July 4, 1950 E. A. JONES ET AL 2,513,414

OVEN DOOR AND HINGE CONSTRUCTION

Filed Nov. 4, 1944 2 Sheets-Sheet 1

Fig. 1.

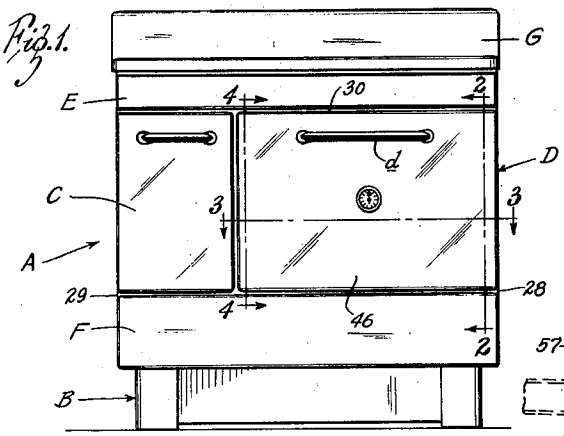


Fig. 2.

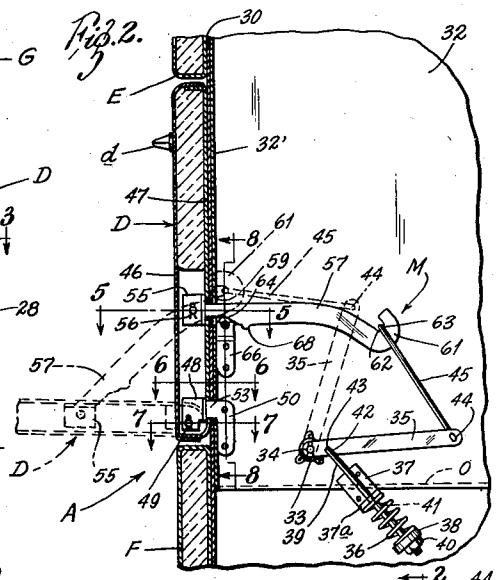


Fig. 3.

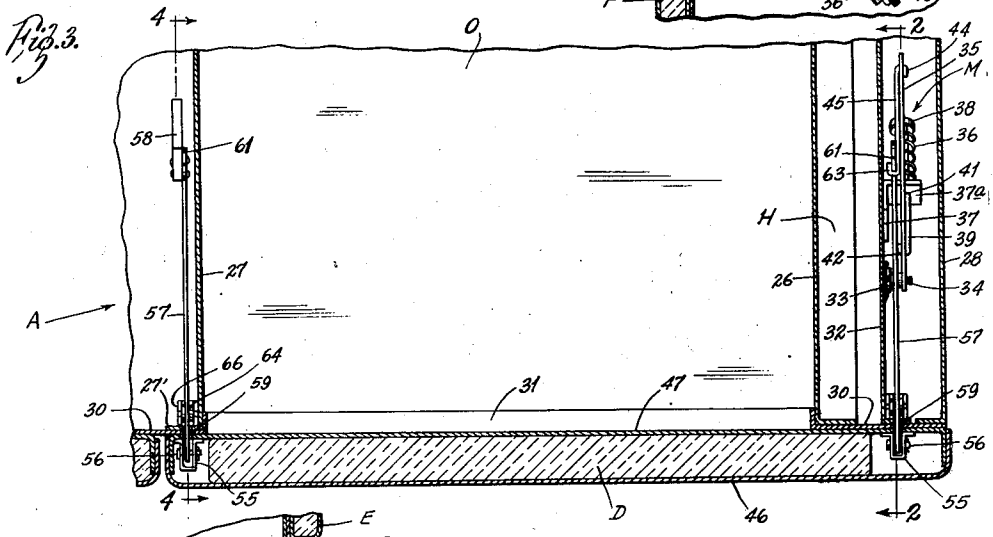
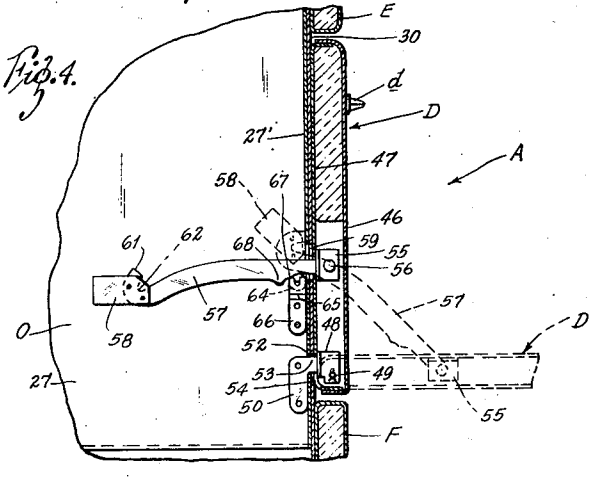


Fig. 4.



INVENTORS:
EDWIN A. JONES,
ROBERT E. GARDINER,
BY Kingsland Rogers & Ezell
ATTORNEYS.

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Fig. 5.

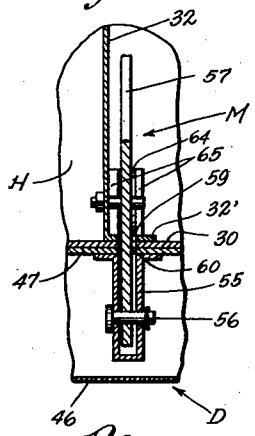


Fig. 6.

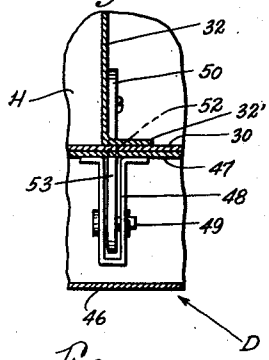


Fig. 7.

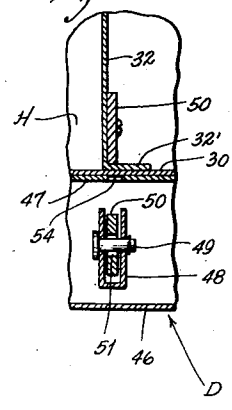


Fig. 8.

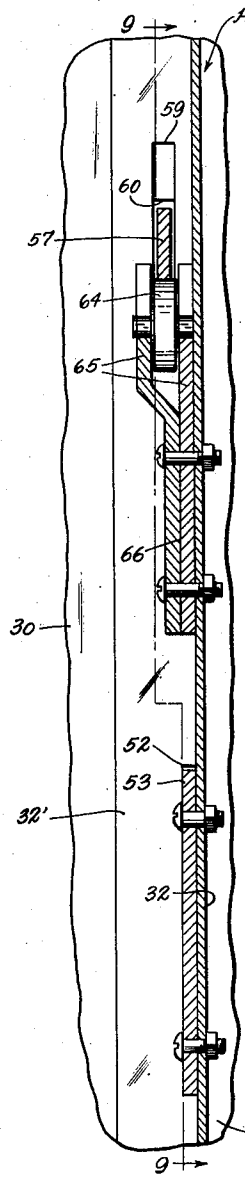
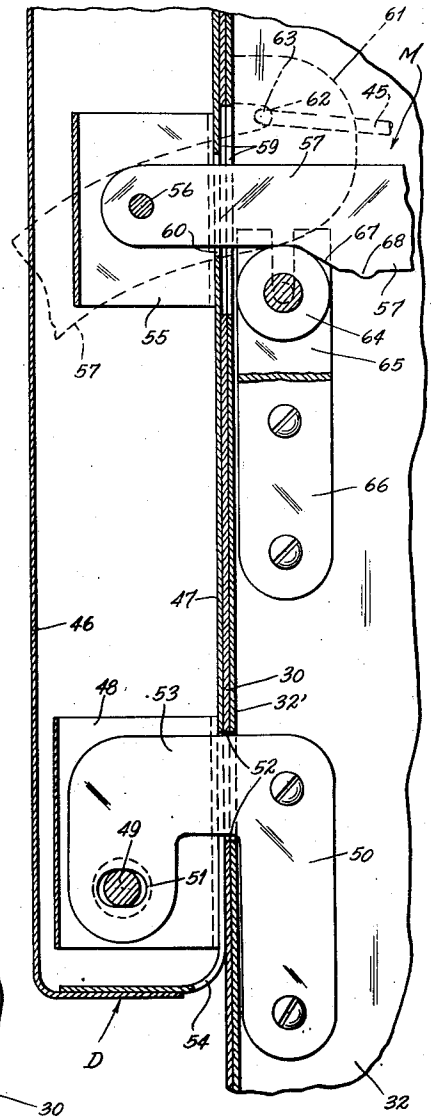


Fig. 9.



INVENTORS:
EDWIN A. JONES,
ROBERT E. GARDINER,
BY Kingsland Rogers & Ezell
ATTORNEYS.

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OVEN DOOR AND HINGE CONSTRUCTION

Edwin A. Jones, Webster Groves, and Robert E. Gardiner, University City, Mo., assignors to Majestic Manufacturing Company, St. Louis, Mo., a corporation of Missouri

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4 Claims. (Cl. 126—191)

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Generally, the present invention relates to improvements in oven door constructions. More particularly, it concerns improvements in the operating mechanism associated with the opening and closing of oven doors which swing vertically, are hinged at the bottom, and whose hinged connections with the body of a range, or the body of a commercial baking and roasting structure, are entirely or at least partially concealed.

As at present constructed, oven doors of this type frequently fail to achieve their primary purpose, which is to seal the oven opening against the escape of heat during baking and roasting operations.

Such failure may be due to any one of a number of causes, or to a combination of them. As an illustration, a slight irregularity at one point in the oven opening surrounding face of the front panel frequently tends to prevent the major portion of the oven door from contacting said face, thus obviously permitting the escape of a considerable amount of heat. Again, such an irregularity may exist on the inner face of the door itself producing a similar unfavorable condition.

The disadvantages enumerated above are permanent ones, and one object of this invention is to overcome, or at least minimize, the heat loss resulting from such structural imperfections, by the provision of a novel door operating mechanism adjacent the sides of the oven in cooperation with a novel hinge arrangement provided on the oven door proper.

Non-permanent disadvantageous conditions also frequently arise during baking and roasting operations, due to variations resulting from expansions and contractions in the contiguous surfaces of the front panel and the oven door of present constructions, accompanied by attendant heat losses of variable degrees.

A further object of the invention is to overcome, or at least reduce to a minimum, these heat losses by providing the oven door with a compensating hinge arrangement cooperable with an adjustable spring-controlled linkage mechanism suitably mounted adjacent one or both sides of the oven exteriorly thereof, albeit interiorly with respect to the range or commercial oven to which the invention is applicable.

Oven doors, as well as the oven-surrounding portions of the front panel contiguous thereto, frequently warp, thereby creating a similar heat-loss condition. The present invention also proposes to remedy, at least to some extent, a defective condition of this kind.

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Other features and objects will be apparent or pointed out in the following description and in the drawings which form a part of this specification. The specific constructions illustrated, though preferred, are subject, of course, to modifications within the scope of the appended claims.

In the drawings:

Fig. 1 is a front elevational view of a range embodying the invention;

Fig. 2 is a fragmentary vertical sectional view on the line 2—2 in Figs. 1 and 3;

Fig. 3 is a fragmentary horizontal sectional view on the line 3—3 in Fig. 1;

Fig. 4 is a fragmentary vertical sectional view on the line 4—4 in Figs. 1 and 3;

Figs. 5, 6 and 7 are enlarged fragmentary sectional views taken substantially on the lines 5—5, 6—6 and 7—7, respectively, in Fig. 2;

Fig. 8 is a fragmentary vertical sectional view on the line 8—8 in Fig. 2; and

Fig. 9 is a similar view taken on the line 9—9 in Fig. 8.

With particular reference to Figs. 1–9, inclusive, a range, generally indicated A, is mounted on and supported by a suitable base B. A conventional fire door C is provided, as are ornamental panels E and F and the usual backguard G. The oven door of the invention is generally indicated D, and the operating mechanism therefor is generally indicated M. The door D is of the type that is hinged at the bottom and is provided with a handle *d* whereby it may be swung vertically from open to closed position or vice versa. The oven O has its right and left side walls 26 and 27 spaced from the right and left end walls 28 and 29, respectively, of the range. It may otherwise be of conventional construction.

As shown in Fig. 3, the front panel or wall 30 of the range has formed therein a flanged oven opening 31, the flange being turned inwardly and adapted to be welded or otherwise rigidly secured to the adjacent portions of the oven casing. A vertical partition wall or panel 32, extending from the front wall 30 to the rear wall (not shown) of the range, and rigidly held in place by welding or other securing means, is located intermediate the side wall 26 of the oven and the end wall 28 of the range body.

The door operating mechanism M, which will presently be described, is mounted on and supported by the said partition wall, which, incidentally, in conjunction with the side wall 26 of the oven and the front and rear walls of the casing, forms a down flue H for the products of combustion. Thus, the operating mechanism is

shielded from the grime and soot unavoidably present in a range of the type illustrated. It should, however, be noted that the invention is not limited to coal or wood burning ranges, as will appear.

As shown in Figs. 2 and 3, a bracket **33** provided with a laterally extending stud or pivot pin **34** is rigidly secured to the panel **32**. Pivotally mounted on the stud **34** and held in place by a cotter pin or the like is a link **35** which, when the door D is in closed position, is yieldingly maintained in an approximately horizontal position by means of a compression spring **36** interposed between an angular bracket **37** fixed to the panel, and a spring-seat **38**.

The spring-seat is adjustably maintained on the threaded lower end of a rod **39** by means of a nut **40**. The laterally extending portion **37a** of bracket **37** is provided with an aperture **41** through which the rod **39** passes. The spring **36**, as shown in the drawings, surrounds that portion of rod **39** extending between abutment **37a** and spring-seat **38**.

The upper end of rod **39** terminates in a reversely bent or hook portion **42** engageable in a hole **43** formed in one end of the link **35** a slight distance from the pivot **34**. The opposite end of link **35** is apertured to receive the lower end hook portion **44** of a rod **45** whose upper end terminates in a similar hook formation for a reason to be later explained.

The oven door D is preferably constructed of a front panel **46** and a back panel **47** in spaced relation, with suitable insulating material between them, and with their marginal flanges welded or otherwise secured together in overlapping relation as shown in the drawings. Welded, or otherwise secured to the inner face of the rear door panel **47** near each bottom corner thereof, is one of a pair of aligned channel-shaped hinge brackets **48**, each pivotally connected by a pin **49** to a stationary hinge member **50**, whose configuration is best seen in Fig. 9. The hinge member **50** to the right is permanently fastened to the panel **32**, while the one on the left is secured to the left side wall **27** of the oven.

Attention is directed to Figs. 7 and 9, wherein it is seen that the apertures in each bracket **48** through which the pivot pin **49** passes are of a size to snugly embrace the pin, while the aperture **51** in each member **50** is in the form of an elongated slot. Suitable openings **52** are provided in the front wall **30**, the flange **32'** of the panel **32** and the flange **27'** of oven wall **27** to accommodate the forwardly extending horizontal portion **53** of the hinge members. The door panel **47** likewise has elongated openings **54** therein to permit the oven door D to swing about the pivot **49** as is understood.

Welded or otherwise fastened to the inner face of the rear door panel **47** are two aligned hinge brackets **55**, similar to the brackets **48**, and located directly thereabove. One of these brackets has a pivotal connection **56** with one end of a second link **57** included in the operating mechanism M. The other has a similar connection with an identical link to which a counterweight **58** is attached. Openings or slots **59** and **60** analogous to the openings **52** and **54**, respectively, are provided for the links **57** as shown.

The ends of the links **57** remote from the pivots **56** terminate in a reversely curved stop portion **61** whose formation is such as to provide a notch **62** therein. Notch **62** of the link **57** included in the operating mechanism M is engaged by the aforementioned hook portion of rod **45**, designated by the numeral **63**. In the embodiment illustrated, the notch **62** in the counterweight carrying link **57** is not utilized. It is to be understood, however, that the invention also contemplates the installation of an identical operating mechanism M on the left side of the oven when warranted, for instance, on doors of large commercial ovens. In such installations, the counterweight **58** is dispensed with.

During opening and closing movements of the door, each link **57** rides over a roller **64** loosely journaled in the bifurcated upper ends **65** of a pair of stationary supports **66**, one of which is attached to panel **32**, the other to the side wall **27** of the oven. The arrangement is illustrated clearly in Figs. 8 and 9, where it is also seen that the link **57** is angularly offset as at **67**, and that said offset portion is so located as to be in contact with roller **64** when the oven door is in its closed position. Adjacent said offset, each link is also provided with a downwardly extending hump **68**.

Operation

The manner in which the various elements operate should now be apparent from an inspection of the drawings. The appearace of the parts when door D is in its closed or normal position is shown in full lines throughout the various views, while the broken lines indicate the relative positions they occupy when door D is in its open position.

To open the oven door, the handle *d* is grasped and swung vertically downwardly. Initially, the downward travel of the door is retarded slightly by the offset **67** and the hump **68**. But since the adjacent end of the link **57** is pivoted while the opposite end thereof is yieldingly held against the roller by spring **36**, via rod **45**, link **35**, and rod **39**, as is understood, this initial resistance is easily overcome. Further downward movement of the door may follow, the links **57** riding smoothly over their respective rollers **64** until their stop portions **61** impinge against the flanges **32'** and **27'** above the slots **59**, at which time the door comes to rest in a horizontal plane. Due to the location of the brackets **55**, the oven door in this position, while also supported by the hinge arrangements **48**, **49**, **50**, receives its principal support from the arms **57**.

To close the door, handle *d* is grasped and swung vertically upwardly until the inner door panel **47** comes in contact with the front panel **30** of the range about the oven opening. It is at this time that the mechanism M in conjunction with the elongated slot **51** attains its primary objective, which is to effectively seal the oven opening against the escape of heat therefrom.

As the door approaches the end of its closing operation, the humps **68** engage the stationary rollers **64**, retarding a too rapid travel at that time, and obviating any tendency of the door to slam. By means of the humps **68** in conjunction with said rollers, the door may also be left ajar when it is desired to cool the oven.

In its closed position, door D is supported by the hinge parts **48**, **49**, **50**, which maintain it constant insofar as vertical movements are concerned. Horizontal movements, however, may be had toward or away from the face of the front panel **30** because of the configuration of the aperture **51**. Thus, the door D, under the action of spring **36**, may accommodate itself to irregularities in the front panel **30** or irregularities in

the back panel of the door itself. The spring 36, by means of its associated rod 39, link 35, rod 45 and link 56, exerts a "pulling" action on the door to maintain it firmly against the front panel 30 at all times.

The irregularities under consideration may result from defects in manufacture or in material, uneven expansion or contraction of contiguous parts when subjected to heat or cold, warping, etc. Whatever the cause, the location of the pivotal connection 56 between the door and the mechanism M, coupled with the horizontally elongated aperture 51 in the hinge member 50, imparts to the oven door D sufficient flexibility, so to speak, to enable it to automatically adjust itself into its most effective sealing position about the oven opening.

Fortuitous opening of the oven is obviated by the offsets 67 of links 57. Smooth operation during door opening and closing is assured by the counterweight 58, in installations wherein it is employed. The offsets 67 also provide a wedging action to maintain the door securely closed, the spring and counterweight at such time exerting a considerable downward pull on the links. The offsets transfer this to a horizontal pull, so that an increased closing force is exerted when the door is in the fully closed position.

Obviously, the form of the invention illustrated may be modified in some respects without departing from the scope of the invention.

What is claimed is:

1. A door construction for an oven having an opening surrounding face including a first pair of aligned hinge brackets in spaced relation rigidly secured to the door, a pair of aligned hinge members rigidly secured adjacent the oven, means supporting said brackets and supported by said hinge members adapted to support the door in its closed position and during swinging movements thereof from closed to open position or vice versa, a second pair of aligned hinge brackets in spaced relation to one another and to the first pair rigidly secured to the door, a spring-controlled linkage pivotally mounted on either side of the oven including a principal link, a roller journaled in a stationary bracket in constant contact with the underside of the principal link of each linkage, an offset on each principal link adapted in cooperation with the roller to prevent fortuitous opening of tne door, a pivotal connection between one end of each said principal link and one of said second pair of hinge brackets, a reversely curved stop portion formed on the other end of each principal link to limit the downward movement of the door, a hump formed on each principal link adjacent the offset thereon adapted to retard the movement of the door as it approaches the end of its closing movement, and also adapted to maintain the door ajar when desired, and means included in the door supporting hinge arrangement adapted in cooperation with said linkage to automatically maintain the closed door firmly against the opening surrounding face of the oven regardless of irregularities present in said face or in the rear panel of said door.

2. Automatically adjustable closure means for an oven opening including, a door, spaced hinge assemblies to support the door near the bottom thereof, each assembly including a hinge pin and two hinge members, means loosely connecting the hinge pin and one of the two hinge members included in each assembly, at least one linkage adapted in cooperation with said hinge assemblies to maintain the door in adjusted position firmly closing the oven opening to effectively seal the same, said linkage comprising a first link adapted to be pivotally mounted on a side wall of the oven, a second link pivotally connected at one end to the door intermediate the top and bottom thereof, a rod connection between the other end of the second link and the free end of the first link, a stationary support, a roller journaled in said stationary support in contact with the underside of the second link, a stationary bracket, a rod slidably carried in said stationary bracket and connected at its upper end to the first link, a spring seat attached to said rod, a coil spring surrounding said rod and interposed between a portion of said stationary bracket and said spring seat, and a nut engaging the threaded lower end portion of the rod to maintain the spring seat in proper position and to increase or decrease the tension of said spring.

3. In combination with a range including a casing having a front wall, end walls, an oven and an oven opening, a door for said opening comprising a front panel and a rear panel in spaced relation, means for supporting the door in its closed position comprising spaced hinge members attached to the casing and cooperating hinge brackets attached to the door, a hinge pin journaled in registering circular apertures in each hinge bracket and passing through an elongated horizontally disposed slot in each hinge member providing the pivotal connection, means for limiting the downward travel of the door and for supporting same in its open position comprising a pair of links pivotally connected to the door at opposite sides and intermediate the top and bottom thereof and having a stop portion formed on their free ends, a roller journaled intermediate the oven and the end wall of said casing for supporting one of said links during door opening and closing movements, a similar roller attached to one end wall of the oven for supporting the other of said links, an offset formed in each link engageable by its associated roller to prevent fortuitous opening of the door, a counterweight secured to one of the links, and means connected with the other link adapted to effectively maintain the door yieldingly but firmly against the front wall of the casing about the oven opening.

4. In combination with a range including a casing having a front wall, end walls, an oven and an oven opening, a door for said opening comprising a front panel and a rear panel in spaced relation, means for supporting the door in its closed position at the bottom comprising spaced hinge members attached to the casing and cooperating hinge brackets attached to the door, a hinge pin journaled in registering circular apertures in each hinge bracket and passing through an elongated horizontally disposed slot in each hinge member providing the pivotal connection, means for limiting the downward travel of the door and for supporting same in its open position comprising a pair of links pivotally connected to the door at opposite sides and intermediate the top and bottom thereof and having a stop portion formed on their free ends, a roller journaled intermediate the oven and the end wall of said casing for supporting one of said links during door opening and closing movements, a similar roller journaled at and rigidly attached to one end wall of the oven for supporting the other of said links, an offset formed in each link engageable by its associated roller to prevent fortuitous opening of the door, a downwardly extending hump formed in each

link adjacent the offset therein, a counterweight secured to one of the links, and means connected with the other link adapted to effectively maintain the door yieldingly but firmly against the front wall of the casing about the oven opening, a partition panel in the range, a bracket rigidly attached to said partition panel, said last means comprising a link having an aperture in one end and a stud formed on said bracket rigidly attached to said partition panel, said link being pivotally carried by said stud, a rod terminating in hook portions connecting the free end of said link with the free end of one of said first mentioned pair of links, an angular bracket having a lateral extension secured to the bracket supporting panel, a rod slidably received in an aperture in said lateral extension, said rod having an upper end terminating in a hook portion engaging said aperture in said stud supported link, a spring seat adjustably mounted on the threaded lower end of said rod, a nut to maintain the spring seat in adjusted position, and a coil spring surrounding a portion of the rod and interposed between said apertured lateral extension of the stationary bracket and the spring seat.

EDWIN A. JONES.
ROBERT E. GARDINER.

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