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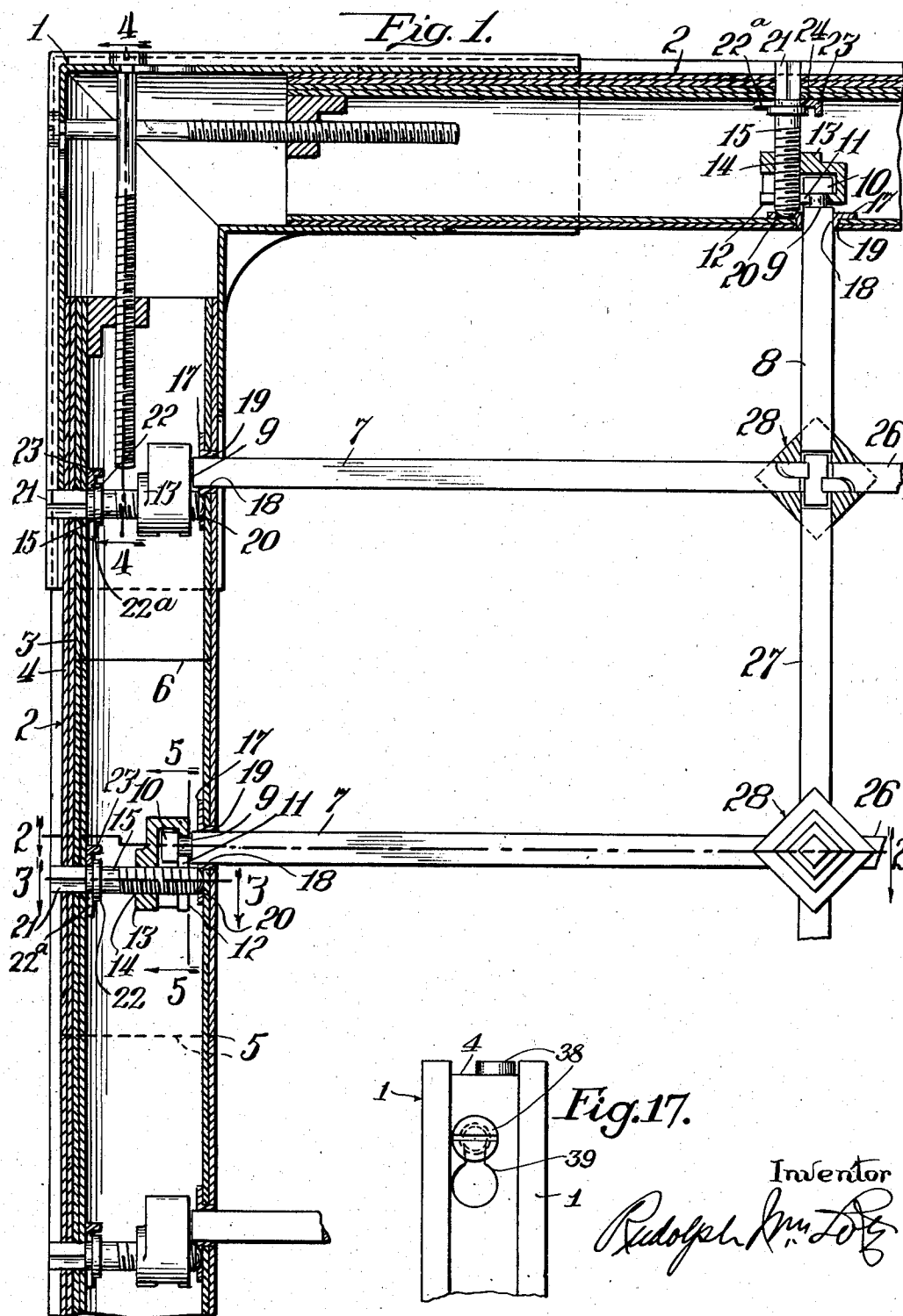
R. W. LOTZ

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KNOCK-DOWN CLOSURE STRUCTURE FOR WINDOWS AND DOORS

Filed April 1, 1937

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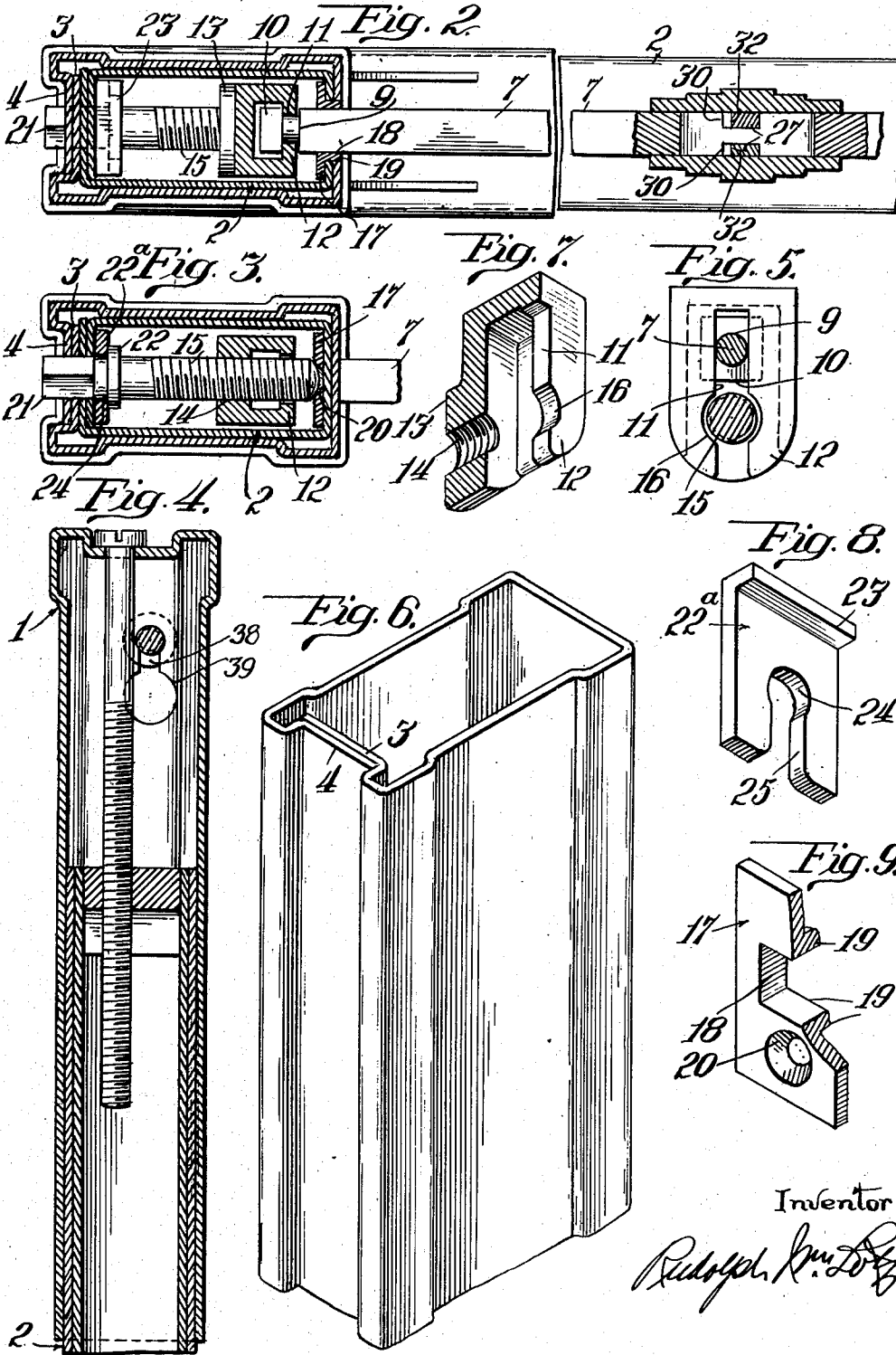
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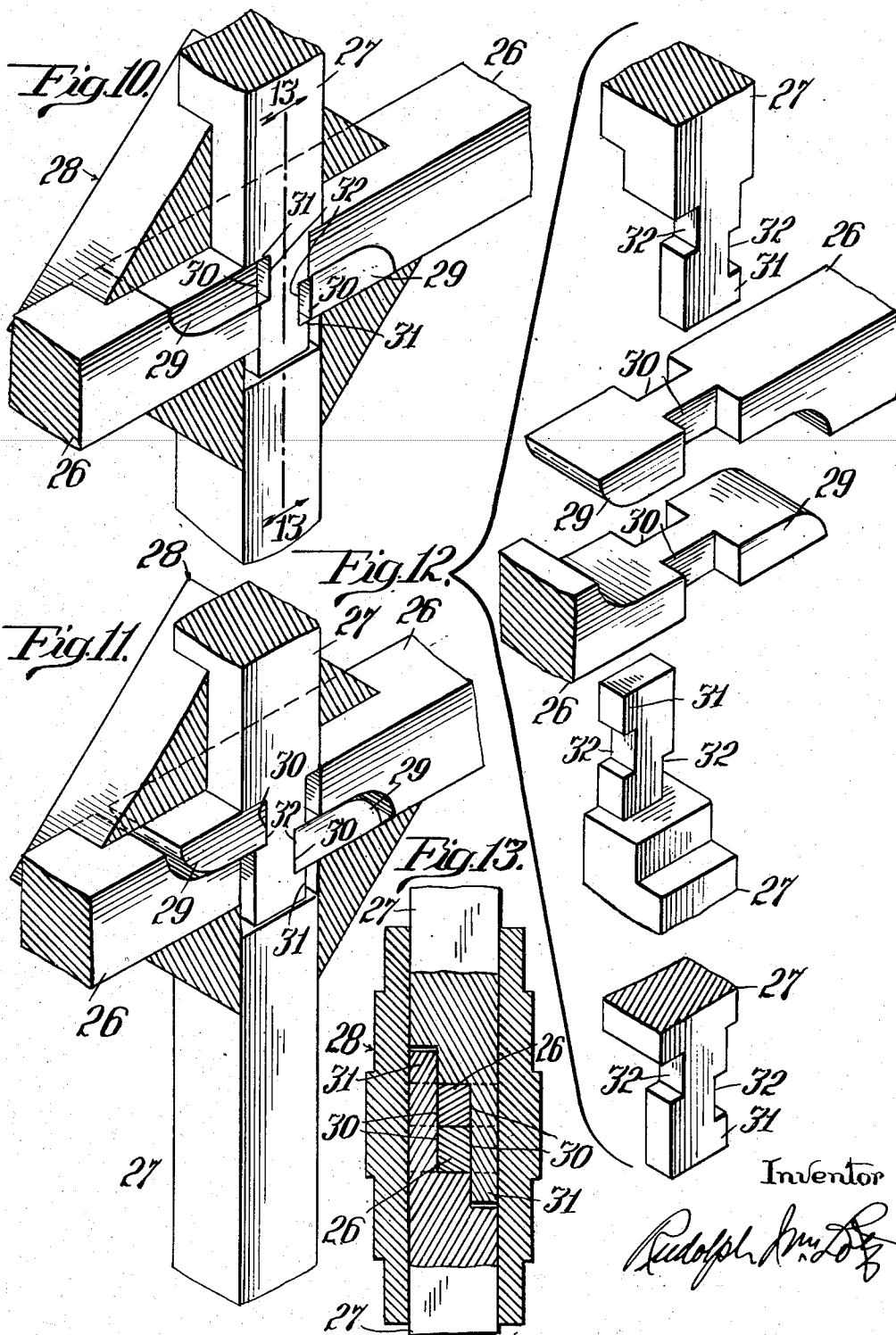
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KNOCK-DOWN CLOSURE STRUCTURE FOR WINDOWS AND DOORS

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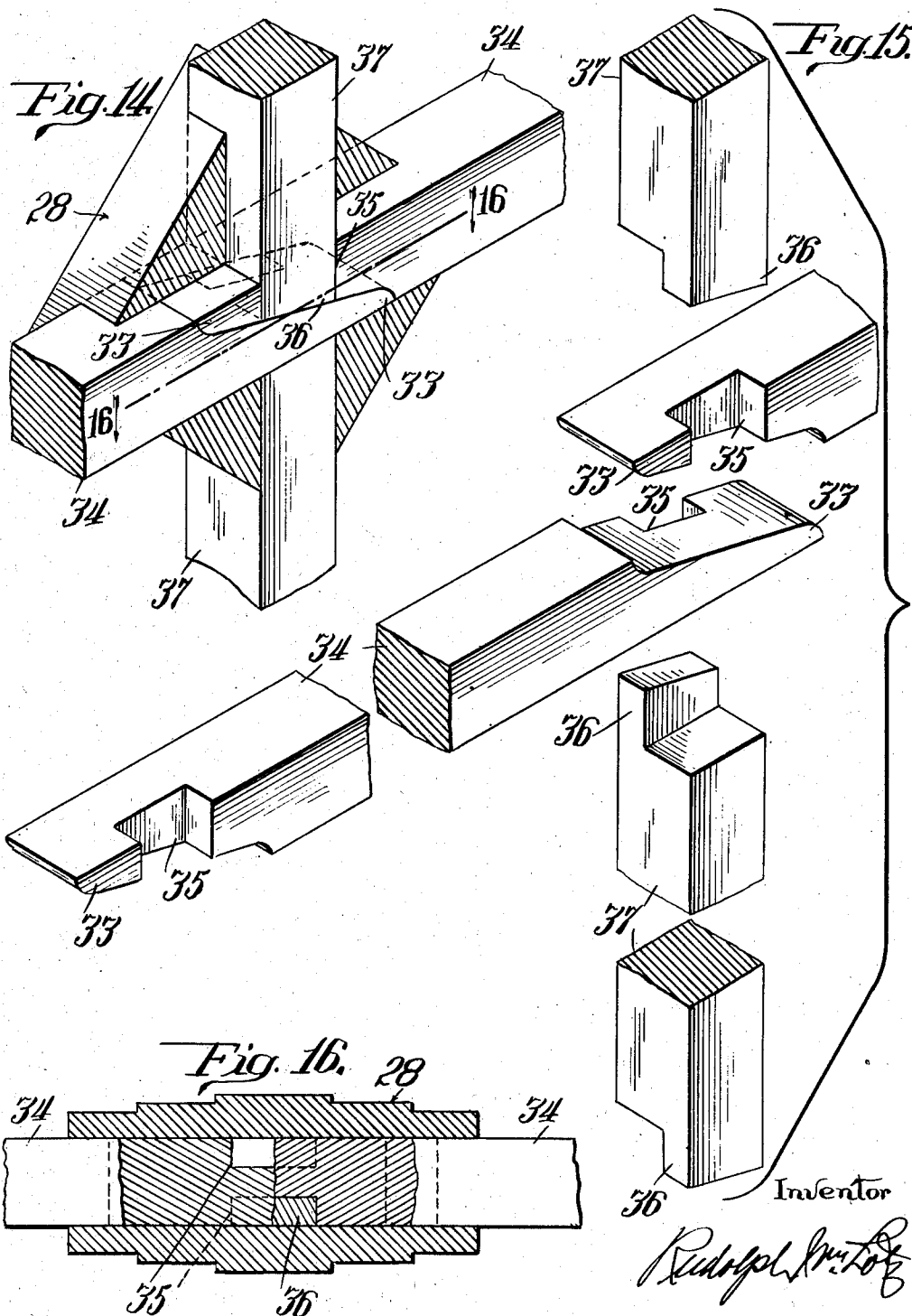
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UNITED STATES PATENT OFFICE

2,159,666

KNOCK-DOWN CLOSURE STRUCTURE FOR
WINDOWS AND DOORS

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and mesne assignments, to Gibson Patents
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Application April 1, 1937, Serial No. 134,197

16 Claims. (Cl. 189—79)

The invention relates to a so-called burglar proof closure for doors and windows composed of a plurality of interchangeable parts which include a marginal frame and a metallic knock-down grill structure composed of bars and coupling members of a suitable metal, all of which are capable of assembly to fit door and window frames of different dimensions.

The main object of the present invention is to provide a grill structure composed of bars and coupling members wherein the composite bars or rods are so interlocked with each other within the coupling members as to obtain two primary advantages, one thereof being to provide a structure wherein the coupling members are of the smallest possible dimensions relatively to the dimensions of the bars associated therewith so as to exclude as little light as possible and at the same time provide the maximum length of bearings of the end portions of the bars within the couplings as to prevent any one of the bars from being withdrawn from a coupling without effecting breakage of said bar within the coupling or first effecting breakage of a companion bar with which the same is interlocked.

A further object of the invention is to provide within the marginal frame of the structure a means whereby any axially aligned set of bars of the structure may be placed under tension or compression at will.

Suitable embodiments of the invention are illustrated in the accompanying drawings, wherein:

Fig. 1 is a fragmentary detail view, partly in section and partly in elevation, of a corner portion of a closure structure constructed in accordance with the invention.

Figs. 2, 3, 4, and 5 are, respectively, sectional views taken on the lines 2—2, 3—3, 4—4 and 5—5 of Fig. 1.

Fig. 6 is a perspective view of one of the outer tubes of the marginal frame structure.

Fig. 7 is a perspective sectional view of the device shown in Fig. 5.

Fig. 8 is a perspective view of a washer employed.

Fig. 9 is a perspective view, partly in section, showing another washer employed in the marginal frame structure.

Fig. 10 is a perspective view in section and partly in elevation, showing a coupling member of the structure with transversely disposed bars engaged at their end portions with each other within the coupling in their primary relative positions prior to effecting final positioning thereof

to interlock all of the said bars with each other against withdrawal from the coupling.

Fig. 11 is a view similar to Fig. 10 showing the bars in their ultimate assembled relation within the coupling member.

Fig. 12 is a composite view, partly in section, showing the end portions of the bars to be engaged in the coupling members in their relative positions prior to effecting assembly thereof within said coupling.

Fig. 13 is a fragmentary detail sectional view taken on the line 13—13 of Fig. 10.

Fig. 14 is a view similar to Fig. 10 illustrating a modification of the structure of the latter.

Fig. 15 is a view similar to Fig. 12 showing the end portions of the bars of Fig. 14 in their relative positions preparatory to effecting assembly thereof within a coupling member.

Fig. 16 is a sectional view taken on the line 16—16 of Fig. 14.

Fig. 17 is an elevation view of the corner of the frame shown in Fig. 1.

The marginal frame of the structure is composed of corner members 1 having tubular arms to receive telescopically the sectional tubular parts or outer sleeves 2 at the ends of the side and end rails of the marginal frame. As shown in Fig. 6 each of the outer tubes 2 is composed of sheet metal bent to form a substantially rectangular tube structure and has overlapping flanges 3 and 4 disposed preferably to constitute the middle portion of the outer wall of each of the side and end rails of the structure.

Inner rectangular tubes which, in the instance illustrated, coincide in shape and which are dimensioned to fit telescopically within the outer tubes, and also having their outer walls composed of overlapping flanges 3 and 4, are disposed within the outer tubes in staggered relation to the latter so that each inner tube overlaps the abutting ends of two outer tubes sections as shown at 5 in Fig. 1 and so that each outer tube overlaps the abutting ends of the two inner tubes as shown at 6 in Fig. 1.

The said inner and outer tube sections composing the side and end rails of the frame, are provided at regular intervals with openings for the passage of the outer end portions of the marginal rods 7 and 8 of the knockdown grill structure into the said side and end rails. Each of said rods 7 and 8 is provided adjacent its outer end with recesses 9 which border the inner end of the head 10.

The head 10 of each of the marginal rods 7 and 8 is received in the longitudinal slot 11 of the device shown in Fig. 5 which consists of a hollow

casting or forging having a bottom wall 12 equipped with said slot 11 and which, in the instance illustrated, has side and end walls but no front wall and the top wall of which is equipped with a boss 13 through which the threaded opening 14 passes and which receives adjusting screws 15 hereinafter described. By means of said screws 15 said device hereinafter referred to as element 12 is adjusted in position between the inner and outer peripheral walls of the marginal frame. The slot 11 is enlarged arcuately at points 16 in axial alignment with the threaded opening 14 to permit the shank of the adjusting screw 15 to pass through the same.

In the instance illustrated the bars of the grill structure including the said marginal bars 7 and 8, are shown as being square in cross section. The openings in the telescopically inter-engaged tubular sections composing the side and end rails of the frame structure are shown as being equipped with openings of appreciably larger size than the cross sectional dimensions of said rods 7 and 8. Washers 17 equipped with square openings 18 are shown in Fig. 9. Each of the openings 18 is bordered by a flange 19 which engages in the opening through which a rod 7 or 8 passes and serve as bushings or fillers for said openings. Each washer 17 is equipped adjacent one end thereof with a counter-sunk opening 20 in which the inner end of the set screw 15 engages.

Each of the set screws 15 is equipped, preferably, with a polygonal head 21 and is also equipped between said head 21 and a collar formation 22, with an annular recess which is engaged in a split washer 22^a. Said washer 22^a is equipped with an end flange 23 and is inserted into the marginal frame after the screws 15 to be engaged thereby are in place and engaged with the member 12 to cause the inner end 24 of its longitudinal slot 25 to receive the said recessed portion of the set-screw 15 for cooperation with the head thereof and the said collar formation 22 to hold said set screw against longitudinal movement relatively to the marginal frame, the said washer being sprung into place in an obvious manner. The flange 23 affords a means for effecting disengagement of the washer from the screw 15.

It will be obvious that by rotating the set-screw 15 clockwise the said member 12 engaged therewith will be moved toward the outer peripheral wall of the marginal frame to draw a marginal rod 7 or 8 into the latter and by rotating the screw 15 anticlockwise said member 12 will be moved toward the inner wall of the marginal frame thus to project a marginal rod 7 or 8 in the opposite direction.

It will be obvious, of course, that each of the screws 15 must be threaded into the member 12 and its lower end engaged in the opening 20 of the washer 17 before the washer 22 can be moved into place to prevent longitudinal movement of said screw 15 relatively to the marginal frame.

The knockdown grill structure is composed of said marginal rods 7 and 8 and additional rods 26 and 27, respectively, and coupling members 28. All rods 26 will be of equal length and all rods 27 will be of equal length, whereas the marginal rods 7 and 8, respectively will be of lengths determined by the dimensions of the marginal frame and of the structure composed of rods 26 and 27 and couplings 28.

In the instance illustrated the rods 26 are shown as extending horizontally and the rods 27

as extending vertically. In the instance illustrated the coupling members 28 are shown as equipped with diagonally disposed openings or passages within which the opposed end portions of rods 7 and 26, 8 and 27 are engaged, as shown in Fig. 1.

Obviously, between the terminal rods 7 at opposite sides of the frame structure there may be one or more axially aligned rods 26 and the requisite additional coupling members 28 and, similarly, with respect to the length of the frame, the number of rods 8 and 27 and coupling members 28 will vary.

As shown in Figs. 10-13 inclusive, each of the rods 26 is equipped at its ends with projections 29 of a width equal to the width of the body portion of the rods 26 in one direction and half the width thereof in the other direction, said projections 29 being preferably provided with arcuate ends to fit similar shoulder formations at the junction of each of the projections 29 with the body of the rod. Substantially midway between the ends of each of said projections 29 the latter is provided in the instance illustrated with opposed side recesses 30.

The vertical rods 27, including also the terminal ends of the rods 8 to be engaged in couplings 28, are shown as equipped with longitudinal projections 31 of a width at their extremities equal to the width of the recesses 30 of the projections 29 so that they may pass snugly through said recesses in inserting said rods into the coupling members 28.

The said projections 31 of the rods 27 are provided between their ends with side recesses 32 in which the portions of the projections 29 adjacent one side of each of the recesses therein are adapted to be received so that, after assembly of the structure as shown in Fig. 10 has been effected, the said rods 26 are pulled apart as shown in Fig. 11 to interlock the projections 31 of the rods 27 with the projections 29 of the rods 26 and thereupon none of the rods 26 or 27 can be withdrawn from the coupling without effecting breakage thereof within the coupling.

While square rods are illustrated herein it will be obvious that rods of any other cross-sectional shape may be substituted therefor.

It will also be obvious that the interlock or interengagement of the projections 29 and 31 is maintained by subjecting the rods 26 to tension stress or suitably holding them against movement toward each other whereas the rods 27 may be subjected to either tension or compression stress selectively.

By reversing the positions of the side recesses of the projections 31 so that they are transposed oppositely from the positions shown and also disposing the side recesses of the projections 29 so that they are offset from each other when the extremities of the said projections 29 are in contact with the shoulders opposed thereto and then pulling the rods 26 apart until the side recesses thereof register with each other, the projections 31 may be passed through said side recesses and by then restoring the rods 27 to position wherein the extremities of the projections 29 contact with the shoulders opposed thereto, the projections 31 will be interlocked with the projections 29 and held against withdrawal from the coupling. This modification will be readily understood by persons skilled in the art without special illustration and it will also be obvious that in this modified structure the rods 26 must be held against separation.

ration, preferably, by maintaining them under axial compression stress.

It will also be noted that by reason of the length of the projection 29 of the rods 26 and the projections 31 of the rods 27, each of said rods 26 and 27 has a very long bearing or extension portion within the coupling, this being very desirable in order that the width and length of the coupling member may be reduced to a minimum size and thus exclude less light than is excluded by a larger size coupling. The cross sectional dimension of the couplings 28 may be such as to provide ample strength to resist destruction thereof for the purpose of disengaging any of the rods 26 and 27 therefrom. In the instance illustrated the projections 31 of the rods 27 are shown as being of less width than the body portions of the said rods, but it will be obvious that the width thereof may be coincident with the width of the face of the rod with which said projections are flush, without departing from the invention, though obviously, in such event, the side recesses of the projections 29 of the rods 26 will have to be lengthened accordingly.

The structure illustrated in Figs. 10-13 inclusive is intended to be subjected to tension at least axially along the composite horizontal bars of the latter, whereas the vertical bars thereof may be subjected either to tension or compression at will. Obviously, the relative arrangement of the bars 26 and 27 may be reversed so that the bars 27 extend horizontally and the bars 26 vertically, this being desirable in the case of the closure structures of great length, for the reason that alternate axially aligned composite bars 27 may, in that event, be placed under tension and compression respectively, to prevent bowing or distortion of the long side rails of the marginal frame.

It will be noted that because of the fact that the set-screws 15 pass through the threaded opening 14 of the members 12 in offset relation to the axes of the rods engaged in said members 12, the application of appreciable tension or compression stress upon the rods engaged with said members 12 will tend to cause the latter to be canted and thus to appreciably cramp the threads of the screws to resist rotation of the latter to such an extent as to produce the effect of a lock-nut connection as will be obvious, this being decidedly desirable to prevent relief of the stress applied to the rods by the members 12 under the influence of ordinary vibration and temperature change.

In the structure of Figs. 14-16 inclusive, the overlapped end portions 33 of the horizontally disposed rod 34 engaged in a coupling member 28 are provided each with only one side recess 35 to receive a projection 36 at the end of a vertical rod 37, thereby preventing relative movement of the overlapped rods 34 in any direction relatively to each other and relatively to the coupling 28. In this structure the vertical rods 37 must be maintained under a pressure stress in order to maintain said projections 36 engaged in said recesses 35 as will be obvious. The advantage of the structure of Figs. 14-16 inclusive, lies in the fact that the structure lying within the coupling member 28 will be of greater strength than would be true of the structure shown in Figs. 1-13, inclusive.

Except as to the details of construction of the members 12 and the washers and other parts associated therewith, the marginal frame illus-

trated in Figs. 1-4 inclusive and Fig. 6 constitutes no part of the present invention.

I claim as my invention:

1. A knockdown skeleton structure comprising in combination, a coupling member equipped with intersecting bores, a pair of rods each having a cutaway end portion disposed to extend into one of said bore from opposite ends of the latter with said cutaway end portions disposed in overlapped relation to each other and each thereof extending beyond the intersection of said last-named portions of said rods equipped with a recess opposed to the other of said bores, and a pair of companion rods engaged in said last-named bore and engaged at their inner ends in said recesses of said first-named rods whereby to prevent withdrawal of said first-named rods from said coupling members.

2. In a structure of the type specified, a coupling member equipped with two bores extending laterally of each other and having their axes intersecting each other at a substantially middle point in said member, a pair of opposed rods telescopically engaged in opposite end portions of one of said bores and equipped with cutaway end portions disposed in overlapping relation to each other and each thereof projecting beyond the other of said bores, said overlapped end portions being of respective cross-sectional dimensions such as to cause the pair thereof to be of combined cross-sectional dimensions equal to that of the body of each of said rods, and a pair of axially aligned opposed rods telescopically engaged along end portions thereof in the other of said bores and engaged at their inner extremities with said overlapped cutaway portions of the first-named rods.

3. In a structure of the type specified, a coupling member equipped with two bores extending laterally of each other and having their axes intersecting each other at a substantially middle point in said member, a pair of opposed rods telescopically engaged in opposite end portions of one of said bores and equipped with cutaway end portions disposed in overlapping relation to each other and each thereof projecting beyond the other of said bores, said overlapped end portions being of respective cross-sectional dimensions such as to cause the pair thereof to be of combined cross-sectional dimensions equal to that of the body of each of said rods, and a pair of axially aligned opposed rods telescopically engaged along end portions thereof in the other of said bores and engaged at their inner extremities with said overlapped cutaway portions of the first-named rods, the extremities of said last-named rods equipped with male formations, and said cutaway end portions of said first-named rods equipped with female formations interengaged with said male formations for preventing disengagement of said first-named rods from said coupling member.

4. In a structure of the kind specified, a coupling member equipped with passages extending laterally of each other therethrough and having their axes intersecting each other at a point spaced from the periphery of said member, a pair of opposed rods telescopically engaged in respectively opposite end portions of one of said passages and equipped at their inner ends with formations overlapping each other and bridging the other of said passages, another pair of opposed rods telescopically engaged in the opposite end portions of the last-mentioned passage and

abutting the overlapped formations of the first-named rods, said last-named formations equipped with female formations opposed to the last-mentioned passage and said second pair of rods equipped with terminal male formations engaging in said female formations and cooperating therewith to prevent disengagement of said first-named rods from said coupling member.

5. In a structure of the kind specified, a coupling member equipped with passages extending laterally of each other therethrough and having their axes intersecting each other at a point spaced from the periphery of said member, a pair of opposed rods telescopically engaged in respectively opposite end portions of one of said passages and equipped at their inner ends with formations overlapping each other and bridging the other of said passages, another pair of opposed rods telescopically engaged in the opposite end portions of the last-mentioned passage and abutting the overlapped formations of the first-named rods, said last-named formations equipped with female formations opposed to the last-mentioned passage and said second pair of rods equipped with terminal male formations extending through said female formations, each of said male formations equipped with a recess spaced from its extremity and in which a wall of one of said female formations is engaged whereby all of said rods are held against disengagement from said coupling member.

6. In a structure of the kind specified, a coupling member equipped with passages extending laterally of each other therethrough and having their axes intersecting each other at a point spaced from the periphery of said member, a pair of opposed rods telescopically engaged in respectively opposite end portions of one of said passages and equipped at their inner ends with formations overlapping each other and bridging the other of said passages, another pair of opposed rods telescopically engaged in the opposite end portions of the last-mentioned passage and abutting the overlapped formations of the first-named rods, said last-named formations equipped with female formations opposed to the last-mentioned passage and said second pair of rods equipped with terminal male formations extending through said female formations, each of said male formations equipped with a recess spaced from its extremity and in which a wall of one of said female formations is engaged whereby all of said rods are held against disengagement from said coupling member, said several rods and said formations thereof being relatively dimensioned to completely fill said passages and obviate hollows therein.

7. A knockdown grill structure for the purpose specified comprising in combination a plurality of coupling members each equipped with two intersecting passages extending through the same, rods adapted to fit said passages telescopically and equipped with terminal projections engaged telescopically in said passages with said cutaway end portions disposed in overlapped relation to each other and so positioned in said couplings that each of said projections is intersected between its ends by the axis of the passage other than that in which said projections are housed, each coupling passage housing end portions and terminal projections of two pairs of rods, all of said projections housed by each coupling being equipped with interengaging key formations for preventing any of said rods from being withdrawn from engagement with said couplings.

8. The combination with a hollow frame and a grill structure bordered thereby and equipped with marginal rods projecting into said frame, of devices within said frame each detachably engaged with one of said marginal rods, and set screws operable from the exterior of said frame and held against longitudinal movement relatively thereto each having threaded engagement with one of said devices and disposed substantially parallel with and offset laterally from the respective rods engaged with said devices for imparting movement to the latter to selectively impose tension or compression stresses on the rods engaged therewith.

9. The combination with a hollow frame and a grill structure bordered thereby and equipped with marginal rods projecting into said frame, of devices within said frame each detachably engaged with one of said marginal rods, and set screws operable from the exterior of said frame and held against longitudinal movement relatively thereto each having threaded engagement with one of said devices and disposed substantially parallel with and offset laterally from the respective rods engaged with said devices for imparting movement to the latter to selectively impose tension or compression stresses on the rods engaged therewith, said interengaged threads of said screws and said devices adapted to become cramped for resisting rotation of said screws proportionately to the degree of stress imposed upon said marginal rods.

10. The combination with a hollow frame and a grill structure bordered thereby and equipped with marginal rods projecting into said frame, of devices within said frame each detachably engaged with one of said marginal rods, and set screws operable from the exterior of said frame and held against longitudinal movement relatively thereto each having threaded engagement with one of said devices and disposed substantially parallel with and offset laterally from the respective rods engaged with said devices for imparting movement to the latter to selectively impose tension or compression stresses on the rods engaged therewith each of said screws constituting a means for preventing detachment of the rods associated therewith from the device engaged by said screw.

11. The combination with a knockdown grill structure composed of sets of relatively laterally disposed rods detachably interengaged with each other at their ends to cause the rods of one set to maintain the rods of the other set in predetermined relation to each other against stresses tending to displace the same from said relation, and coupling devices housing the ends of all of said rods and cooperating with said rods to maintain all of them in their predetermined relative positions, said structure including marginal rods, of a hollow marginal frame bordering said grill structure and equipped with openings through which the outer end portions of said marginal rods project, devices within said frame each detachably engaged with an end portion of one of said marginal frames, set screws each having threaded engagement with one of said devices and operable from the exterior of said frame and means engaged with said frame and said screws for preventing longitudinal movement of the latter relatively to the frame, said devices being operable to impose stresses upon said marginal rods selectively toward or from the marginal frame whereby to hold the same and the remaining rods against disengagement from each other, the

axis of each screw being substantially parallel with and spaced from the axis of the rod associated therewith.

12. In a structure of the type defined, a coupling member equipped with two bores intersecting each other, a rod engaged in one of said bores and projecting beyond the other of said bores, said rod equipped with a female formation initially aligned with the other bore, a rod engaged in the latter and equipped with a male formation extending through the female formation of the first named rod, the said male formation of the second rod equipped with a recess opposed to a wall of the female formation of the first named rod and adapted to receive said wall upon moving the first-named rod longitudinally in the required direction, thereby locking the second named rod against longitudinal movement, and means operatively associated with said rods to maintain the same in their last-named relative positions within the coupling member and thereby preventing movement of the latter relatively to said rods.

13. In a structure of the type defined, a coupling member equipped with two bores intersecting each other, a rod engaged in one of said bores and projecting beyond the other of said bores, said rod equipped with a female formation initially aligned with the other bore, a rod engaged in the latter and equipped with a male formation extending through the female formation of the first-named rod, thereby locking the first-named rod against longitudinal movement, the said male formation of the last-named rod equipped with a recess adapted to receive a portion of the first-named rod adjacent the female formation thereof when said first-named rod is moved in one direction relatively to the second-named rod, thereby to interlock said rods with each other, and means operatively associated with said rods to maintain the same in their last-named relative positions within the coupling member and thereby preventing movement of the latter relatively to said rods.

14. In a structure of the type specified, a coupling member equipped with two bores extending perpendicularly to each other with their axes disposed in a common plane substantially parallel with the front and rear faces of the coupling, a pair of rods engaged in opposite ends of one of said bores and having reduced end portions overlapping each other and each extending beyond the other of said bores, said reduced end portions equipped with recesses adapted to be disposed in alignment with the other of said bores, a pair of rods disposed in opposite ends of the last-named bore and equipped with reduced end portions adapted to engage in said recesses,

said last-named reduced end portions equipped with recesses adapted to receive reduced end portions of the first-named rods when the latter are moved relatively to the coupling and the last-named rod, thereby preventing disengagement of all of said rods from the coupling so long as said rods are maintained in their last-named relative positions.

15. In a structure of the type specified, a coupling member equipped with bores disposed at right angles to each other with the axes of said bores intersecting each other, a rod engaged in one of said bores and projecting beyond the other of said bores, said rod equipped with a female formation initially aligned with the other bore, a rod engaged in the latter and equipped with the other bore, a rod engaged in the latter and equipped with a male formation extending through the female formations of the first-named rod, the said male formation of the second rod equipped with a recess opposed to a wall of the female formation of the first-named rod and adapted to receive said wall upon moving the first-named rod longitudinally in the required direction, thereby locking the second-named rod against longitudinal movement, and means operatively associated with said rods to maintain the same in their last-named relative positions within the coupling member and thereby preventing movement of the latter relatively to said rods.

16. In a structure of the type specified, a coupling member equipped with bores disposed at right angles to each other with the axes of said bores intersecting each other, a pair of opposed rods equipped with reduced end portions engaged in opposite end portions of one of said bores with said reduced end portions overlapping each other and projecting beyond the other bore, there being recesses in said reduced end portions adapted to be aligned with said other bore, a second pair of opposed rods equipped with reduced similarly overlapping end portions engaged in opposite ends of the other bore and projecting through the recesses of the first-named rods, the reduced end portions of the second pair of rods equipped with recesses adapted to receive portions of the reduced end portions of the first-named rods as the latter are moved laterally relatively to the second pair of rods after the latter are inserted, thereby to interlock all of said rods with each other, and means operatively associated with said rods to maintain the same in their last-named relative positions within the coupling member and thereby preventing movement of the latter relatively to said rods.

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