Sept. 16, 1969 S. BOHN 3,466,801

SEALING JOINT

Filed Oct. 4, 1967 2 Sheets-Sheet 1

FIG. 1

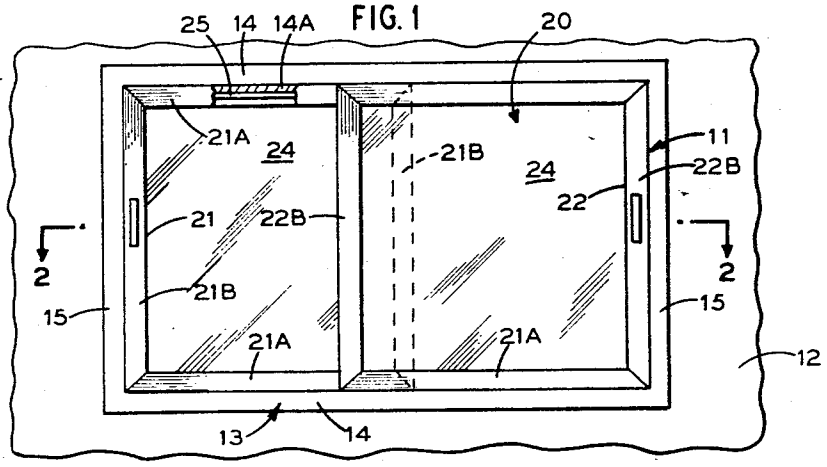


FIG. 2

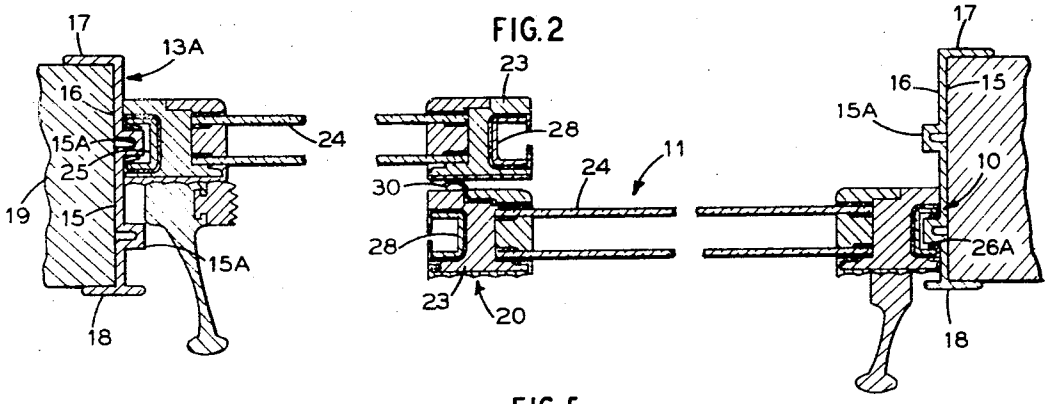


FIG. 5

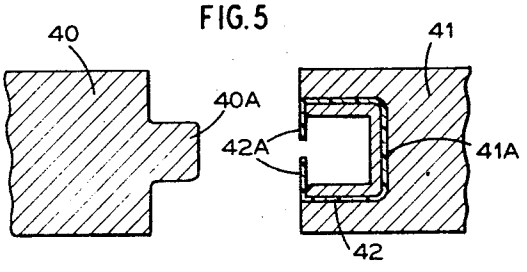
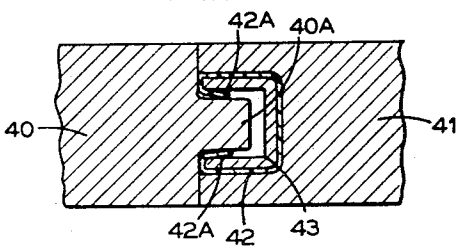


FIG. 6



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FIG. 3

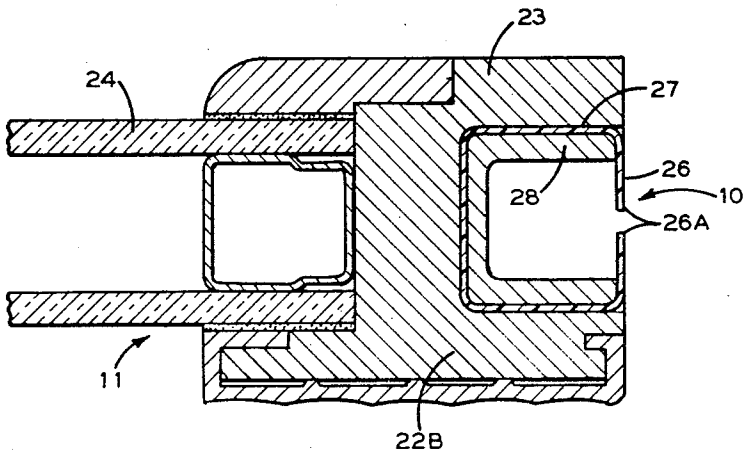
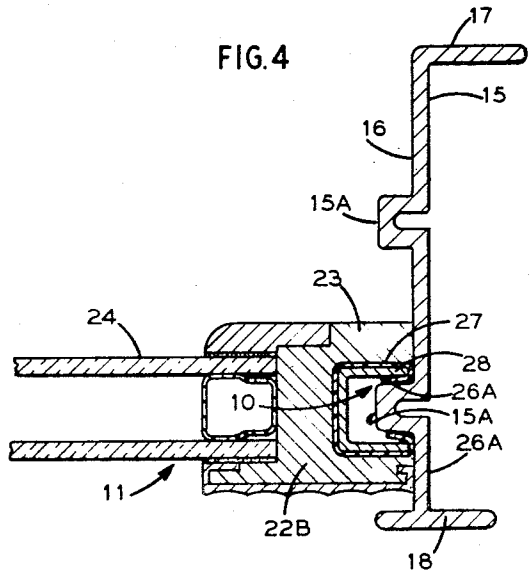


FIG. 4



United States Patent Office 3,466,801 Patented Sept. 16, 1969

3,466,801

SEALING JOINT

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Int. Cl. E06b 3/36, 7/16
U.S. Cl. 49—404 7 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates in general to a sealing joint and more specifically to a sealing joint adapted for use on a sliding closure construction that is particularly adapted for use in cabinets, such as cold storage cabinet, refrigerators and the like, and also as a sealing joint for use in the construction of walls, ceiling, and roof panels of large refrigerators when adjacent panel portions thereof are assembled to each other by means of a tongue and groove connection. In a construction including a first member having a projecting tongue and a second member having a complementary groove adapted to receive the tongue of the first member, the seal of the joint therebetween is attained by a resilient and flexible membrane or flap extending normal to the sides of the groove and generally transversely of the groove opening which is free to flex inwardly of the groove when the tongue of the second member is received within the groove.

The prior art constructions and problems

Heretofore in cold storage cabinets, as for example, of the commercial type found in self-service supermarket outlets, retailers, meat markets and the like, it was customary to close the access openings of such cabinets by means of sliding type closures. Such closures usually comprised a plurality of closure sections, each of which was adapted to slide between an open and closed position whereby access was permitted through only a portion of the opening. These closure assemblies generally included a frame outlining the access opening to the interior of the cabinet, and a closure consisting of two or more sections slidably mounted within the frame defining the opening. The frame outlining the access opening included opposed side members having guide rails and end jamb members with projecting tongue or rail which extend substantially coextensively the length of the side and end members of the frame. The sliding closures or the closure sections disposed within the opening frame included complementary tracks or grooves formed about the peripheral edge portions thereof to accommodate the rails of the frame opening. Usually a conventional sealing strip, packing, or bead of suitable sealing material, was heretofore secured to the peripheral edges of the closures to engage the opposed side members of the frame to seal the space between the sliding closures and the frame opening in an effort to prohibit any of the interior cold air from escaping to the outer atmosphere and/or conversely for prohibiting the warmer outside air from entering the cold storage area of the cabinet.

However, it has been observed that considerable difficulty had been encountered in providing a satisfactory seal between the closure and the frame defining the opening to the cabinet with the known seals. Also it has been noted that considerable shock and impact are imparted to the closure member as it is moved between open and closed positions. It also has been observed that because of the frictional forces operating on the known type sealing means in moving the doors or closure sections between open and closed positions that the sealing strips were subjected to considerable wear and/or deterioration. Consequently, the useful life of the known sealing strips

was substantially diminished due to the excessive frictional wear to which they were subjected.

Objects of invention

It is an object of this invention to provide an improved sealing joint between the first and second member having complementary tongue and groove abutting edge portions when disposed into abutting edge and edge relationship which functions as a combined shock-absorbing and positive sealing means.

Another object of this invention is to provide in a cabinet construction having its access opening closed by sliding closure members, an improved seal between the closure and the cabinet access opening formed in the nature of flexible flaps extending across the groove.

It is another object of this invention to provide in cabinets having the access opening thereof closed by a sliding closure, a combined buffer or shock absorbing and sealing means.

It is another object of this invention to provide for use in devices having first and second members having complementary tongue and groove construction, a combined buffer and seal means which is relatively simple in construction and may be readily fabricated, and which is positive in operation.

Another object of this invention is to provide an improved sealing means for use with tongue and groove constructions wherein the sealing is automatically effected when the tongue and groove of complementary members are brought into abutting relationship with respect to one another.

Another object of this invention is to provide a sliding closure with combined buffer and sealing means which function to absorb the shock of the closure as it is moved to a closed position, while at the same time automatically effecting a seal between the closure and the adjacent frame member of the opening when the two are brought into edge to edge abutting relationship.

Summary of invention

The foregoing objects and other features and advantages of this invention are attained by a first member and a second member, each formed with a complementary tongue and groove construction so that when the respective members are disposed in edge to edge abutting relationship the tongue portion of one member is received within the groove portion of the other member. The arrangement is such that the groove in one of the members is made slightly larger than the width of the tongue of the other member adapted to be received therein. In accordance with this invention a resilient and flexible membrane is extended along and adjacent the open end of the groove. The flexible member extends generally transversely of the groove to define flaps extending coextensively of the groove. The arrangement is such that when the tongue of one member is received within the groove of the other member, the flexible membrane or flaps are deflected inwardly of the groove whereby the inherent resiliency thereof defines a seal between the groove and the tongue adapted to be received therein. A practical application of the sealing means described in cabinets, as for example, cold storage cabinets, which have an access opening formed therein adapted to be closed by a sliding closure. In such cold storage cabinets, the access opening is generally closed by a plurality of sliding closures disposed in side-by-side relationship and arranged to define closures for only a portion of the opening. The respective closure members are defined by rectangularly disposed frame members in which opposed side members having a longitudinal groove formed therein. These grooves are adapted to receive opposed guide rails formed on the frame defining the access opening and define the means by which the slid-

ing closure is guided transversely across the access opening. The end or vertical members of the closure are also provided with grooves adapted to receive the end jamb of the access opening frame when the edges of the respective closure sections are disposed in abutting position to the end jamb.

To effect a positive seal between the closure member and the frame defining the access opening, there is provided in accordance with this invention a combined sealing and shock absorbing means secured adjacent the grooves formed in the end members of the closure. The combined seal and shock absorbing means comprises a flexible and resilient material in the form of a longitudinally extending flap which extends inwardly and transversely of the groove adjacent the opening thereof. The arrangement is such that when the closure is moved toward the end jamb of the access opening, the flexible seal or flaps are deflected inwardly toward the groove as the tongue of the adjacent jamb member is received within the groove of the closure member. The inherent resiliency of the flexible member or flap insures a positive seal being formed between the end jamb rail of the access opening and the adjacent edge of the closure member when the closure is disposed thereagainst.

A feature of this invention resides in the provision of an improved sealing joint for abutting members having complementary tongue and groove constructions when the respective complementary members are disposed into edge to edge abutting relationship.

Another feature of this invention resides in an improved sealing construction for use with tongue and groove structures wherein the seal is defined by a resilient member or flap which extends inwardly from the groove adjacent the opening thereto and which is adapted to flex inwardly of the groove upon receipt of the tongue portion of the adjacent member.

Another feature of this invention resides in an improved sealing construction for use in cold storage cabinets wherein the closure member is provided with a combined buffer and seal means which tends to reduce shock and noise as the sliding closure is moved to either an open or closed position, and to function as an effective seal between the closure and the frame defining the access opening in the closed position.

Other features and advantages will become more readily apparent which considered in view of the drawings and description in which:

FIG. 1 illustrates a front view of a closure assembly to which the present invention is applied as used in a cold storage cabinet.

FIG. 2 is a sectional plan view to an enlarged scale taken along line 2—2 on FIG. 1.

FIG. 3 is an enlarged detailed sectional view illustrating the seal construction along the vertical edge of the closure.

FIG. 4 is a view similar to that of FIG. 3, but illustrating the closure and seal in the operative position thereof when the closure is in the closed position.

FIG. 5 illustrates a modified form of the invention illustrating the seal construction as applied to panel sections having a tongue and groove interfitting relationship, illustrated in the disconnected or inoperative position.

FIG. 6 illustrates the seal of FIG. 5 when the respective members are disposed in abutting or operative relationship with respect to one another.

Referring to the drawings there is shown an application of the improved combined buffer and sealing joint **10** as applied to a closure assembly **11** which is particularly adapted for use on a cold storage cabinet, refrigerator, and/or the like **12**. As illustrated the closure assembly **11** comprises a frame **13** which is adapted to define an access opening **13A** formed in a wall portion of a cabinet, as for example, a cold storage cabinet. Preferably the frame **13** comprises essentially of opposed frame side members **14—14** and opposed end jamb members **15—15** which are rectangularly disposed. The respective frame members **14—14**; **15—15** are substantially identical in cross-section whereby the same may be readily fabricated from a continuous elongated structural member which may be formed by extrusion and/or molding. The structural frame members **14—14**; **15—15** thus formed can then be readily cut to any desired length and assembled to form a frame for any desired size opening. Thus the frame members **14—14**; **15—15** may be suitably formed of any metallic or plastic material which can be readily extruded or molded.

In the illustrated form, respective side **14—14** and end jamb **15—15** members are formed of a structural member having a relatively wide web portion **16** having an outwardly extending flange portion **17** connected along one edge thereof. Connected to the other longitudinal edge of the web portion **16** is a front-facing flange **18** that extends laterally to either side of the web portion. The front facing **18** and the opposed laterally extending flange **17** are constructed and arranged so as to receive therebetween the wall thickness **19** of the cabinet.

The respective side members **14—14** in the illustrated form of the invention are each provided with a pair of spaced apart guide rails **14A** which project inwardly of their respective frame members **14—14** and which extend substantially coextensively the length thereof similar to the respective jamb end rails or tongues **15A** formed on the end jamb members **15—15**. The arrangement is such that the complementary guide rails **14A** and jamb rails or tongues **15A** respectively, are coplanarly disposed so that each defines an endless track circumscribing the internal periphery of the frame opening **13A**.

A closure means **20** is slidably disposed within the frame opening. As illustrated in FIG. 1 and FIG. 2, the closure means **20** includes two closures or doors **21, 22** each being arranged to form a closure for a portion of the cabinet opening **13A** only. The arrangement is such that the respective closure sections **21, 22** are dimensioned so that each will form a closure for substantially one-half of the access opening. Each closure **21, 22** includes a circumscribing frame **23** constructed and arranged to accommodate a double wall of thermo-sealed glass panel **24**, which permits visibility of the contents within the cabinet. Each of the respective door frames **23** is provided with a groove **25** extending substantially the length of the respective opposed side portions **21A, 22A** for accommodating the complementary guide rails **14A** of the respective opposed side members **14—14** so that the respective closures **21, 22** are slidably guided within the opening frame **13**. To facilitate sliding of the respective closure **21, 22** sections and to insure a proper seal between the side edges **21A, 22A** of the closure and the adjacent side portions **14—14** of the opening frame **13** and to facilitate sliding of the closures, a seal means as described in my U.S. Patent 3,320,700 may be utilized therebetween.

In accordance with this invention an improved sealing means **10** is provided for effecting a seal between the vertical end members **21B, 22B** of the respective closure panels **21, 22** and the adjacent end jamb rails or tongue **15A** of the end frame members **15**. As best seen in FIGS. 2, 3 and 4, the improved seal means **10** for use on the vertical members **21B, 22B** of the closure panels **21, 22** comprises a resilient and flexible membrane **26** which is formed as flap ends **26A**. The respective flap ends or membranes **26A** are arranged to extend substantially normal to and in the vicinity of the open end of the groove **27** defined in the vertical end member **22B** of the closure **22**.

In one form of the invention as shown in FIG. 3 the flexible membrane **26** comprises substantially C-shaped member which is arranged as a liner for the interior surface of the groove **27** with a clamping means in the form of a complementary C-shaped or channel member **28** frictionally securing the flexible membrane **26** within

the groove **27**. The free end portions **26A** of the flexible member, which are formed as flaps disposed substantially 90 degrees to the sides of the opening to extend inwardly from the opposed sides of the groove **27**, define the seal. It is to be noted that the flexible material **26** may be formed of either a resilient and flexible rubber or plastic material which is readily free to flex. As shown, the free ends **26A** of the respective members or flaps **26** are disposed in contiguous relationship to form a substantial covering portion for the front opening to the groove in the vertical member **21B**, **22B** of the closure means **21**, **22**. Thus, as the vertical member **21B**, **22B** of the closure is moved to its closed position and urged against the end jamb rail **15A** of the adjacent end jamb **15**, the rail or tongue **15A** received within the groove **27** will cause the free end portions **26A** of the flexible members or flaps **26** to flex inwardly within the groove as seen in FIGS. 2 and 4. The inherent resiliency of the flexible flaps **26A** will thus form a positive seal between the closure and the end jamb of the opening. Also due to the inherent flexibility and resiliency of the sealing member **26**, it will be noted that as the closure member **21**, **22** is moved toward the end jamb member **15—15** the resiliency of the flaps **26A** will also function as a buffer to minimize shock and/or noise as the closure panel **21**, **22** is urged against the end jamb **15—15**.

While the illustrated form of the invention illustrates the sealing member or flap **26A** as a portion of the liner **26**, is will be understood that the flap ends **26A** may comprise simply a strip of flexible material extending along the edge of the groove **27** to extend inwardly thereof, and secured to the sides of the groove by suitable fastening means, as for example, adhesive and/or screw fasteners and the like.

To insure sealing between the respective sliding closure members **21**, **22** when each is disposed in the closed position, as viewed in FIGS. 1 and 2, one of the closure members is provided with a sealing strip **30** which extends inwardly between the intermediate or inner vertical edges of the door. Accordingly, in the closed position of the respective closures **21**, **22** the sealing strip **30** is deflected as seen in FIG. 2 to form a seal between the adjacent inner edge portions of the closure **21**, **22**.

When the respective closures or sliding doors **21**, **22** are oppositely disposed as best seen in FIGS. 1 and 2, to effect a closure of the access opening **13**, the sealing means along the top and bottom sides, as described in my Patent 3,320,700, and the sealing means **10** herein described seal about all sides of the door; and the seal **30** defines the seal between the adjacent sliding doors **21**, **22** intermediate thereof. In this manner any leakage of cold air through the space formed between the adjacent closure members is positively prohibited.

With the construction described it is noted that an improved and positive sealing effect is afforded. Thus the sealing means **10** herein described provides a double seal for the respective sliding doors adjacent the vertical edges thereof. Also the arrangement is such that the end seals **10** provide a means whereby the noise and shock as the closure is urged toward the end jamb are minimized and/or prohibited. Also the construction of the improved seal **10** is such that a positive seal is effected in a manner which still permits the necessary looseness required for effecting sliding ease.

While the end seal **10** herein illustrated is formed as an integral member which lines the groove, it will be understood that the same may be formed of two separate and distinct parts which may be inserted in appropriate slots or otherwise suitably secured to the inside of the groove so as to extend normal thereto in the manner illustrated by flap ends **26A**.

A seal construction of the type hereinabove described may also be used between structural members **40**, **41** having complementary tongue and groove connections **40A**, **41A** to insure a positive seal therebetween as seen in FIG. 6. As best seen in FIGS. 5 and 6, the structural member **41** formed with the groove **41A** may be provided with a flexible sealing means **42** of the type hereinbefore described disposed within the groove portion of the member **41**. In the illustrated form of the invention the flexible seal **42** is secured within the groove by a suitable channel shaped friction clamp **43** as previously described to frictionally secure the flexible seal **42** in place. Accordingly it will be noted that when the panel **41** formed with seal **42** is brought into abutting relationship with the edge portion of the complementary structural member **40** provided with a projecting tongue **40A** extending along the edge thereof, that the interfitting of the tongue **40A** within the groove **41A** causes the free end of the flexible members **42A** to be deflected in the manner illustrated in FIG. 6 to form a seal therebetween. The inherent resiliency of the free ends **42A** of the seal member **42** will exert sufficient bias against the opposed sides of the tongue **41A** to insure a proper seal. Accordingly in this manner it will be noted that an effective sealing means is provided between tongue and groove structural members **41**, **42** which are adapted to be disposed in side-by-side abutting relationship.

With the construction herein described it will be noted that the groove formed in one structural member or closure member is rendered slightly larger than the width of the tongue of the adjacent structural member to provide for the necessary looseness for such structures. In the case of the sliding door embodiment, such looseness is desirable to provide ease of movement. Also because such looseness is required, it is important that the tolerance or spacing required therefor be suitably sealed. Also it will be noted that the seal herein described in the operative position will minimize any play in the closure due to the required tolerances for ease of operation when in the closed position.

While the instant invention has been described with reference to a particular embodiment thereof, it will be readily appreciated and understood that variations and modifications may be made without departing from the spirit or scope of the invention.

What is claimed is:

1. A sealing joint comprising:
- a first member having a projecting tongue extending along the length thereof, and
- a second member having a complementary groove adapted to receive the tongue of said first member when said first and second members are disposed into edge-to-edge abutting relationship,
- said groove having a width which is slightly greater than the width of the tongue adapted to be received thereby when said members are placed in abutting relationship, and
- a resilient and flexible membrane extending along the open end of said groove arranged to flex inwardly of said groove by said tongue when said first and second members are brought into abutting relationship to form a seal therebetween,
- said membrane comprises a strip of soft plastic-like material disposed as a liner within said groove, means for securing said liner in said groove,
- and said liner having its free edges disposed normal to the opening of said groove to form a displaceable combined buffer and sealer between the tongue and groove when said first and second members are brought into abutting relationship.

2. A sealing joint as defined in claim **1** wherein said groove is sufficiently large to define a space between the groove and the tongue when said first and second members are disposed in abutting relationship.

3. The invention as defined in claim **1** wherein said membrane comprises an angular member having a leg portion normally extending longitudinally of and sub-

stantially normal to the side edge of the groove, and which leg portion will flex inwardly of said groove in the abutting relationship of said members, and means for retaining said membrane in position relative to said groove.

4. A closure assembly for a cabinet construction comprising:

a frame for outlining an access opening to the cabinet,

said frame including rectangularly disposed opposed end jamb members and interconnecting opposed side members,

each of said side members having a guide rail extending longitudinally therealong, and

each of said end jamb members having a jamb rail defined as a projecting tongue,

said opposed guide rails and jamb rail being coplanary disposed,

a closure for said opening slidably disposed along said guide rails,

said closure including a closure frame comprising rectangularly disposed side and end portions, each of said side portions being formed with a groove for receiving said guide rail, and said closure end portion having a groove formed therein for receiving the jamb tongue,

and means defining a combined buffer and sealer disposed adjacent said groove formed in the closure end portion,

said combined buffer and seal means including a flexible membrane means for securing said membrane in said groove,

said flexible membrane normally extending inwardly transversely of said groove formed in the end of said closure adjacent the front opening of said groove so that when said closure is brought into abutting relationship with the end jamb, the jamb tongue causes said membrane to be inwardly flexed to define a seal between the closure and the adjacent end jamb of the opening frame.

5. The invention as defined in claim 4 wherein:

said flexible membrane includes a substantially C-shaped flexible member extending substantially coextensive of said groove in the end portion of said closure frame,

and said flexible member having its free end portions extending substantially normal to and transversely inwardly of said groove whereby the free end portions are deflexed inwardly of its respective groove to define a seal and buffer between the closure frame and the adjacent end jamb.

6. The invention as defined in claim 5 and including a sealing means between adjacent closure frames.

7. The invention as defined in claim 6 and including a flexible member secured to one of said closure frames on the side facing the side of the adjacent closure frame, said latter flexible member including a soft sealing strip disposed normal to said closure frame, and which strip is free to flex to define a seal between adjacent closure frames when said closure frames are extended to their respective closing position within the opening frame.

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U.S. Cl. X.R.

49—475, 483, 489