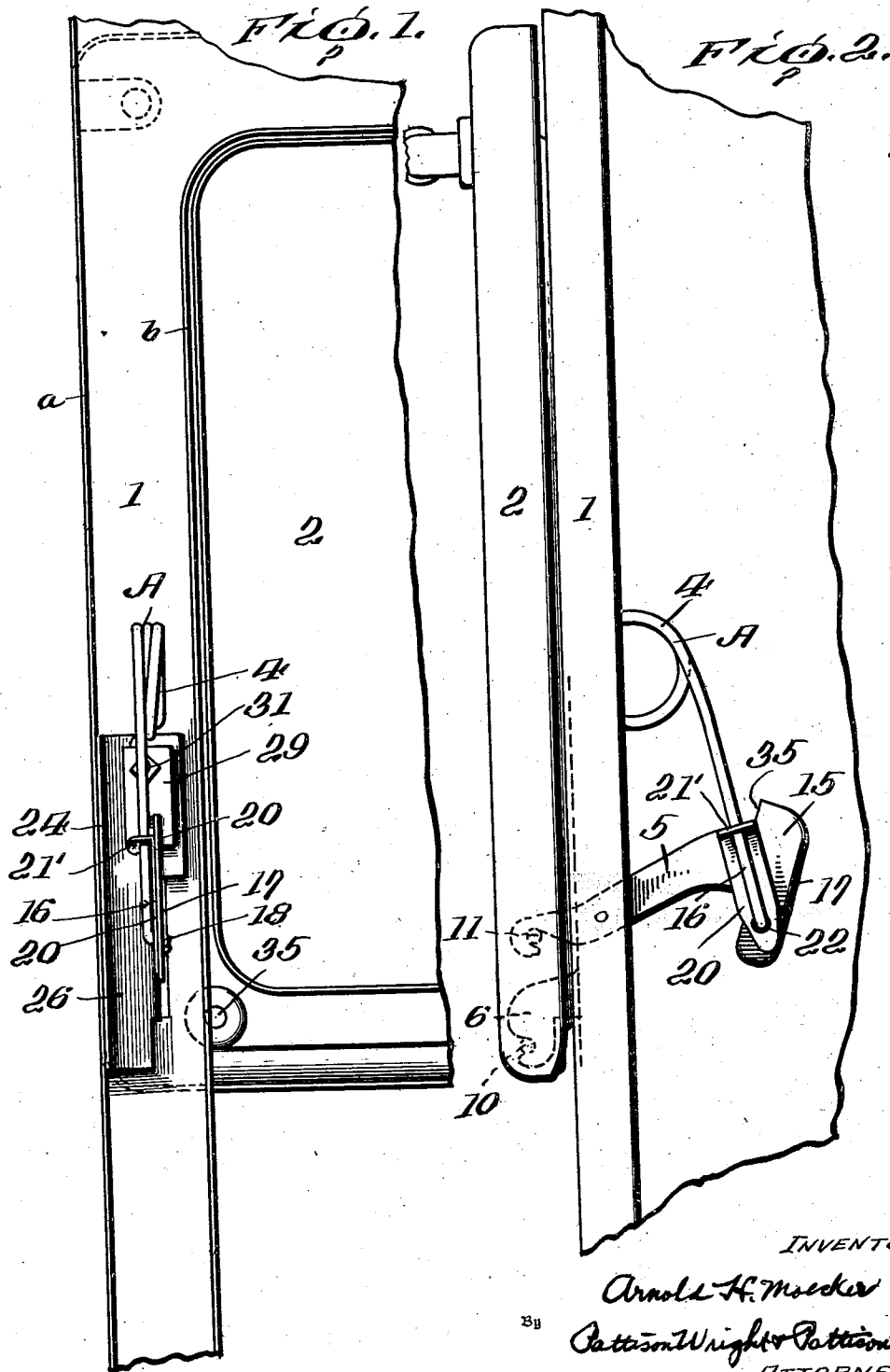
A. H. MOECKER

2,179,049

RANGE DOOR CONSTRUCTION

Filed March 9, 1939

4 Sheets-Sheet 1



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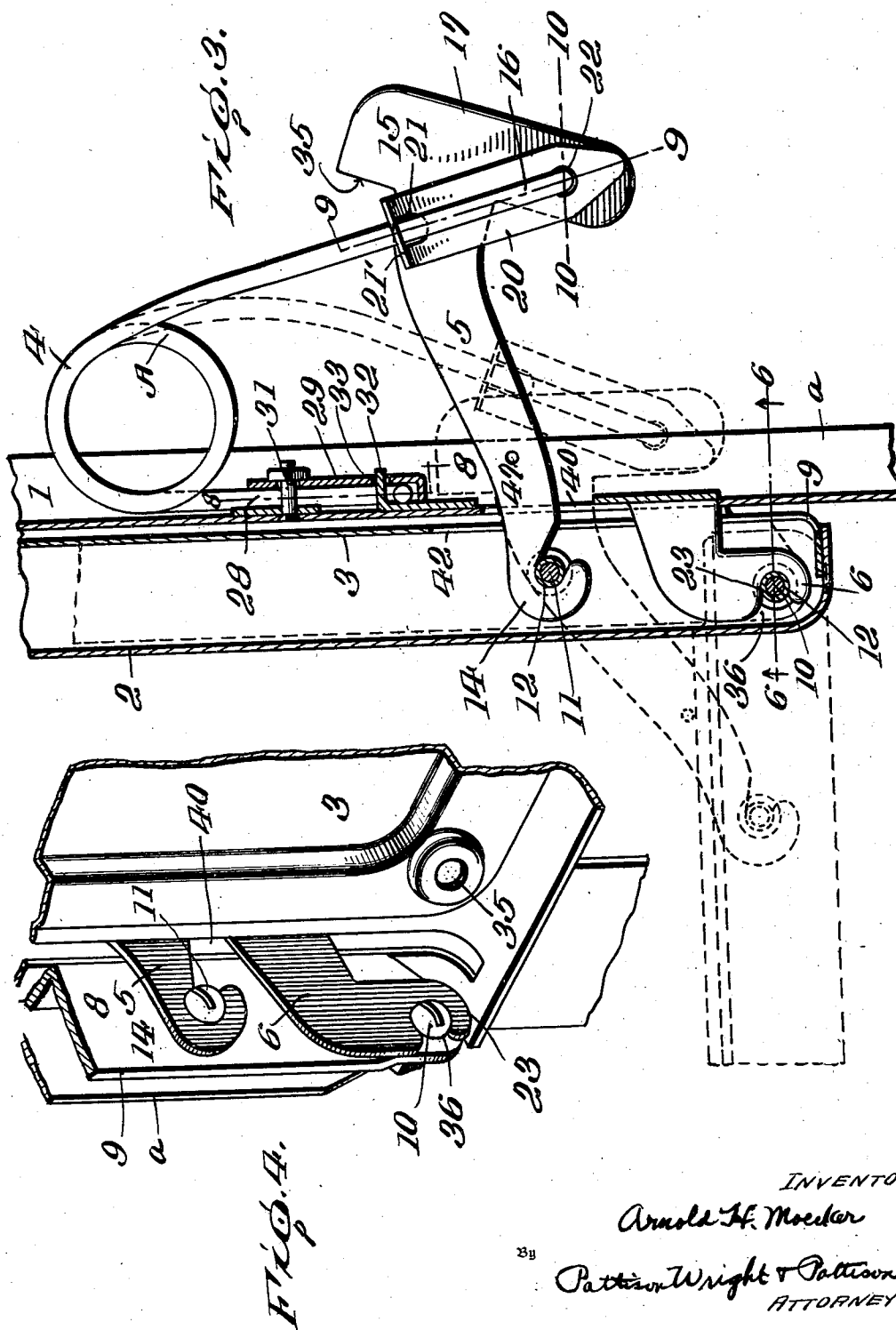
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4 Sheets--Sheet 2



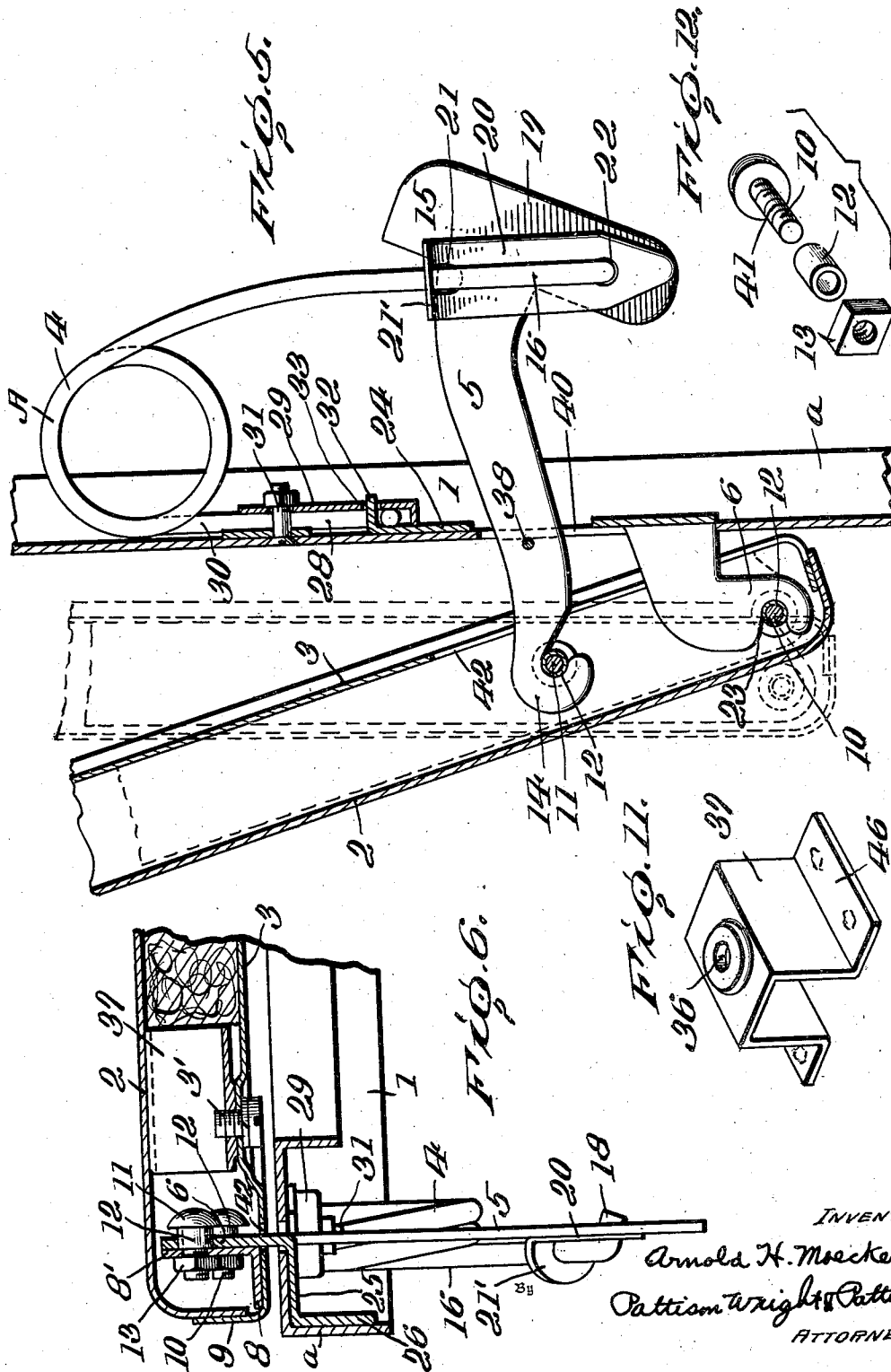
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4 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,179,049

RANGE DOOR CONSTRUCTION

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18 Claims. (Cl. 126—194)

The present improved invention has been conceived to provide a greatly improved hinge construction which is particularly adapted for the oven or broiler doors of a cooking range, but as will appear from the following description its construction is such as to make it adaptable for doors used in many and varied capacities.

To those skilled in this art it is well known that oven hinges as ordinarily constructed are in the form of castings which are as a consequence subject to frequent breakage and which due to breakage both at the time of fabrication of the range and when in use, constitute a formidable item in the manufacturing and maintenance cost of cooking ranges.

As a consequence one of the primary objects of the present invention is to provide a hinge the parts of which are sheet steel stampings and which as a consequence reduce to the minimum the breakage in the manufacture of the hinge parts; breakage at the time of the fabrication of the range and the assembly of the hinge and range doors, and which are much more durable as to life in the hands of the range operators.

Hinges constructed of sheet metal or steel stampings have the further attribute that if for any reason they become bent or distorted they can be straightened by an ordinary mechanic which will thus avoid the heretofore and usual necessity of furnishing new parts brought about by the fact that the stress or strain which has caused the bending of the stampings would have resulted in the breakage of the ordinary cast metal hinge parts.

Another and further object of the invention consists in so constructing the hinge as to make it possible for the door to be easily, quickly and readily attached and detached from the hinge and to accomplish this without in any manner disturbing or removing the hinge parts. Additionally the construction is such that the removal and attachment of the door can be accomplished by an ordinary mechanic or even by those persons who ordinarily operate and use ranges.

A still further object of the invention is the provision of a novel manner of attaching the hinge parts to the door frame and of providing supporting bearings for the door.

An additional object is that of providing a novel manner of attachment of the resilient means of the hinge.

A still further object of the invention is the provision of a novel manner of providing and securing pivot pins or pintles to the door.

Another and further object is that of providing

a novel and unique manner of preventing lateral tipping of the door and of the link portions of the hinge.

A still further and additional object of the invention is that of providing novel plate members as parts of the hinge construction and providing for cooperation between said members and the door opening frames.

An important object of the invention is the provision of a hinge construction which is comparatively cheap and simple of manufacture and assembly and which is highly efficient and durable in use.

Other objects, novel features of construction and improved results of the invention will appear in more detail from the following description when read in the light of the disclosure of the accompanying drawings.

In the drawings:

Fig. 1 is an elevation of the door opening which forms part of the range, and looking at the inner side thereof and the parts of the hinge which is carried by said frame.

Fig. 2 is a side elevation of the door opening frame, the door, parts of the door hinge, and part of the range.

Fig. 3 is a side elevation of parts of the hinge, showing the door and the door opening frame in section, and the hinge and door in open positions in dotted lines.

Fig. 4 is an inside perspective view of parts of the door hinge and some of the parts of the door.

Fig. 5 is an elevation of the hinge with its parts locked in partly open positions to relieve the spring tension thereon to permit the removal of the door without disturbing the positions of said parts.

Fig. 6 is a horizontal sectional view of the hinge parts on the dotted line 6—6 of Fig. 3 and looking in the direction indicated by said dotted line.

Fig. 7 is a perspective view of the hinge parts shown separated.

Fig. 8 is a vertical sectional view of the spring clamp taken on the line 8—8 of Fig. 3.

Fig. 9 is a vertical sectional view taken on the line 9—9 of Fig. 3.

Fig. 10 is a horizontal sectional view on the line 10—10 of Fig. 3.

Fig. 11 is a detached perspective view of one of the attaching supports for the door lining.

Fig. 12 is a perspective view through one of the pivots for the link and the bearing.

Having reference now to the drawings which illustrate a preferred embodiment of the invention, 1 designates what is commonly referred to

as the front frame of a range and may serve to frame one or more door openings. In the following description reference will be made to only a single opening as a door and hinge for a second or other door opening of the range would be of like or identical construction.

The range front frame 1 illustrated is of ordinary or typical construction in most respects other than in being provided with elongated and vertically extending slots 40 positioned adjacent the opposite lower corners of the frame door opening. In conformity with usual practice the frame is of a U-shape in cross section and has an inwardly extending outer marginal flange *a* and an inwardly extending circumferential flange *b* about the door opening.

The door in many respects is of conventional construction and particularly so in that it comprises an outer front panel 2 which telescopically receives an inner lining 3 to form a door of hollow construction.

The present hinge is of the resilient type and includes a pair of coil springs of identical nature only one of which is illustrated and is designated as an entirety by A and will be described in more detail hereinafter.

The links or connecting means between the springs or resilient means A and the door are designated as an entirety by the numeral 5 and as they are of identical construction only one of them is illustrated.

There are a pair of bearings for rotatably supporting the door and these are formed as a part of a pair of plates 24 of identical construction, only one of which is illustrated, and will be later more specifically described.

Referring now to the door and particularly to Fig. 6 of the drawings, it will be seen that within the space between its panels 2 and 3 there is provided a bracket which is of an L-shape in cross section and comprises the legs 8 and 8'. The leg 8 abuts and is suitably secured to the door lining while the leg 8' extends outwardly therefrom towards the front panel 2 in spaced and separated relationship to the vertical end or side wall 9 of the door. This bracket is also clearly illustrated in Fig. 9 of the drawings and can be, if desired, of a length substantially equal to the height of the door or shorter as may be desired. In spaced aligned relationship this bracket carries an outwardly extending hinge pintle or pin 10 and an outwardly extending link stud 11 the outer ends of which are provided with heads 10' and 11' respectively. The shaft portions of the studs, see Fig. 12 of the drawings, are threaded as at 41 and are surrounded by a spacer sleeve 12. The pins and stud are clamped in the bracket by tightening down suitable nuts 13.

It will be understood that a construction identical to that immediately before described is present within the opposite lower corner of the door.

The door linings adjacent the leg portions 8' of the brackets are provided with an opening 42 the purpose of which is to permit the passage of the door bearings, as will hereinafter more fully appear.

Describing now in detail the plates or members 24 which are of a stamped steel form or construction, it will be seen that the plates are of an L-shape in cross section comprising the legs 25 and 26 disposed at right angles to one another. In the assembly of the spring, see Figs. 1 and 6 of the drawings, it will be seen that the leg 25 of the plate abuts the inner face of the front

frame while the leg 26 parallels and abuts the flange *a* of the frame. To prevent unsightly appearance the plate is preferably welded to the frame.

Each plate has formed as an integral part thereof an ear 6 which extends outwardly at right angles to the leg 25 and has formed in its outer end an open bearing or pocket 23 which is of hook-like form. It will be seen by reference to Fig. 6 of the drawings that this ear extends outwardly through the slot 40 of the front frame 1 and is disposed exteriorly of the front frame and at right angles to the outer face thereof.

Each plate 24 is provided with a cut-out or opening 27 which reduces the width of the leg 25 for a considerable length so as to form no obstruction to the upper portion of the frame slots 40. The lower portion or wall of the cut-out or opening 27 is designated as 34 and acts as a stop, as will hereinafter more fully appear.

Above the opening or cut-outs 27 the plates are provided with an inwardly extending tongue 32 which is preferably obtained by cutting the leg 25 and bending the portion of the leg which lies within the cuts downwardly and inwardly. Above the tongue each of the plates is provided with an opening 43 through which passes a bolt 31, the head of which is at the outer side of the front frame 1. This bolt will serve to correctly position the plate preparatory to its being welded to the front frame and serves also to lock the clamp plate 29 to the plate.

The clamp plate is in the form of an open sided box having an opening 44 for the passage of the bolt 31 and an opening 33 for the passage of the tongue 32. The bolt 31 and the tongue 32 are in alignment and in spaced relationship to the side wall *d* of the plate.

There is a single coil spring A secured to each of the plates 24 and to each of the links 5 in identical manner.

It will be seen that these springs comprise a convolute 4 from which extends at substantially right angles to the horizontal axes of the convolute an arm or end portion 28 which is disposed within the clamp plate or box 29 in the space between the side wall *d* thereof and the adjacent sides of the bolt 31 and the tongue 32. The extreme end of the portion 28 of the spring is bent at substantially right angles as indicated at 45 to lie behind or beneath the tongue 32. It will thus be seen that when the bolt 31 is tightened down the spring is securely locked to the plate 24 against possible displacement and against rocking.

The other and free end 16 of the spring is of considerable length and when the door is in a closed position, see Fig. 3, extends downwardly and inwardly at an angle to the front frame. The lowermost end of this arm 16 of the spring passes through an opening 19 in the head or cross arm portion 17 of the link 5. In Fig. 10 of the drawings the method of securing this end with the opening 17 is clearly illustrated.

The links 5 pass loosely through the openings 27 of the plates 24 and the openings 40 in the front frame as well as the openings 42 in the lining 3 of the door. As clearly illustrated in the drawings the hooked ends of the links operatively engage the studs or pins 11. Because of the aforementioned looseness there would be a tendency for the links to tip laterally under the action of the coil springs and to prevent such tipping or turning of the links sheet metal members 20 are provided which are applied to the spring

arms 16 in the manner illustrated in the drawings. These members are in reality threaded upon the spring arms in that the spring arm passes through the openings 21 and 22 thereof. The upper end of each member 20 is bent at right angles as indicated at 21' and a portion of the opening 21 is through this ear 21'. In operation it will be seen that the members 20 provide a continuous bearing surface which will engage either the heads or cross arms 17 of the links or the main arm portions 5 thereof and serve as an abutment to prevent the links from tipping.

When the door is swung into a completely open position as illustrated in dotted lines in Fig. 3 of the drawings, the lower walls 34 of the openings 27 of the plates 24 act as stops and supporting means for the door in that they engage the lower edge of the links at a point adjacent their connection with the cross arms or heads 17 of the links. The forward edge or shoulder *e* of the link cross arm 17 above the main arm 5 of the link will engage the inner face of the plate and serve as a stop to the outward movement of the door.

In the construction the inner door panel 3 is removably secured to the outer panel and inasmuch as these panels are subjected to considerable stress and strain the attaching means provided is such as to strengthen and give rigidity to the door. By reference particularly to Figs. 4, 6 and 11 of the drawings it will be seen that at each of its corners the inner face of the outer door panel 2 is provided with a U-shaped housing 37 the legs 46 of which are suitably welded to the front panel. The bridge or top of the bridges or tops of these housings are provided with a threaded opening 36 which threadably receives the shanks of suitable bolts 3' which bolts pass through the openings 35 which are disposed in the four corners of the door lining panel 3.

Irrespective of whether the door is in an open or a closed position the springs are constantly exerting an inward pull upon the links 5. This tension will maintain the pintles 10 within the bearing pockets 23 of the bearing 6 and will of course at all times maintain engagement between the hooked outer ends 5 of the links and the link studs or pins 11.

The tension of the spring and the arrangement of parts is such that when the door is swung into a completely open or horizontal position it will remain or stay in that position until it has been manually raised past a dead center point.

For the accomplishment of the easy, quick and almost instantaneous removal of the doors and their replacement each of the links 5 intermediate its length is provided with an opening 47 into which is adapted to be inserted a pin 38 or the like. These pins are inserted through the opening when the door has been moved outwardly to the position indicated in full lines in Fig. 5 of the drawings and bear against the outer front face of the frame 1 and thus lock the links 5 against inward pull of the coil springs. With these pins engaging the frame 1 the tension of the springs upon the door pintles and studs 10 and 12 is relieved and the door can be readily detached and removed in the manner illustrated in dotted lines of Fig. 5 of the drawings.

This removal is accomplished by swinging the lower end of the door outwardly and then moving the door inwardly and downwardly. To replace the door it is necessary only to reestablish operative connection between the pintles 10 and the

bearings 6 and the pins 11 and the hook ends of the links 5 and then exert an outward movement upon the door and thereupon remove the pins 38.

From the foregoing it will be seen that an arrangement which is comparatively cheap and simple of construction has been provided for accomplishing the numerous objects and desirable results heretofore enumerated and that the resultant structure is one which is highly efficient and durable in operation.

I claim:

1. In a range or the like, a door opening, a bearing at the outer side of said opening, said bearing having an outwardly projecting open end, a door pivotally supported in said bearing, a link pivotally connected to said door and extending inwardly through said opening, said link having at its outer end a downwardly extending hook, a spring connected to the inner end of said link, and said spring exerting an inward pull on said link.

2. In a range or the like, a door opening frame, bearings at the outer side of said frame and oppositely positioned adjacent the lower corners of said opening, a door provided with a horizontally disposed pivot pin adjacent each of its lower corners, said pivot pins engaging said bearings and serving to pivotally support said door, a pivot pin extending horizontally outward from each side of said door above and in separated relationship to said first named pivot pins, a link pivotally connected to each of said second named pivot pins and extending inwardly past said door opening, a bent spring positioned at each side of said opening and at the inner side of said frame, said springs including a leg at one side of their bent portion and disposed in parallelism to the front frame and secured to the inner side thereof and a second leg extending outwardly at an angle from the other side of said bend, the second legs of said springs being secured to the inner ends of said links, and said springs at all times exerting an inward pull upon said links.

3. A construction such as defined in claim 2, wherein the door bearings are provided with a pocket for rotatably supporting the lowermost pivot pins of said door, the outer sides of said pocket being open to permit the free passage of said pins into and out of the pocket.

4. A construction such as defined in claim 2, wherein said door bearings have a pocket for receiving and rotatably supporting the lowermost pivot pins of said door, the front sides of said pocket being open to permit the free passage of said pins into and out of said pocket, the outer ends of said links being provided with a pocket to rotatably receive the uppermost pivot pins of said door, and the rear faces of said pockets being open to permit the free passage of said pivot pins into and out of said pockets.

5. A construction such as defined in claim 2, wherein an elongated plate is mounted on each of the free ends of said springs and is movable therewith, said plates having sliding engagement with the inner ends of said links and preventing lateral tipping of said links.

6. In a range or the like, a door opening, a door for said opening, an outwardly extending link having at its outer end an inwardly extending open hook, a spring having one end connected with said range and its opposite end connected with the inner end of said link, said spring having an inward tension on said door and a normally outwardly open ended bearing member between said door and said range, said bear-

ing member having a normally outwardly extending open bearing, whereby the spring action holds said door normally in engagement with both said hook and said bearing member.

7. In a range or the like, a door opening frame, a door for said frame, pivot pins carried by said door, bearings for rotatably supporting said pivot pins, said bearings having an open side for permitting free passage of said pivot pins into and out of said bearings, links pivotally connected at their outer ends to studs carried at the opposite sides of said door, said links having bearings open at their rear sides to permit free passage of said studs into and out of said bearings, the inner ends of said links disposed at the inner side of said frame and at the opposite side of said door opening, and spring means connected to the inner ends of said links and normally exerting an inward tension thereupon, and the inward tension of said spring serving to normally close said door and to hold the studs and pivot pins of said door within their open bearings.

8. A construction such as defined in claim 7, wherein a frame engaging member is provided for attachment to each link and adapted to lock said links against inward movement to permit the door pins and studs to be freely disengaged from their bearings and the door thus removed from connection with its hinge parts.

9. A range or the like, a door opening frame having elongated slots adjacent two of the corners of the door opening of said frame, a sheet metal plate secured to the inner face of said frame at either side of the door opening, each of said plates provided with an outwardly extending bearing passing through said slots and provided in its outer end with a bearing, a door having pivot pins rotatably supported in said bearings, a pair of elongated links having bearings in their outer ends, said links extending outwardly and loosely through said frame slots and the bearings thereof having pivotal connection with studs provided at the opposite edges of said door, and resilient means having connection with the inner ends of each of said links and exerting an inward pull thereupon.

10. A construction such as defined in claim 9, wherein the inner ends of said links are provided with a head to which said resilient means are attached, and means interposed between said resilient means and the heads of said links to prevent lateral tipping of the links.

11. A hinge construction for a range or the like having a door opening, a door for said opening, a spring connection carried by the outer wall of said range having an inward spring tension, the outer end of said spring connection pivoted to said door, a bearing member between said door and said range having an outwardly extending open end, and a stop member engaging said spring connection and said range when the door is partially opened to relieve the spring action on said door for the purpose of permitting disconnecting of the door from the range without disturbing the position of the hinge members.

12. A range door construction comprising a range having a door opening, a door for said opening, an outwardly extending spring connection having an inward tension carried by said range and having its outer end movably connected with said door, a bearing connecting said door and said range, the ends of said spring connection and said bearing comprising open ended

hooks, said spring connection serving to hold the door in said open ended bearing, and said spring connection between its ends adapted to receive means engaging the outer face of said range when the door is partially open and which releases the spring tension of said spring connection on the door and serves to hold said parts while the door is released and replaced in said hooks.

13. A range door construction comprising a range having a door opening frame, a door for said opening, said frame having a vertical slot, a plate fixed to the inner side of said frame and having an opening located in line with said frame slot opening, a spring having one end attached to said door frame and its other end extending downward and having connection with a link which passes outward through said plate opening and frame slot, the outer end of said link being pivotally connected to said door, and said plate having an outwardly bent portion passing through said plate opening portion and said range frame slot, and the outer end of said plate portion carrying a bearing adapted to pivotally support said door.

14. A range door construction comprising a range having a door opening, a door for said opening, an outwardly extending member carrying at its outer end a bearing having pivotal connection with said door, a spring attached to said range at the inner side of said door opening and having a downwardly extending arm pivoted to the inner end of a link that extends outward and is pivoted to said door, said link having at its inner end a laterally extending portion, and a member attached to the downwardly extending arm of the spring and located between the lateral extension of said link and the end of said spring arm and movable over said link.

15. A range door construction comprising a housing having a door opening, a door therefor, a spring having an outwardly extending connection provided with a hook at its outer end engaging the door, a bearing fixed to said housing having at its outer end a hook engaging and supporting said door, the spring hook comprising an opening extending in a vertical direction and said bearing hook comprising an opening extending outwardly in a horizontal direction, said spring exerting a pressure tending to close said door and to hold said spring hook and said bearing in operating positions, and means for relieving the pressure of the spring upon the door, thereby releasing said spring tension on both said hook and bearing whereby the door can be freely disconnected from said hooks.

16. In a range or the like, a housing having a door opening and a door therefor, a pair of plates each provided with a bearing, said plates positioned within said housing and suitably secured thereto at opposite sides of said door opening, and the bearings of said plates extending outwardly beyond and at right angles to said housing and pivotally engaging and supporting said door between them.

17. In a spring hinge construction including a door frame having a door, a plate adapted to be attached to the inner side of said frame, said plate provided with a bearing projecting outward beyond said housing and having its outer end open and adapted to engage and pivotally support said door, and said plate further provided with means for engaging and definitely positioning said spring in respect to the plate and the door.

18. A frame having a door opening and a door therefor, a plate attached to the inner side of said frame and at each side of said door opening, a bearing carried by each plate and extending outwardly and pivotally engaging and supporting the door, a pair of springs, a pair of links connecting said springs to the door, said

links passing through and adapted to abut said plates when the door is swung to an open position, means to clamp said springs to said plates, and means on said plate for definitely positioning the springs thereon prior to their being clamped thereto.

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