

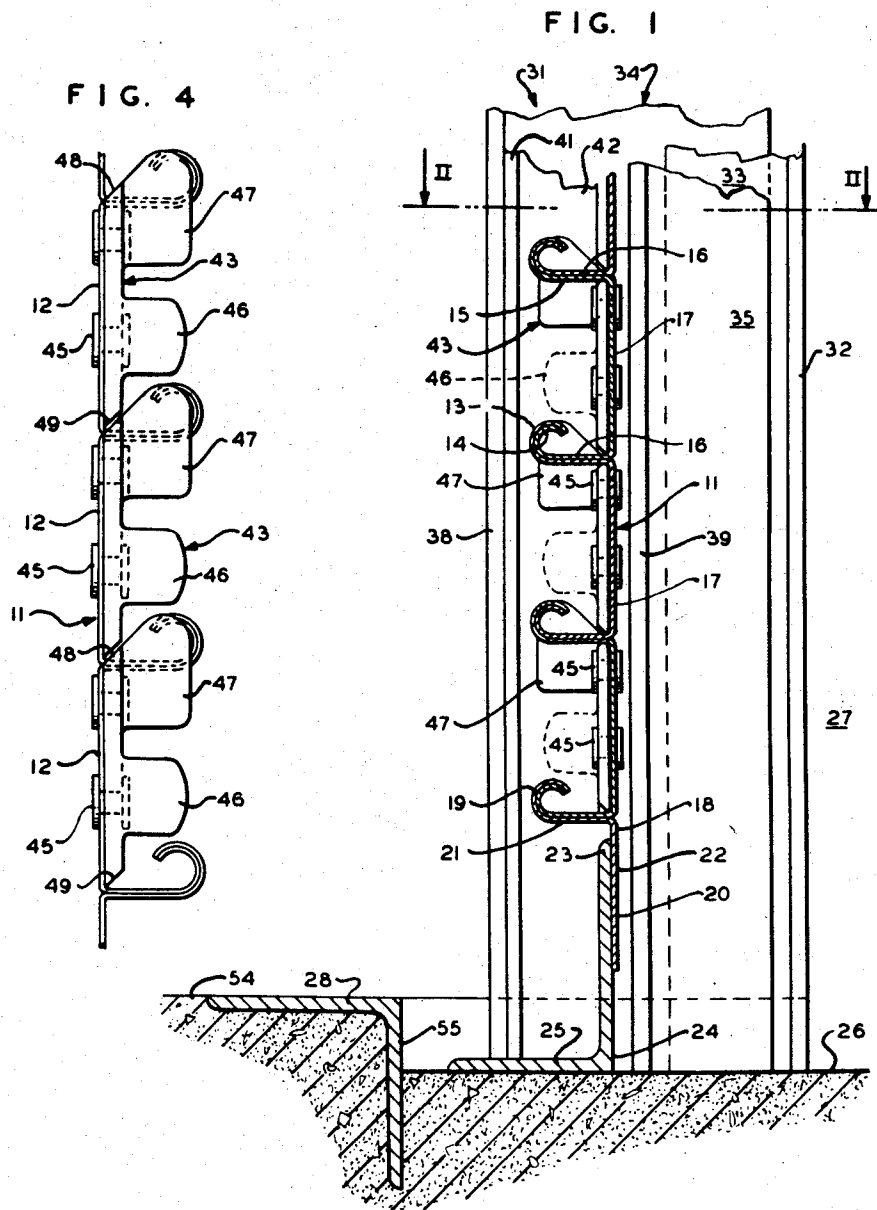
Feb. 5, 1963

M. B. ZOLL ETAL
SLATS FOR ROLLING METAL DOORS

3,076,500

Filed April 30, 1962

4 Sheets-Sheet 1



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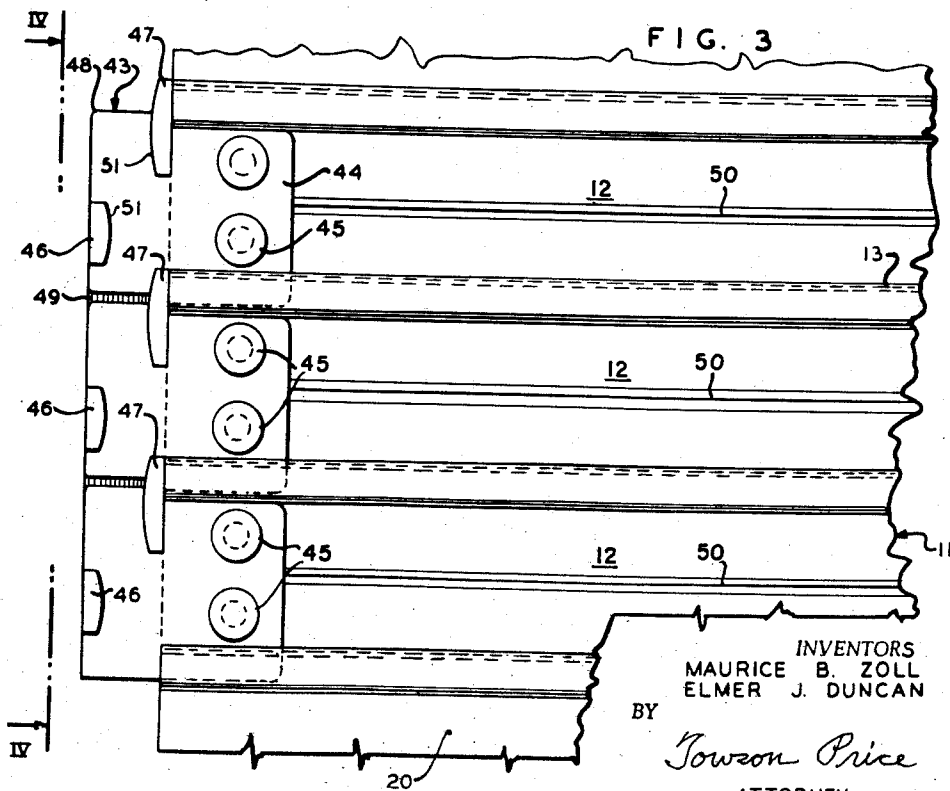
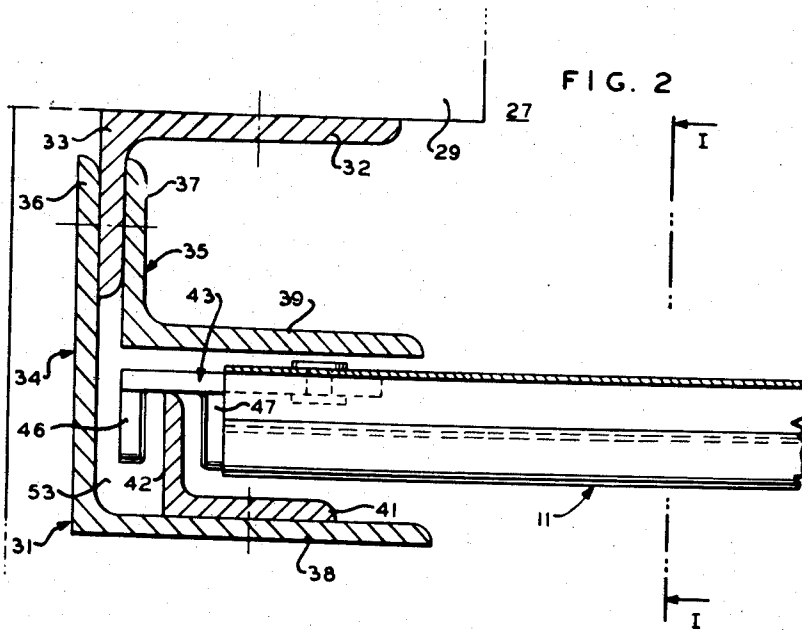
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4 Sheets-Sheet 2



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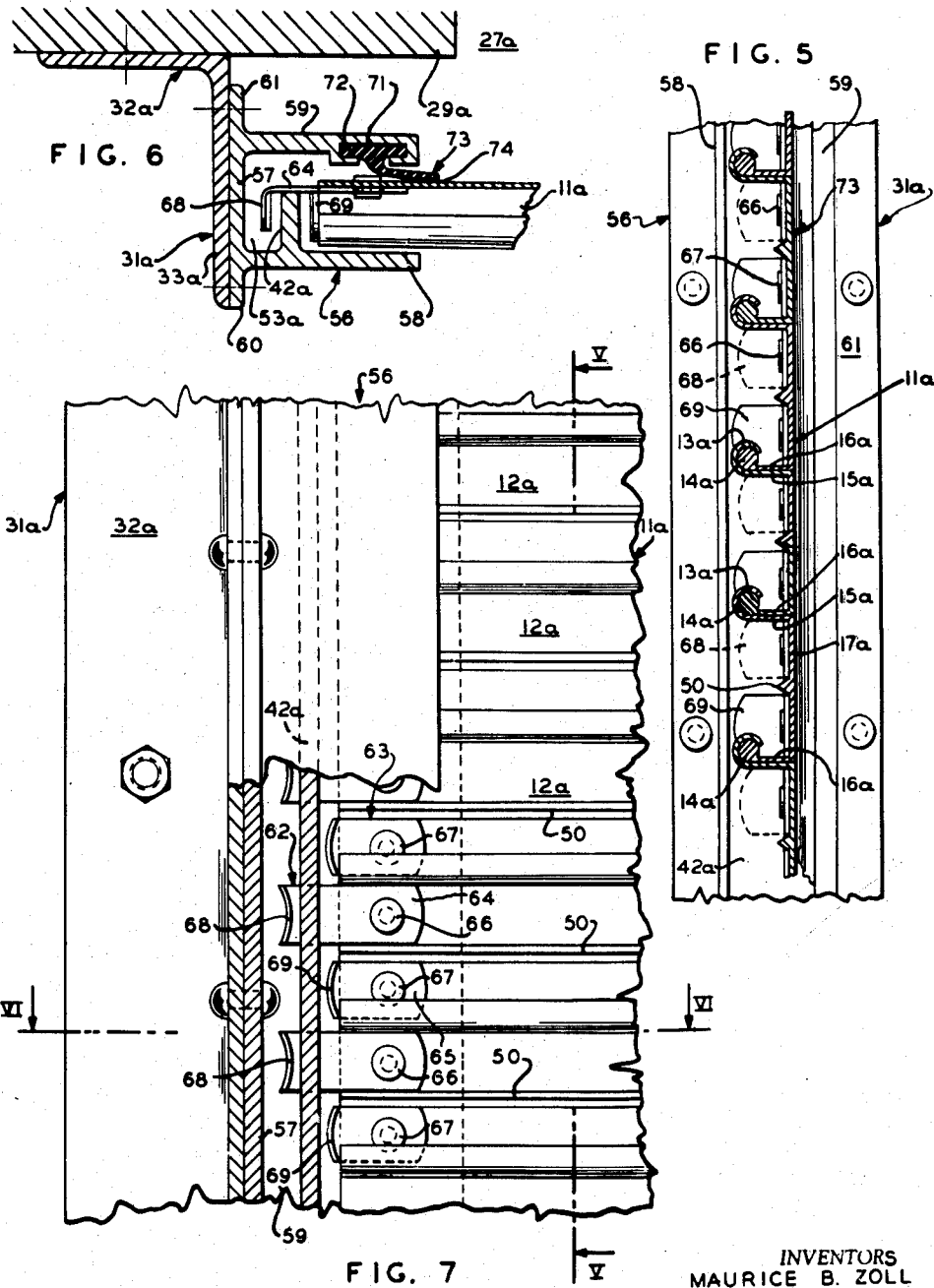
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SLATS FOR ROLLING METAL DOORS

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4 Sheets-Sheet 3



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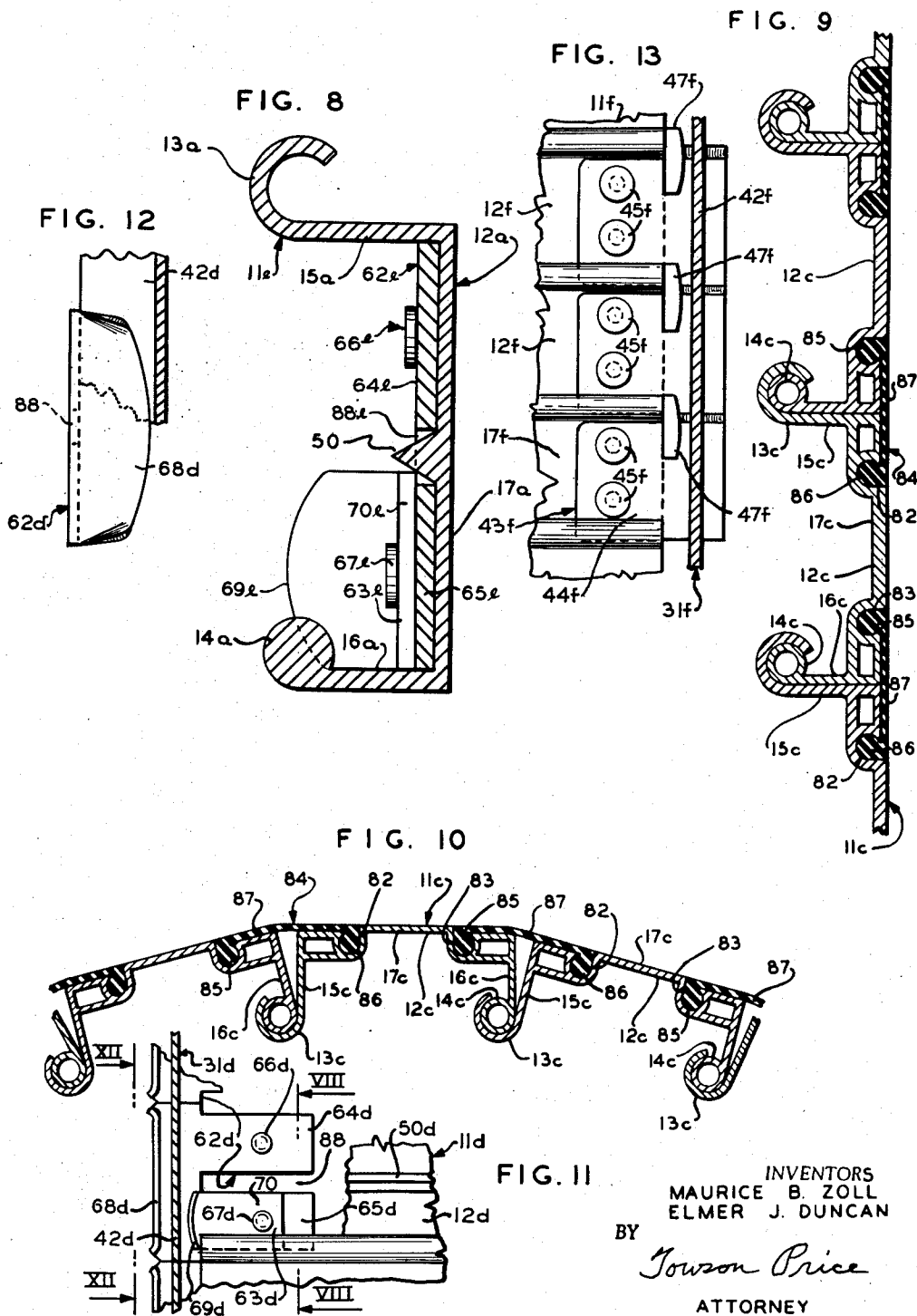
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4 Sheets-Sheet 4



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3,076,500

SLATS FOR ROLLING METAL DOORS

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Filed Apr. 30, 1962, Ser. No. 191,006
7 Claims. (Cl. 160-236)

This application is a continuation-in-part of our pending application Serial No. 760,160, filed September 10, 1958.

This invention relates to closures in the form of metal doors composed of jointed or interengaging slats and, more particularly, to the form of such slats. Such doors are mounted for vertical reciprocation or up-and-down movement with regard to a door frame or structure presenting an opening to any space and, when in closed position, substantially sealing that frame against the passage of fluid, without the need of flexible sealing strips, but adapted for use therewith if desired.

Such doors may be used by themselves or in combination with other elements for closing openings, either with or without safety mechanism to prevent them from being lifted from the outside by unauthorized persons. The advantages of our new rolling metal doors or closures lie not only in the general construction of such but also in the means sealing the lateral edges thereof against the passage of fluid, particularly water, and preventing lateral shifting of said doors in the planes of their slats.

An object of our invention is to provide a rolling metal door consisting of interengaging slats, with means supporting the door for up-and-down movement with respect to a frame, means being employed for guiding each lateral edge of the door, including a flange extending along each of said edges, members secured to the end portions of said slats and cooperating with said guiding means, said members comprising portions secured to said slats and with lugs outstanding therefrom and lying on one side of the flange of the adjacent guiding means, other lugs outstanding therefrom and lying on the other side of said flange, the means supporting said door being such that at least some of the secured portions of said members lie in sealing engagement with the free edge of the cooperating flange, and the flanges guide the door in its up-and-down movement with said lugs preventing undesired displacement of the door.

Another object of our invention is the provision of flexible means for sealing the joints between adjacent slats of a door, even when the door is flexed as when rolled up on a supporting device.

A further object of our invention is the provision of a rolling metal door consisting of slats hinged with respect to one another, and guiding means at the ends of said slats including parts which perform the additional function of end locks for preventing longitudinal displacement of said slats with respect to one another.

A still further object of our invention is to provide novel forms of slats particularly adapted to serve as parts of rolling metal doors, said slats being of such construction that they efficiently seal said doors against the flow of air and water past the vertical edges thereof.

These and other objects and advantages will become apparent from the following detailed description when taken with the accompanying drawings. It will be understood that the drawings are for purposes of illustration and do not define the scope or limits of the invention, reference being had for the latter purpose to the appended claims.

In the drawings, wherein like reference characters denote like parts in the several views:

FIGURE 1 is a fragmentary vertical sectional view of

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a rolling metal door embodying our invention, on the line I—I of FIGURE 2, in the direction of the arrows.

FIGURE 2 is a fragmentary plan of the door and one of the guides for a lateral edge thereof, with parts in horizontal section on the line II—II of FIGURE 1, in the direction of the arrows.

FIGURE 3 is a fragmentary inside elevational view of the door of FIGURE 1, or in a direction from the left of said figure.

FIGURE 4 is a fragmentary end elevational view in the direction of the arrows on the line IV—IV of FIGURE 3.

FIGURE 5 is a fragmentary vertical sectional view of a modification, on the line V—V of FIGURE 7, in the direction of the arrows.

FIGURE 6 is a fragmentary horizontal sectional view on the line VI—VI— of FIGURE 7, in the direction of the arrows.

FIGURE 7 is a fragmentary interior elevational view, or one from the left of FIGURE 5.

FIGURE 8 is a transverse sectional view of the novel form of slat illustrated in FIGURE 5, as on the line VIII—VIII of FIGURE 11 in the direction of the arrows, but separated from the associated door elements, showing a modified form of guide member, and to a larger scale.

FIGURE 9 is a fragmentary vertical sectional view showing a further embodiment of our rolling metal door, the slats thereof being shown in coplanar or normal positions.

FIGURE 10 is a view corresponding to FIGURE 9, but showing the slats in angled positions, as when the door is rolled up or raised.

FIGURE 11 is a fragmentary front elevational view corresponding to FIGURE 7 but showing a modification.

FIGURE 12 is a fragmentary end elevational view on the lines XII—XII of FIGURE 11 in the direction of the arrows.

FIGURE 13 is a fragmentary inside elevational view of the right hand edge portion of a door like that of FIGURES 1 to 4, inclusive, but slightly modified.

Referring to the drawings in detail, and first considering the embodiment of our invention illustrated in FIGURES 1 to 4, inclusive, there is shown the fragmentary left hand portion of a rolling metal door, generally designated 11, which may be connected to, operated by, and rolled up on a reel, not shown, but which may be conventional as illustrated, for example, in the Greeger Patent No. 1,989,513, or in the Zoll copending application, Serial No. 623,398, filed November 20, 1956, now Patent No. 2,898,988, dated August 11, 1959 and owned by the assignee of the present application. The right hand portion of the door 11, and other doors to be later described, may correspond with, and be guided in a similar manner, although turned left to right, or as viewed in FIGURE 13.

The door 11 consists of a plurality of metal slats 12, each of which has edge portions rolled or turned to generally cylindrical form, as indicated at 13 and 14, to desirably closely receive in or be desirably closely received by the correspondingly rolled edge of an adjacent slat. In the present embodiment, these rolled edges are formed respectively on flanges 15 and 16, extending from, and at the extreme lateral edges of, the inner surfaces of webs 17. The webs 17 may be flat on both sides, as illustrated in FIGURES 1 and 2, or formed with a longitudinally extending bead or boss, designated 50 in FIGURE 3, because it may correspond with that so designated in the embodiment of FIGURES 5 to 8, inclusive. Although we do not wish to be limited to the material forming the slats, which may be of any durable metal, in the present embodiment a preferred material is stainless steel.

By virtue of the interengaging rolled or generally cylin-

drical edge portions of the slats, the same may be hinged with respect to one another and relatively angled during a raising or rolling-up operation. The slats are hingedly assembled with respect to one another by inserting one end of each of the smaller rolled edges, such as those designated 14, in the opposite end of the larger rolled edge such as that designated 13 of the adjacent slat, and sliding said slats longitudinally with respect to one another until they lie with their corresponding ends disposed in the same vertical lines as viewed most clearly in FIGURE 3.

Each door 11 may be terminated at its lower end by a special slat 20, the upper edge of which is rolled, as indicated at 19, at the end of a flange 21, the remainder of the slat being a flat web or depending portion 22 secured to the upstanding flange 23 of an angle iron 24. The other or lower flange 25 of said angle iron is adapted to lie flat on the ground or pavement 26 outside of a door opening 27. The latter may be defined by a sill 28 in the form of an angle iron, and vertical side members 29 only one of which is illustrated. Each lateral edge of the door 11 is slidable in a guide generally designated 31.

In the present embodiment, each guide 31 consists of a fixed metal angle iron 32, secured to a vertical door frame side member 29 and with a flange 33 projecting therefrom. Pairs of angle irons 34 and 35 have flanges 36 and 37, respectively, engaging opposite faces of the flanges 33 and are secured thereto in any desired manner as by means of rivets, not shown. The other flanges 38 and 39 of said angle irons 34 and 35, respectively, are spaced from one another as shown most clearly in FIGURE 2 to receive a lateral edge portion of the door 11. Each of the flanges 38 has secured thereto in any desired manner a fourth metal angle iron 41 which has a flange 42 which has a generally straight free edge and projects therefrom toward a flange 39 to form a seal as well as the guides for the corresponding lateral edges of the door 11.

In order to provide means at each lateral edge of the door 11 to cooperate with a flange 42 and prevent undesired displacement of the door in the plane of its slats, we secure at each end of each slat a guide member 43 comprising a generally flat web or other portion 44 directly secured to the inner face of the web 17 of its slat, as by means of rivets 45, desirably formed of aluminum or aluminum alloy. Extending from each web 44 in the same direction as the flanges 15 and 16 is a lug 46 adjacent the outer side edge of each member 43 and a lug 47 disposed laterally inward, and vertically, in this case upwardly, offset or displaced therefrom so as to overlap the member 43 thereabove and the corresponding hinged connection between a pair of slats, thereby lying along the ends of the slats and providing an end lock to prevent lateral displacement of the slats with respect to one another. Even if the lugs 46 were omitted, lateral displacement of the door would be prevented by the lugs 47 engaging the right side of the illustrated flange 42 and the corresponding lugs 47 at the other ends of the slats engaging the left side of the corresponding flange 42 at the other lateral edge of the door.

In the present embodiment, although each of the members 43 is desirably formed as an aluminum or aluminum alloy casting and the edges are closely bevelled, as indicated at 48 and 49, so as to overlap the correspondingly bevelled edges of adjacent members to thereby further inhibit the leakage of fluid between slats, we do not wish to be limited to the material used or the manner of shaping it. When a door is in place, the lugs 46 and/or 47 lie on the right and left, that is, the opposite sides of the guide flanges 42 or in straddling relationship and desirably have their flange-adjacent faces 51 formed convex or cylindrical to prevent biting into the adjacent sides of said flange 42 upon vertical reciprocation of the door.

From the foregoing it will be seen that if water or other fluid attempts to go through the door opening 27 to the inside of the door 11, it has to pass from the outside between the flanges 39 of the angle irons 35 and the sides edges of the door 11 around the guide member webs 44 and their lugs 46, where it is effectively stopped by the flat metal-to-metal engagement between said webs 44 and the edges of the flanges 42 of the angle irons 41 which thereby forms an effective seal, as viewed most clearly in FIGURE 2. Also, any water reaching the space 53 in which the lugs 46 are disposed will drain downwardly to the bottom of the door, thereby discharging on the surface 26 which, as viewed in FIGURE 1, is below the floor or surface 54 inside of the door 11. Any water, of course, passing under the bottom angle iron 24 will not usually get to the floor 54 because it will be stopped by the depending flange 55 of the angle iron 28. Thus the members 43 perform the double function of preventing undesired lateral displacement, or such in the plane of the door 11, and providing a durable metal-to-metal seal against the passage of fluid around the side edges of the door.

Referring now to the embodiment of our invention illustrated in FIGURES 5, 6, 7 and 8, there is shown a door 11a similar to that of the first embodiment except that the slats and some of the associated parts are formed somewhat differently. Specifically, the door 11a consists of a plurality of metal slats 12a, desirably of cross-section as illustrated most clearly in FIGURE 8, which slats may be formed from aluminum or an alloy thereof by an extrusion process rather than by rolling. One edge of each slat, in this case upper, may be formed hollow and slightly more than semi-cylindrical, as indicated in 13a, and the other, in this case the lower edge portion 14a, instead of being hollow, as in the previous embodiment, may be solid and somewhat more than semi-cylindrical and of corresponding size to be hingedly received in the turned edge portion 13a of the adjacent slat. As in the preceding embodiment, these edge portions are formed on the edge portions of flanges 15a and 16a, respectively, extending from the inner surfaces of webs 17a. Each web 17a, in the present embodiment, is desirably reinforced by a longitudinally extending bead or boss 50, desirably triangular in cross-section, thereby presenting a pleasing appearance. Each boss 50 thus provides means against which adjacent members may abut. For example it presents sloping sides serving to guide the adjacent associated members 62 and 63, to be later discussed in detail, to seating engagement on the web 17a.

By virtue of the interengaging generally cylindrical portions of the slats, the same are hinged with respect to one another and may be relatively angled during a raising or rolling-up operation. The slats are assembled with respect to one another by inserting one end of the solid bead 14a in the opposite end of the hollow cylindrical edge portion 13a of the adjacent slat and sliding said slats longitudinally with respect to one another until they lie with their corresponding ends disposed on the same vertical lines, as viewed most clearly in FIGURE 7.

The door 11a may be terminated at its lower end by a special slat formed generally like that designated 20 of the preceding embodiment, except that it may be extruded rather than rolled. It may have secured to its flat depending portion the upstanding flange of an angle iron as in the preceding embodiment. Each lateral edge of the door 11a is slidable in a guide generally designated 31a.

In the present embodiment, each guide 31a consists of an angle iron 32a secured to a door frame member 29a by suitable means such as bolts, not shown, and with a flange 33a projecting therefrom. A special structural member 56 is connected to each of flanges 33a by suitable means such as rivets, not shown. Each structural member 56 is generally U-shaped in section and consists of a base 57 from which extend flanges 58 and

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59. Flanges 60 and 61 extend beyond the flanges 58 and 59, respectively, to provide portions through which the attaching rivets, if used, may extend. Each of the flanges 58 has projecting therefrom toward the corresponding flange 59, an interior flange 42a to form the guides for the corresponding lateral edges of the door 11a.

In order to provide means at each lateral edge of the door 11a to cooperate with a flange 42a and prevent lateral displacement of the door in the plane of its slats, we secure at each end of each slat a pair of, rather than a single guide member, said guide members being here designated 62 and 63. In the present embodiment, the guide members may be formed of sheet metal rather than cast. They comprise base portions 64 and 65 respectively disposed between the slat boss 50 and the flange 15a thereof, and said boss and the flange 16a thereof and respectively secured to said web as by means of rivets 66 and 67. At the outer ends of said base portions 64 and 65 are respectively provided lugs 68 and 69.

The guide members 62 and 63 are so formed and connected to the slats that one of them, in this case the member 62, has its lug 68 laterally offset with respect to the lug 69 on the member 63 so that said lugs may lie on opposite sides of the flanges 42a, as viewed most clearly in FIGURE 6, one of said lugs, in this case that designated 69, being of such width that it overlaps the bead 14a of its slat, thereby providing an end lock to prevent lateral displacement of the slats with respect to one another.

Although in the present embodiment each of the members 62 and 63 are shown separate from one another yet each pair may be joined as a unitary member, following the showing of the first embodiment. Each is formed desirably of material such as stainless steel and the rivets, 66 and 67, are desirably formed of aluminum or an alloy thereof. We do not wish to be limited in the material used. The lugs 68 and 69 desirably have their faces which are adjacent to flanges 42a formed convex or cylindrical to prevent biting into the adjacent sides of said flanges upon vertical reciprocation of the door.

In order to further weatherproof the joints between the door edges and the special structural members 56, we may find it desirable to form the flanges 59 of said members with inwardly opening pockets 71 for receiving the heads 72 of flexible T-shaped members 73, the stems or projecting portions 74 of which resiliently engage near the side edges the adjacent face of the door 11a, as viewed most clearly in FIGURE 6. It will be understood, however, that such a resilient sealing member need not be employed and if desired it may be employed in any one or all the other embodiments. It may be formed of flexible rubber or rubber-like materials such as "neoprene."

From the foregoing, it will be seen that if water or other fluid attempts to go through the door opening 27a to the inside of the door 11a, it has to pass between the flanges 59 of the special structural members 56 and the side edge portions of the door 11a along the base portions 64 and around the lugs 68 to where it is effectively stopped by the engagement between the base portions 64 of the guide members 62 and the edges of the flanges 42a which form an effective seal as viewed most clearly in FIGURE 6. However, such a seal is not quite as effective as in the preceding embodiment, unless the members 62 and 63 are formed unitary with one another and with a correspondingly extended base, because the base portions 64 do not form a substantially continuous vertical surface like the webs 44 of the cast members 43 of the preceding embodiment. However, this seal is, in the present embodiment, supplemented by the flexible member 73 so that the sealing is sufficiently effective for the purpose. Any water reaching the spaces 53a in which the lugs 68 are disposed will drain downwardly to the bottom of the door, thereby discharging on the surface

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corresponding with that designated 26 in FIGURE 1, just below the floor or surface designated 54 inside of the door.

Referring now to the embodiment of our invention illustrated in FIGURES 9 and 10, there is shown a fragmentary portion of a door 11c which consists of a plurality of metal slats 12c, each of which has edge portions formed generally cylindrical as indicated at 13c and 14c, to receive in or be received by the correspondingly formed edge of an adjacent slat. In the present embodiment these edge portions are formed on flanges 15c and 16c, respectively, extending from the inner surfaces of webs 17c. Although we do not wish to be limited to the material forming the slats, which may be of any durable metal, in the present embodiment the metal is desirably aluminum or an aluminum alloy.

By virtue of the interengaging generally cylindrical edge portions of the slats, the same are hinged with respect to one another and may be relatively angled during a raising or rolling-up operation. The slats are assembled with respect to one another by inserting one end of the smaller cylindrical edge portion, such as that designated 14c, in the opposite end of the larger cylindrical edge portion, such as that designated 13c, of the adjacent slat and sliding said slats longitudinally with respect to one another until they lie with their corresponding ends disposed on the same vertical lines, as viewed most clearly in FIGURE 3 or FIGURE 7. The door 11c may be terminated at its lower end as described in connection with the first embodiment and each lateral edge of door is or may be provided with guide members, such as those designated 43, or those designated 62 and 63, slidable in a guide, as described in one of the preceding embodiments, thereby preventing the passage of fluid, particularly water, past the lateral edges of the door.

In the present embodiment, special provision is made for also preventing passage of water between the slats around the hinged connections. This sealing of the joints between the slats is effected by the provision of grooves or pockets 82 and 83 in each slat 12c, or in each web 17c thereof, each pocket extending longitudinally from end to end of its slat and being desirably generally cylindrical except where it opens to the outer face or weather side of its slat. Those portions of each slat defining the inner or bottom portions of the pockets 82 and 83 are desirably connected to intermediate portions of the adjacent slat flanges by inwardly spaced supplemental webs extending therebetween and running generally parallel to the web 17c of the slat, thereby rigidifying the connections between web and flanges. Received in said pockets are weather seals formed of flexible rubber or rubber-like material such as "neoprene," each of which may consist of enlarged side edge portions 85 and 86 snugly fitting and insertible longitudinally of the adjacent pockets 83 and 82, respectively, of the slats, like the slats are assembled with respect to one another, and thereby locked in place in said pockets. These enlarged side edge portions are connected by resilient flexible portions 87 spanning the distance therebetween to seal the joints between adjacent slats, even when the latter are rotated with respect to one another, as to the position illustrated in FIGURE 10, as during the process of being elevated or rolled up. It is understood that, if desired, the joints between the slats of any one or all of the preceding embodiments may be similarly sealed.

Referring now to the embodiment of our invention illustrated in FIGURES 11 and 12, there is shown a fragmentary portion of a door 11d, which may be similar to that of the embodiment of FIGURES 5 to 7, inclusive. In order to provide means at each lateral edge of the door 11d to cooperate with a guide flange 42d, which may correspond with the flange 42a of said previous embodiment, we secure to each end of each slat 12d a guide member 62d. Each member 62d comprises a base portion slotted, as indicated at 88, to leave bifurcations or base sections 64d and 65d which straddle the boss 50d, so that they

may lie flat on the webs of the slats 12d to which connected.

The sections 64d and 65d are respectively disposed between a slat boss 58d and one slat flange, corresponding with that designated 15a, and said boss and the other slat flange, corresponding with that designated 16a of said previous embodiment. Said sections are respectively secured to said web as by means of rivets 66d and 67d. At the outer end of each base portion 64d is formed a flange or lug 68d which extends from top to bottom to lie at each end close to comparable flanges or lugs of adjacent guide members 62d. In the present embodiment, we employ another guide member, designated 63d, with a base portion 70 disposed over the base portion 65d and with it secured to the web of the slat 12d by the rivet 67d. The guide member 63d is provided with an outstanding lug 69d shaped and functioning like the lug 69 of the embodiment of FIGURES 5 to 7, inclusive.

From the foregoing, it will be seen that while the present embodiment is like that of FIGURES 5, 6 and 7, in that it uses sheet metal for the guide members 62d, yet it is an improvement thereover in that there is a substantially continuous sealing surface provided by the base portions beyond the slot 88. Also, the lug 68d is so long that it cooperates with such lugs of associated slats to provide substantially continuous outer guide means.

Referring now to the embodiment of our invention illustrated in FIGURE 8, other than the cross-section of the slat 12a, there is shown a fragmentary portion of a door 11e, which may be similar to the door 11d of the preceding embodiment except that it lacks lugs corresponding with those designated 63d. In order to provide means at each lateral edge of the door 11e to cooperate with a guide flange (not shown) which may correspond with the guide flange 42d of FIGURE 12, we secure to each end of each slat of said door a guide member 62e. Each member 62e comprises a base portion slotted, as indicated at 88e, to leave bifurcations or base sections 64e and 65e which straddle the boss 58, so that they may lie flat on the webs of the slats to which connected, with their sections disposed, and secured to said webs by rivets 66e and 67e, as in the preceding embodiment. The rivet 67e also serves to secure a guide member 63e, with a base portion 70e disposed over the base portion 65e, by passing through the portions 70e, 65e and the slat web over which they lie.

Referring now to the embodiment of our invention illustrated in FIGURE 13, there is shown a fragment of a rolling metal door generally designated 11f, like that designated 11 in FIGURES 1 to 4, inclusive. It may be connected to, operated by and rolled upon a reel, not shown, but which may be conventional. The door 11f consists of a plurality of metal slats 12f, each of which has an upper flange and a lower flange which outstands therefrom like the flanges 15 and 16 of each slat 12. The free edge portions of these flanges are rolled or turned to receive in or be received by corresponding edge portions of adjacent slats, as in said first embodiment.

Each lateral edge of the door 11f is slidable in a guide, generally designated 31f. Each guide may be constructed as illustrated in FIGURES 1 to 4, inclusive, or in accordance with one of the other embodiments, and have a flange 42f lying in a plane perpendicular to the plane of the door. Each flange 42f has a generally straight free edge and projects from its guide 31f to form a seal as well as one of the guides for the lateral edges of the door 11f.

In order to provide means at each lateral edge of the door to cooperate with a flange 42f and prevent undesired displacement of the door in the plane of its slats, we secure at each end of each slat a guide member 43f comprising a generally flat portion or web 44f directly secured to the adjacent or inner face of the web 17f of its slat, as by means of rivets 45f, desirably formed of aluminum or aluminum alloy. Extending from each web 44f

in the same direction as the flanges of its slat is a lug 47f disposed inwardly of its outer edge and vertically, in this case upwardly offset or displaced from the slat center line. It thus extends beyond the upper edge of the member 43f so as to overlap the member 43f thereabove and the correspondingly hinged connection between a pair of slats, thereby lying along the ends of said slats and providing an end lock to prevent lateral displacement of the slats with respect to one another.

In the present embodiment, although each of the members 43f is desirably formed as an aluminum or aluminum alloy casting and the edges are closely beveled, as in the embodiment of FIGURES 1 to 4, inclusive, so as to overlap the correspondingly beveled edges of adjacent members to thereby further inhibit the leaking of fluid between slats, we do not wish to be limited to the material used or the manner of shaping it. When the door is in place, the lugs 47f at the right edge thereof, as viewed in FIGURE 13, lie on the left side of the flange 42f, while the corresponding lugs 47f, not shown, at the left edge of the door lie on the right side of the corresponding flange 42f, not shown, at the other edge of the door thereby effecting a straddle of the flanges 42f to avoid undesired longitudinal displacement of each slat. All the lugs 47f desirably have their flange-adjacent faces formed convex or cylindrical, as illustrated, to prevent biting into the adjacent side of the adjacent flange 42f upon vertical reciprocation of the door.

From the foregoing, it will be seen that the construction of the embodiment of FIGURE 8 is or may be identical with that of FIGURES 11 and 12, while that of FIGURE 13 is or may be identical with that of FIGURES 1 to 4, inclusive, except for the omission of lugs corresponding with those respectively designated 63d in FIGURES 11 and 12 and 46 in FIGURES 1 to 4, inclusive. Such a construction as here illustrated is not as desirable as that of said other embodiments because, although lateral shifting of the door is respectively prevented by the lugs 69e and 47f, instead of on the one hand by both sets of lugs 63d and 69d, and on the other by 46 and 47. That is, if the door is quite wide or there is a strong wind load, it might be bent and pulled out from between the guiding means 31d or 31f at its edges by not being restrained by outer lugs, such as 63d and 46. However, on a short slat for a narrow door, it is permissible to have merely inner lugs, such as those designated 69e in the embodiment of FIGURES 11 and 12, and 47f in the present embodiment.

Except for the specific differences enumerated, including the omission of the outer lugs from the door and slats thereof, as shown in the embodiment of FIGURE 8 and in that of FIGURE 13, the construction may be respectively identical with the embodiment of FIGURES 11 and 12 and with the embodiment of FIGURES 1 to 4, inclusive or may otherwise correspond with one of the other embodiments, such as including the use of slat reinforcing bosses like 50 and outer guide lugs like 46.

Having now described the invention in detail in accordance with the requirements of the Patent Statutes, those skilled in this art will have no difficulty in making changes and modifications in the individual parts or their relative assembly in order to meet specific requirements or conditions. Such changes and modifications may be made without departing from the scope and spirit of the invention, as set forth in the following claims.

We claim:

1. A metal slat adapted for use as part of a rolling metal door, comprising a web flat on both faces, except that on one face it is rigidified by a solid boss extending longitudinally intermediate the lateral edges of said web, said web terminating at its lateral edges in flanges extending from the rigidified face of, and in planes perpendicular to said web, the flange at one edge terminating in a portion curved away from the web as a hollow structure slightly more than semi-cylindrical in extent, the other flange terminating in a portion curved toward the web as

a portion somewhat more than semi-cylindrical in extent and corresponding in size with the interior of said hollow structure on the other flange, whereby said slat may hingedly engage associated slats of similar construction, guide means at each end of said slat, said means comprising generally flat web portions directly secured to the rigidified face of the slat web, a pair of lugs extending from each guide means web portion in the same direction as the slat flanges, one lug of each guide means lying near the plane of one slat flange and short of the outer end of its guide means, and the other lug of each guide means disposed outward from said first-mentioned lug, so that the two lugs of each guide means may straddle a generally vertical guiding flange at the adjacent end of the slat and prevent undesired longitudinal slat displacement, said first-mentioned lug being offset transversely of the slat from the other lug toward the plane of the other flange, so as to overlap the correspondingly hinged connection with an associated slat, thereby providing end lugs to prevent longitudinal displacement of the slat with respect to such an associated slat.

2. A metal slat for use as part of a rolling metal door comprising a web terminating at its lateral edges in flanges extending in the same direction from and in planes perpendicular thereto, the flange at one end terminating in a portion curved away from the web as a hollow structure slightly more than semi-cylindrical in extent, the other flange terminating in a portion curved toward the web as a portion somewhat more than semi-cylindrical in extent and corresponding in size with the interior of said hollow structure on the other flange, whereby said slat may hingedly engage associated slats of similar construction, guide means at the ends of said slat, said guide means comprising generally flat portions directly secured to the face of said web between said flanges and extending outwardly beyond the ends thereof, and lugs secured to and extending from said generally flat portions, away from the face of the web from which the slat flanges extend and disposed inwardly of the ends of said flat portions, so that said lugs may lie between generally vertical guiding flanges at the ends of said slat when the generally flat portions engage the edges of said guiding flanges and prevent undesired longitudinal slat displacement, said lugs being offset toward one of said slat flanges so as to overlap the correspondingly hinged connection with an associated slat to prevent longitudinal displacement of the slat with respect to such an associated slat.

3. A slat as recited in claim 2, wherein the generally flat portion of the guide means at each end of said slat has a lug positioned at its outer end, longitudinally and laterally offset with respect to the first-mentioned lug at the same slat end, so that said last-mentioned lugs may lie outside of said generally vertical guiding flanges when the first-mentioned lugs lie therebetween.

4. A slat as recited in claim 2, wherein the connection of each flange with the web is rigidified by a supplemental web lying in a plane spaced toward the free edges of the flanges from said slat web and connecting an intermediate portion of said flange with a structure having a longitudinally extending pocket generally cylindrical, except where it opens to the face of said slat opposite to that from which the flanges extend, and formed to receive a snugly-fitting enlarged side edge portion of a flexible resilient sealing member, whereby said slat may hingedly engage adjacent slats of similar construction and the connection between adjacent slats may be water-proofed by such a resilient sealing member extending between the defined pockets of adjacent slats and spanning the joint therebetween.

5. A slat as recited in claim 2, wherein the lugs extending from said generally flat portions are parts of supplemental guide members also secured to the said generally flat portions.

6. A slat as recited in claim 2, wherein there is another lug outstanding along the entire outer edge portion of each of the guide means at the ends of the slat, to lie on the side of the associated guiding flange opposite that of the first-mentioned lug of its guide means.

7. A slat as recited in claim 2, wherein one face of said web is rigidified by a solid boss extending longitudinally intermediate the slat flanges, and the generally flat portions of said guide means are bifurcated to provide upper and lower sections straddling adjacent end portions of said boss.

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