Nov. 6, 1962 H. F. KLEINHANS 3,061,895

RESILIENT CAULKING SEAL

Filed Aug. 5, 1960 2 Sheets-Sheet 1

FIG. 1.

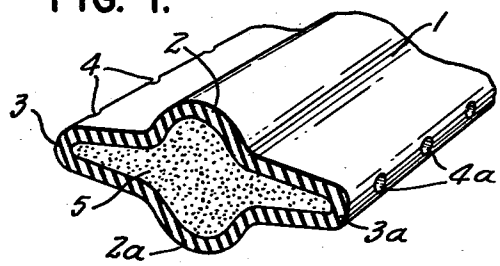


FIG. 3.

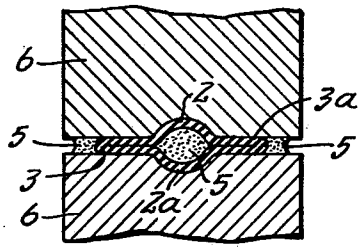


FIG. 2.

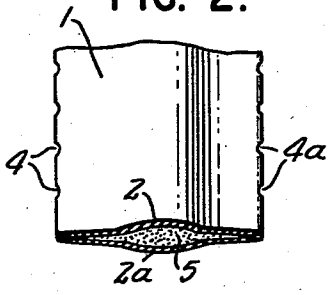


FIG. 4.

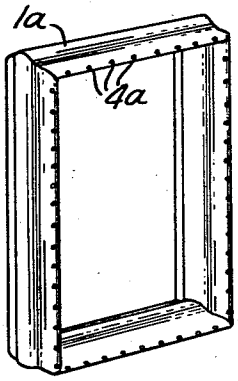


FIG. 13

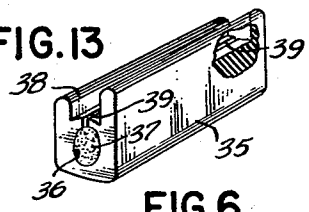


FIG. 6

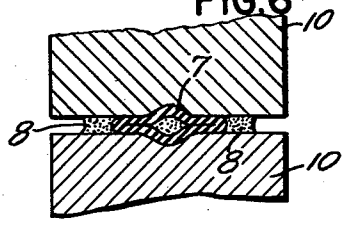


FIG. 5.

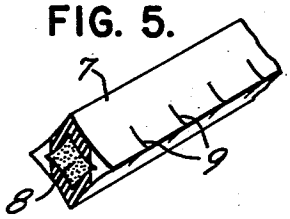


FIG. 8.

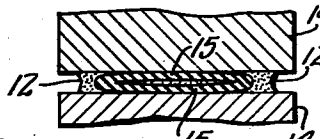


FIG. 9.

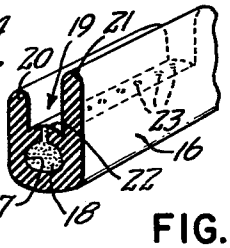


FIG. 7.

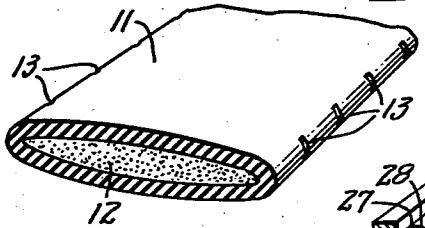


FIG. 11.

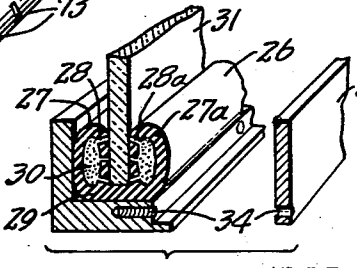


FIG. 12.

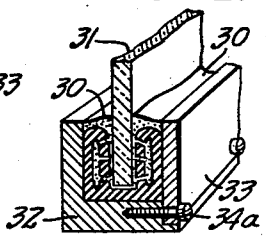
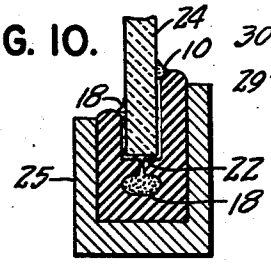


FIG. 10.



INVENTOR.

HERBERT F. KLEINHANS

BY

Pennie, Edmonds, Morton, Barrows & Taylor

AGENT

Nov. 6, 1962 H. F. KLEINHANS 3,061,895

RESILIENT CAULKING SEAL

Filed Aug. 5, 1960 2 Sheets-Sheet 2

FIG. 14

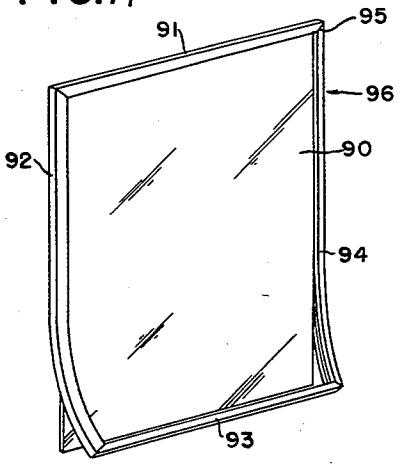


FIG. 15

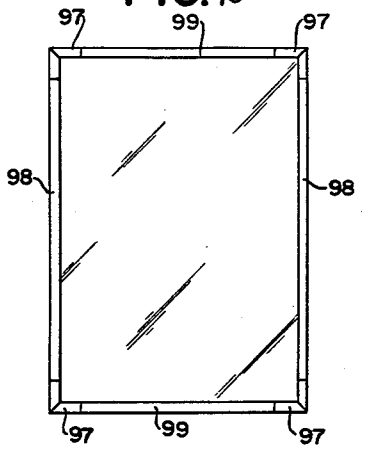


FIG. 16

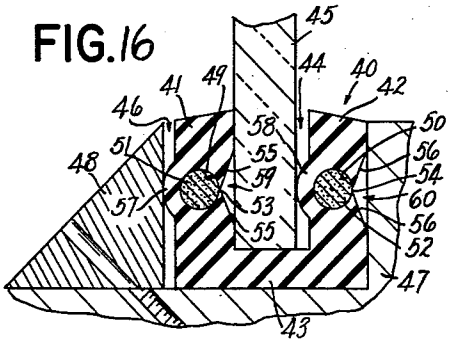


FIG. 17

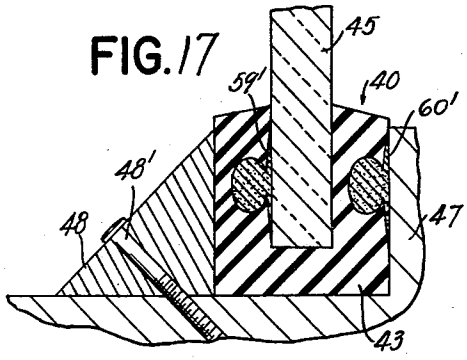


FIG. 18

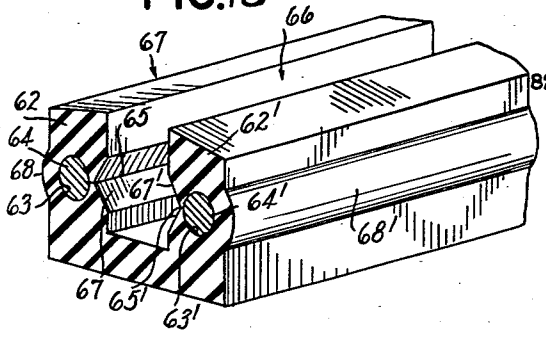
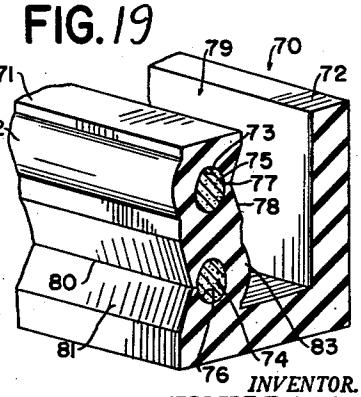


FIG. 19



INVENTOR.
HERBERT T. KLEINHANS

BY

Pennie, Edmonds, Morton, Barrows & Taylor

ATTORNEYS

United States Patent Office

3,061,895

Patented Nov. 6, 1962

3,061,895

RESILIENT CAULKING SEAL

Herbert F. Kleinhans, Darien, Conn., assignor to Pawling Rubber Corporation, a corporation of Delaware

Filed Aug. 5, 1960, Ser. No. 47,835
42 Claims. (Cl. 20—56.4)

The present invention relates to caulking materials and in particular to resilient caulking seals for glazing and sealing frames, panels, pre-assembled window frames, curtain wall structures and the like against normal and adverse weather conditions.

This application is a continuation-in-part application based upon the disclosures of my prior U.S. applications Ser. No. 629,987, filed December 21, 1956 and Ser. No. 702,454, filed December 12, 1957, both of which are now abandoned.

The trend in modern building construction has been toward the more extensive use of curtain wall structures comprising, for artistic as well as for functional reasons, large expanses of glass, abutting metal panels, e.g. aluminum panels, large stone slabs and the like. The use of such wall structures has necessitated the development of new and improved caulking and glazing seals characterized by rubber-like resilience so that the seal will, under substantially all conditions of use, stretch and recover at and in the region of a joint during relative movement of building elements adjacent the sealed edges. An important requirement of such seals is that they should exhibit good adhesion to a wide variety of building materials such as glass, metal, stone and plastic and should insure tightness against atmosphere and moisture while preventing contact between the adjacent edges comprising the joint.

One approach to the problem was the development of polysulfide synthetic rubber compounds. Such compounds were found particularly useful for sealing flashing, embedding louvers and sealing pre-assembled window frames. The starting materials were prepared with a viscosity similar to molasses and were then ready for use by mixing with certain additives to effect thickening, to promote curing, to improve adhesion, etc. The sealants produced in this manner were then applied to the joint to be sealed by means of a piston gun applicator (similar to a grease gun). Thus, in producing a seal between abuttable edges of two adjacent panels, the sealant would be applied along a channel edge of one panel and another panel brought up against it, for example in tongue and groove relationship, thus causing the rubber-like sealant to flow about the joint and produce a tight resilient seal. This type of seal has to have mastic properties in order to flow about and stick to the joint.

While such seals have found wide acceptance in the trade, they had certain disadvantages. For one thing, they were not easy to apply and besides, once in place it was not certain that the sealing material would remain at the critical part of the joint.

The material, being plastically pliable, was apt to roam about during movement of the structural elements making up the joint such that during abnormal movement of the elements, the sealant was apt to bleed or shrink during service, thus resulting in the joint becoming deficient in the sealant.

Experience indicated that an important property of a sealant was that it has to be tacky in order to insure tight adherence to a joint. However, such sealants in use did not always exhibit adequate cushioning to take care of motion by "growth" of building or panel structures and lack strength.

A caulking seal combination has now been discovered that has the required elastic cushioning and yet has all the desired advantages of a tacky sealing compound.

An advantage of the caulking seal of the invention is that it is easy to handle, is easy to apply, and has sufficient elastic strength to react to building movement and growth without loss of sealant.

The caulking seal provided by the invention comprises broadly a hollow resilient elongated body of cured rubber-like material having contained within it a tacky, viscous, mastic sealant, the rubber body being characterized by the provision therein of orifice means, such as a longitudinal slit, a plurality of pressure-yielding orifices or perforations or other means so disposed or located along the body that when the caulking seal is placed between two edges to be sealed and the edges brought together to form a joint, a part of the tacky sealant is caused to ooze out through the orifice means into the joint in bridging contact with at least one of the edges to form a tight seal. The tight seal is insured by the tacky material which, because of its physical properties, compensates for variations in manufacturing tolerances of the panel and the shrinkage and growth of the elements in the region of the joint. The cured rubber-like material insures cushioning strength between the two edges to enable adjustment to building growth or movement.

One of the important features of the invention resides in the provision of a combination sealing element comprising a resilient body having a longitudinally disposed recess therein containing a supply of sealing compound and having improved means, in the form of a longitudinal slit communicating with the recess, forming an opening or orifice means through which the sealing compound may be exuded into contact with a surface to be sealed. Advantageously, the longitudinal slit is defined by a pair of resilient lips, formed integrally with the body and normally substantially closing the recess therein.

One of the specific features of the invention resides in the provision of a combination sealing element, comprising a body of resilient material having a supply of sealing compound, in which novel and improved arrangements are provided for flowing the compound into sealing relationship with parts to be sealed during assembly of the parts. In this respect, the resilient body has a normally substantially closed recess, which contains a supply of sealing compound, and a pressure rib which is operative, upon the application of pressure to the body by the parts to be sealed, simultaneously to open the recess and force the compound therefrom. The arrangement is such that, during assembly of parts to be sealed, the compound-containing recess is provided with a wide opening, through which the compound flows relatively freely. It is thereby assured that the sealing compound will be most effectively distributed along the surfaces to be sealed.

For a better understanding of the invention, and for a discussion of further advantageous features thereof, reference should be made to the following detailed description and accompanying drawings, in which:

FIGS. 1 to 4 illustrate one embodiment of the seal provided by the invention for forming a tight seal between two panels having grooved or channelled edges between which the seal is press fitted;

FIGS. 5 to 8 show still further embodiments of seals adapted for use between two edges;

FIGS. 9 and 10 show one form of the caulking seal for sealing the edge of a glass plate to a framing member;

FIGS. 11 and 12 show another form of the caulking seal for edge sealing a glass plate within a window frame;

FIG. 13 is a fragmentary perspective view of a further form of caulking seal for edge sealing a glass plate or the like within a frame;

FIG. 14 is a perspective view of a sealing element made in accordance with the invention, illustrating one manner

in which the element may be applied to a glass plate or the like;

FIG. 15 is an elevational view of a sealing element of the general type illustrated in FIG. 14, showing another manner in which the element may be applied to a glass plate or the like;

FIG. 16 is a fragmentary, cross-sectional view of a combination sealing element incorporating features of the invention, illustrating one manner in which the element is utilized for mounting and sealing a glass plate or the like;

FIG. 17 is a fragmentary, cross-sectional view of the combination element of FIG. 16, showing the element in its final, assembled position, mounting a glass plate or the like in a frame;

FIG. 18 is a fragmentary, perspective view of another form of combination sealing element incorporating features of the invention; and

FIG. 19 is a fragmentary, perspective view of another form of combination sealing element incorporating features of the invention.

Referring now to the drawings, FIG. 1 shows an extruded and cured hollow rubber-like tubular gasket **1** of somewhat flattened configuration comprising thickened or raised rounded portions **2** and **2***a*, and relatively thin wings **3**, **3***a* having orifice means comprising a plurality of pressure-yielding openings or orifices **4**, **4***a* along the respective sides of the wings (note FIGS. 1 and 2). The hollow of the tube contains a tacky, mastic sealant **5** adapted to be squeezed through orifices **4**, **4***a* under pressure when placed between two edges of panels **6**, as shown in the cross-sectional view of FIG. 3. The raised portions **2**, **2***a* fit into grooves in the panel edges and when one edge of a panel is brought against the other, pressure is exerted on the raised or thickened portions **2**, **2***a*, and wings **3**, **3***a* whereby a portion of sealant **5** is caused to exude through orifices **4**, **4***a* at the sides of the gasket and bridge the two panel edges as shown in FIG. 3 to insure a tight seal. Thus, the extruded rubber-like gasket provides cushioning strength for the joint while the tacky sealant provides the necessary water tight seal.

The gasket design shown in FIG. 1, as well as in the other figures, is advantageous in that it provides a large enough storage quantity of the mastic sealant to augment the sealant outside the confines of the gasket at the joint during growth or expansion of the structural elements making up the joint. Such a gasket thus enables the continuous supply of mastic sealant via the orifices or perforations **4**, **4***a* whenever there is movement at the joint resulting in pressure being applied to the gasket.

Where the orifice means comprise a series of holes as shown along the wings of the gasket of FIG. 1, the gasket could be filled with the mastic sealant by gripping the wings tight to shut off the holes until the gasket is completely filled. The pressure on the wings would then be released and the gasket made ready for use. The sealant, being highly viscous, will not flow to any substantial degree through the orifices until pressure is applied to the external faces of the rubber-like gasket. Where closed slits are employed as orifice means instead of holes (note FIG. 5), the slits provide sufficient resistance to flow to enable a gasket of the types shown in FIGS. 5 and 7 to be filled easily. One method which may be employed to fill a hollow gasket with a sticky, mastic sealant would be to insert a tube (e.g. a metal tube) into the gasket and force the sealant through the tube while withdrawing the tube slowly from the gasket thereby leaving the sealant within the gasket without applying substantial amounts of internal pressure to the gasket during the filling stage.

In applying the tubular gasket along the grooved edges of the panel, the open ends of the gasket would be closed off or the gasket may be a continuous type, for example **1***a* in FIG. 4, to prevent leakage of the sealant and to provide sufficient restraint to the flow of the sealant so that the sealant will be restricted in its flow through the orifices and into the joint.

The continuous rectangularly shaped gasket of FIG. 4, which has the same cross-section as that shown in FIG. 1, is particularly adaptable for use around a rectangularly shaped curtain wall panel, the mastic sealant being caused to exude through orifices **4** (not shown) and **4***a* during abutment of the panel with an edge of another panel.

FIG. 5 shows another embodiment of an elongated tubular gasket **7** of diamond cross section in which two opposite corners thereof have orifice means in the form of slits **9** distributed longitudinally therealong. By placing the gasket between two grooves of panels **10** shown as a cross section in FIG. 6 and one panel brought towards the other to deform the gasket transversely, mastic sealant **8** is caused to ooze into the joint to form a tight seal, the joint at the same time having a rubber-like resilience by virtue of the elastic rubber-like characteristics of the tubular material.

Where the edges of two abutting panels are flat and not grooved (note FIG. 8), a flat, tubular gasket **11** shown in FIG. 7 might be utilized. The gasket **11** has orifice means in the form of spaced orifices **13** provided along the longitudinal sides of the gasket as shown, the hollow portion of the gasket containing mastic **12**. FIG. 8 illustrates the joint resulting from the use of caulking gasket, the joint comprising panels **14** with flat edges **15** in almost abutting relationship with gasket **11** pressed tightly between the edges with sealant **12** exuded into the joint in bridging contact between edges **15**.

The invention is also applicable to channelled or grooved caulking gaskets for use in effecting a tight resilient seal between a glass panel, e.g., a window, and a frame. Such a caulking seal is shown in partial section in FIG. 9 and comprises an extruded rubber gasket **16** having a hollow **17** filled with a mastic sealant **18**, the gasket characterized by a channel-like or U-shaped configuration indicated generally at **19** defined by protruding channel wall portions **20** and **21** and bottom web portion **22**. The bottom web of the gasket **16** is provided with orifice means comprising a plurality of orifices **23** distributed longitudinally therealong. The channel **19** of the gasket is adapted to receive the edge of glass panel **24** as shown in FIG. 10, the gasket itself being fitted into a channelled window frame **25** as shown, for example a window frame made of aluminum. The pressure of the window edge against web **22** causes sealant **18** to exude about the edge in the channel of the gasket to effect a tight seal between the glass and the gasket, the gasket in turn forming a seal with the window frame. If desired, the bottom of the caulking gasket in contact with window frame **25** can also be perforated with pressure-yielding orifices whereby the mastic will also flow under pressure into the channel of the frame to further improve the sealing action if desired. The gasket of FIG. 9 may also be of the continuous type as that shown in FIG. 4.

Another embodiment of a window sealing gasket and frame combination is shown as a partial section in FIGS. 11 and 12. The hollow caulking seal may also comprise a channel-like or U-shaped gasket **26** comprising hollow side wall sections **27** and **27***a* with orifice means in the form of perforations **28** and **28***a* and solid bottom portion **29**. The hollow of the side walls are filled with mastic sealant **30**. The U-shaped gasket is adapted to receive the edge of a glass panel **31**, the gasket in turn being nested in window frame **32** of substantially L-shaped cross section, the window frame having in cooperation therewith a frame-fastening member **33** with screw fastening holes **34** (note FIG. 11). FIG. 11 shows the glass panel and gasket in place ready for assembly, while FIG. 12 shows the results achieved after assembly is completed by fastening frame members **33** via screws **34***a* to frame member **32**. Thus, gasket **26** is put under pressure by the squeezing action of frame member **33** whereby sealant **30** is caused to ooze through perforations **28**,

28a adjacent the edge of glass panel 31, thereby forming a tight seal between the glass panel and the frame and gasket combination.

In the form of the invention shown in FIG. 13, a gasket 35 of channel-like or U-shaped cross-section, for example, is provided with a hollow interior portion 36, filled with mastic sealant 37. The hollow portion 36 communicates with the channel 38 of the gasket through orifice means in the form of a longitudinally disposed slit 29. In use, the gasket 35 is similar to the gasket 16 of FIGS. 9 and 10. However, for some applications, the continuous, longitudinally disposed slit is more advantageous than a plurality of orifices, in that more uniform distribution of the mastic is assured.

Referring now to FIGS. 14–19, and initially to FIGS. 16 and 17 thereof, the new combination sealing element comprises a body, generally designated by the numeral 40, which is formed of a resilient material, such as neoprene. In the sealing element illustrated in FIGS. 16 and 17, the body 40, which is advantageously formed by extrusion, is of generally U-shaped cross section and of elongate form. Thus, the body 40 includes side walls 41, 42 and a bottom wall 43 defining a channel 44 adapted to receive the edge of a glass plate 45 or the like. The outer contours of the body are, in general, such that it may be received in a channel-like recess 46 defined by a frame structure 47, 48.

In accordance with known practice, the frame structure 47, 48 includes a movable element 48 which is adjustably secured to the member 47, as by means of a bolt 48', whereby the width of the frame channel 46 may be varied. The arrangement is such that the body 40 may be easily inserted in the channel 46, with the plate 45 loosely gripped in the body channel 44, after which the frame element 48 may be adjusted to close the frame channel 46 and compress the side walls 41, 42 of the body against the plate.

The body of the sealing element advantageously retains a supply of sealing compound, the arrangement being such that, upon the application of gripping pressure to the body, sealing compound is exuded from the body into sealing contact with selected surfaces of the frame and/or plate. As one of its important features, the present invention provides improved arrangements for retaining the sealing compound in the body 40, as well as for causing or permitting the compound to be exuded from the body at the desired time.

With specific reference to FIG. 16, the side walls 41, 42 of the extruded body 40 are provided with longitudinally disposed recesses 49, 50, which are substantially filled with a viscous sealing compound, as at 51, 52. The sealant material or compound may be of any suitable type. In accordance with one aspect of the invention, the recesses 49, 50 are so located in the cross-sectional outlines of the body side walls 41, 42 that one side of each recess passes close to an outer surface of the side wall. The dimension between the outer surface of the wall and the recess therein is, accordingly, quite small at one point, and at this point the wall is provided with a longitudinal slit, as at 53, 54. The arrangement is such that one side of each recess is defined by resilient lips 55, 56 formed integrally with the body side walls. Advantageously, the lips 55, 56 are so arranged as to normally substantially close off the recesses 49, 50 to retain the supplies 51, 52 of sealant therein.

As will be understood, when lateral pressure is applied to the side walls 41, 42 of the resilient body, the recesses 49, 50 will be deformed, and their volumes will be reduced, whereby a portion of the viscous sealant is caused to exude through the openings or orifice means defined by the slits 53, 54. However, to facilitate and promote the flow of sealant from the body recesses 49, 50, the new sealing element incorporates, as one of the specific advantageous features of the invention, longitudinally disposed pressure ribs 57, 58 which are formed integrally with the body side walls 41, 42 and project outwardly from the general outline thereof at points opposite the slits 53, 54. As shown in FIG. 16, the inner surfaces of the pressure ribs 57, 58 define in part the recesses 49, 50, and the ribs form the only means connecting the portions of side walls 41, 42 above and below the recesses.

As will be readily understood, upon inspection of FIGS. 16 and 17, when lateral clamping pressure is applied to the sealing element, by frame elements 47, 48 having flat pressure surfaces, the pressure ribs 57, 58 will be engaged by substantially non-resilient surfaces, and the side walls will be deformed to an extent such that the pressure ribs will lie flat with the remainder of the walls 41, 42. As one result of that action, substantial local deformation of the body walls takes place, causing sealant to be displaced from the recesses 49, 50. In addition, in accordance with the invention, the deformation of the pressure ribs 57, 58 causes the body side walls 41, 42 to elongate vertically (as referenced to FIGS. 16 and 17) in the regions of recesses 49, 50. This causes the pairs of lips 55, 56 to separate, substantially as shown in FIG. 17, greatly facilitating egress of the sealant from the recesses and thereby improving the flow and distribution of the sealant onto the desired surfaces.

In order further to assure proper flow and distribution of the sealant material, the body 40 is provided, in accordance with one specific aspect of the invention, with shallow grooves 59, 60 which extend longitudinally along the slits 53, 54 and define cavities into which the sealant may flow. Advantageously, the depth of the grooves is such that the deformation which occurs when the sealing element is clamped in the frame structure 47, 48 is insufficient to completely flatten the grooved portions of the side walls against the adjacent non-resilient surfaces. Thus, as shown in FIG. 17, narrow cavities 59', 60' remain, when the sealing element is clamped in place, so that sealing compound may be readily distributed throughout the cavities, in contact with relatively large areas of the adjacent surfaces.

In the form of the invention illustrated in FIGS. 16 and 17, the recesses 49, 50 and slits 53, 54 are so arranged in the body side walls 41, 42 that the slit 53 faces into the body channel 44 while the slit 54 is exposed to the exterior of the side wall 42. Accordingly, in the assembled structure, comprising frame elements 47, 48, plate 45 and the body 40, one area of sealant is in contact with a surface of the plate 45 while another area of sealant is in contact with a surface of the frame structure 47, 48. As will be readily understood, this arrangement affords a complete seal between the plate 45 and the frame structure 47, 48.

The form of the invention shown in FIG. 18 is similar in most respects to that of FIGS. 16 and 17, except for the sealant-retaining recesses. Thus, a resilient body 61, having side walls 62, 62', is provided with longitudinally disposed recesses 63, 63' for retaining supplies 64, 64' of sealant. Longitudinal slits 65, 65' communicating with the recesses 63, 63' face into a body channel 66 adapted to receive an edge of a glass plate or the like (not shown). Shallow grooves 67, 67' are disposed along the slits 65, 65' and longitudinal pressure ribs 68, 68' extend along the recesses 63, 63' and project outwardly from the outer or exposed sides of the body side walls 62, 62'.

When the sealing element of FIG. 18 is assembled in a complete structure of the general type illustrated in FIG. 17, areas of the sealant will be exuded into contact with opposite sides of a plate received in the body channel, substantially in the manner represented by the left hand side of the element shown in FIG. 17.

In the form of the invention shown in FIG. 19, the sealing element comprises a resilient body 70 having side walls 71, 72, only one of which includes recess means for retaining sealant material. Thus, the wall 72 may

be solid, while the wall **71** is provided with longitudinal recesses **73, 74** containing supplies **75, 76** of sealant. A longitudinal slit **77**, bounded by a shallow groove **78**, communicates with the recess **73** and is exposed to a body channel **79** defined by the walls **71, 72**. A second slit **80**, bounded by a shallow groove **81**, communicates with the second recess **74** and faces outwardly of the body wall **71**, and longitudinally extending pressure ribs **82, 83** are disposed along the recesses **73, 74** respectively, on opposite sides of the wall **71**, the arrangement being such that the pressure rib **82** associated with the upper recess **73** is exposed exteriorly of the wall **71** while the rib **83** associated with the recess **74** is exposed to the body channel **79**.

When the sealing element of FIG. 19 is assembled in a structure such as shown in FIG. 17, sealant is exuded into contact with one surface of a plate received in the body channel **79** and also into contact with one surface of the frame structure. The sealing effectiveness is, of course, similar to the element of FIGS. 17 and 18.

It will be apparent that the sealing element of the invention may take a variety of forms, only some of which are specifically illustrated herein. And, in this respect, one of the advantages of the invention is the ease with which sealing elements may be specifically designed or tailored for particular installations, to best accommodate the peculiarities of the parent structure or the particular demands of the usage, all the while retaining the several advantageous characteristics of the invention.

Although it is not to be considered as a limitation of the invention, it is presently contemplated that the new combination sealing element, in any of its forms, may be conveniently manufactured by extruding the resilient body sections. The body recesses may be readily filled with a desired sealing compound, immediately following the extruding operation, or at a later time, by means of simplified apparatus (not shown) which bends back the body side walls to lay open the recesses and permit the sealant to be continuously deposited therein. After the sealant is thus deposited, the recesses are closed by the inherent resilience of the body side walls, so that the sealant is effectively retained in the recesses until the sealing element is put in use.

Where the new sealing element is to be used in connection with the mounting and sealing of glass or other plates of standard or known size, complete sealing gaskets may be advantageously made to the shape and size of the plate, as part of the manufacturing operation. Thus, as shown in FIG. 14 a sealing gasket for a plate **90** of known size and shape may be formed by cutting four sections of sealing element **91—94** to length and connecting the sections by vulcanizing the corners, as at **95**. Advantageously, the complete sealing gasket, generally designated by the numeral **96**, is of such size and shape, with respect to the size and shape of the plate **90**, that the sealing gasket may be readily snapped in place around the edges of the plate.

If desirable or appropriate, pre-formed sealing gaskets such as shown at **96** may be formed by cutting a single length of sealing element and providing notches therein at suitable points, to permit the body to be bent at right angles to form a rectangular gasket. The corners are advantageously vulcanized to improve the strength thereof and to prevent leakage of the sealant material.

Where the size of the plates to be mounted and sealed is not standardized or known is advance, it may be advantageous to utilize mitered, vulcanized corner section **97**, such as shown in FIG. 14. At the job site, a sealing gasket may be completed by cutting the sealing element to appropriate lengths **98, 99** for assembly with the mitered corners **97**. The joints between the corners **97** and the cut sections **98, 99** may be vulcanized if desired.

It will be apparent from the foregoing embodiments that the present invention enables the use of a viscous, tacky sealant of good adhesive quality even though it might not have adequate cushioning strength, the strength being supplied by the extruded rubber-like gasket containing said sealant.

A very important advantage of the invention is that it enables the use of tacky sealants with non-aging characteristics. This is particularly important as the sealant will retain its adhesive tackiness over a very long period of time without substantially losing its sealing characteristics.

One sealant which is adaptable to the invention is a type of depolymerized natural rubber (thermally degraded rubber) having the consistency of molasses at ordinary temperatures. A low-viscosity rubber of the foregoing type has a molecular weight of about 7,000 while the high-viscosity type has a molecular weight of the order of about 11,000 as determined by the light scattering method. The specific gravity of the rubber is of the order of about 0.92 at 25° C. and, as a thin film, has a light brown color. The depolymerized rubber has good storage stability and is chemically and physically stable in a closed container for long periods of time at ordinary temperatures. A low-viscosity grade has a viscosity value of about 12,000 cps. (centipoises) at 150° F. while a high-viscosity grade exhibits a value of about 65,000 cps. at the same temperature. The foregoing properties make depolymerized rubber adaptable to the carrying out of the invention because it retains its sealing characteristics over a long period of time, and is substantially non-aging for the purposes of the invention. However, the invention is also applicable to viscous, rubber-like sealants which age slightly but which do not substantially lose their adhesive tackiness with age. A viscous sealant which will retain substantially its shape for a short period of time under the pull of gravity is particularly adaptable.

The rubber-like body may comprise natural rubber or resilient synthetic rubbers of the plastic type comprising copolymers of butadiene and styrene, e.g., a formulation consisting of about 75% butadiene and 25% styrene. Another rubber-like material which is applicable as gasket material comprises a long chain synthetic rubber made by the polymerization of chloroprene. Polymers of butylene and isobutylene as well as plasticized polymers, e.g., plasticized polyvinyl chloride or polyvinyl acetate may also be used as gasket materials just so long as the material has sufficient rubber-like resilience.

The hollow sealing gasket provided by the invention may also be in the form of a porous matrix containing a viscous sealant within the pores. Thus, when the pores are squeezed much as a sponge is squeezed, the sealant is caused to ooze out and seal the joint.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art will readily understand. Such modification and variations are considered to be within the purview and scope of the invention and appended claims.

I claim:

1. In a caulking seal for use in producing a substantially tight resilient seal between abuttable edges, the combination of an elongated, resilient body containing therein a viscous sealant, said body having pressure-yielding orifice means therein communicating with the sealant whereby when the caulking seal is placed between edges to be abutted and one edge brought towards the other to form a joint, the viscous sealant is caused to ooze out into the joint by virtue of the pressure applied by the edges against the resilient body.

2. In a caulking seal for use in producing a resilient seal between abuttable edges, the combination of an elongated, rubber-like body containing therein a viscous sealant, said body having pressure-yielding orifice means disposed along said body and communicating with the

sealant whereby when the caulking seal is placed between edges to be abutted and one edge brought toward the other to form a joint, the viscous sealant is caused to ooze out into the joint, by virtue of the pressure applied by the edges against the rubber-like body.

3. In a caulking seal for use in producing a resilient seal between abuttable edges, the combination of an elongated, hollow, resilient body containing therein a viscous sealant, said body having a flattened cross-sectional configuration having a thickened center portion and relatively thin side portions, said side portions having pressure-yielding orifice means disposed longitudinally therealong whereby when the caulking seal is placed between the edges to be abutted and the edges brought together to form a joint, the viscous sealant is caused to ooze out into the joint in bridging contact with said edges.

4. In a caulking seal for use in producing a resilient seal, the combination of an elongated, hollow, resilient body containing therein a viscous sealant, said hollow body comprising a channel having internally thereof pressure-yielding orifice means communicating with the sealant whereby when an edge to be sealed is snugly fitted into said channel and pressure applied to form a joint, the viscous sealant is caused to ooze out into the joint and about said edge.

5. A joint comprising opposed edges having therebetween under pressure an elongated, resilient body having orifice means therein and a viscous sealant contained in said body and distributed through said orifice means in bridging and sealing contact with at least one of said edges.

6. A joint comprising opposed edges having therebetween under pressure an elongated, hollow, rubber-like body having orifice means disposed longitudinally thereof and a viscous sealant contained in said body and distributed through said orifice means in bridging and sealing contact with said opposed edges.

7. A joint comprising opposed edges having therebetween under pressure an elongated, hollow, resilient body having a flattened cross-sectional configuration and having orifice means disposed along the sides thereof and a viscous sealant contained in said body and distributed through said orifice means in bridging and sealing contact with said opposed edges.

8. A joint comprising opposed edges having therebetween under pressure an elongated hollow, resilient body comprising a channel having internally thereof longitudinally disposed orifice means, one of said edges being supported snugly in said channel, and a viscous sealant contained in said hollow body and distributed through said orifice means in sealing contact with the edge supported in said channel.

9. A caulking seal comprising an elongate body of resilient material, having a hollow substantially coextensive therewith and containing a viscous sealant, and said body having pressure-yielding orifice means substantially coextensive therewith and communicating with said hollow, said body being yieldable under pressure to compress said hollow and cause sealant to exude from said orifice means.

10. The caulking seal of claim 9, in which the orifice means is a substantially continuous slit disposed longitudinally of said body.

11. The caulking seal of claim 9 in which the orifice means comprises a plurality of openings.

12. A caulking seal comprising an elongate body, and means in the body for retaining a supply of viscous sealant, the retaining means being substantially coextensive with said body and being deformable under pressure whereby to effect the release of sealant directly against an object to be sealed.

13. The caulking seal of claim 12, in which the body is formed of resilient material, and the retaining means comprises a hollow in said body.

14. A caulking seal for use in producing a substantially tight resilient seal, the combination of a hollow elongated, resilient compression body having a recess containing a viscous sealant, said body having pressure yielding orifice means disposed longitudinally along said body, said orifice means communicating with said recess, said orifice means being adapted to open upon the application to said resilient body of pressure by opposed surfaces to be sealed to provide for the flow of sealant from said recess into contact with one of said surfaces.

15. A sealed structural joint, comprising a pair of spaced substantially fixed surfaces to be sealed, a resilient caulking strip disposed between and in substantially fixed contact with said surfaces and maintained under compression thereby, said strip having a recess therein and orifice means therefor exposed to one of said surfaces, and a supply of viscous sealant retained in said recess and forced through said orifice means by said compression and maintained in contact with said one surface.

16. A caulking seal comprising an elongate body of generally U-shaped cross section having a bottom wall and spaced side walls forming a channel for the reception of a glass plate or the like, said body being formed of resilient material and having at least one normally substantially closed recess therein disposed longitudinally of the body and substantially coextensive therewith, a supply of viscous sealant material received in said recess, and means in said body forming pressure-yielding orifice means communicating with said recess, the orifice forming means being adapted, upon application of pressure to the body, to permit the passage of sealant from the recess.

17. The seal of claim 16, in which the recess is disposed in one of the walls of the body, said one wall has a resilient pressure rib projecting outwardly therefrom and extending along said recess, and said orifice means is generally opposite said pressure rib, whereby upon application of pressure to said rib sealant is caused to exude from said orifice means.

18. The seal of claim 17, in which the pressure rib comprises a web of resilient material formed integrally with the body member and forming in part said recess.

19. The seal of claim 17, in which said orifice means comprises a longitudinal slit in said one wall, said slit and said recess defining a pair of opposed lips normally substantially closing off said recess, said one wall being resiliently distortable in the region of said recess whereby upon the application of pressure to said pressure rib said one wall distorts to separate said lips and facilitate the movement of sealant from said recess.

20. The seal of claim 16, in which said recess is formed in one wall of said body, and said one wall has a groove therein extending along said recess and adapted to provide a cavity for receiving sealant exuded from said recess.

21. A caulking seal comprising an elongate body of generally U-shaped cross section having a bottom wall and spaced side walls forming a channel for the reception of a glass plate or the like, said body being formed of resilient material and having in at least one wall thereof a recess disposed longitudinally of the body and substantially coextensive therewith, means integral with said body forming a pair of opposed lips extending along said recess and normally substantially closing off said recess, a supply of viscous sealant material received in said recess, and means adapted upon the application of pressure to the opposite surfaces of said one wall to cause said lips to separate and to cause sealant to exude from said recess.

22. The seal of claim 21, in which both side walls of the body have recesses therein normally substantially closed off by opposed pairs of lips and containing supplies of viscous sealant material.

23. The seal of claim 22, in which the lips of one recess face the channel formed in said body, and the lips of the other recess face outwardly of the body.

24. The seal of claim 22, in which the lips of both recesses face the channel formed in said body member.

25. The seal of claim 21, in which a pair of recesses are provided in one of said walls, each of said recesses being normally substantially closed off by opposed pairs of lips and containing a supply of viscous sealant material, the lips of the respective recesses facing in opposite directions to permit sealant to be exuded from both sides of said one wall upon the application of pressure thereto.

26. The seal of claim 21, in which said one wall has a groove therein extending along said recess and adapted to form a cavity for receiving sealant exuded from said recess.

27. The seal of claim 21, in which the means for separating said lips comprises a pressure rib projecting outwardly from the general outline of said one wall and extending along said recess, said pressure rib constituting the only means connecting portions of said one wall on opposite sides of said recess.

28. A caulking seal for interposition between a pair of opposed surfaces to be sealed comprising an elongate body of resilient material, said body having a recess therein disposed longitudinally along one surface thereof for retaining a supply of viscous sealant material, said one surface being adapted to contact one of the surfaces to be sealed, and means integral with said body and forming opposed longitudinally extending pressure-yieldable lips which normally substantially close off said recess, said body having means adapted, upon the application of pressure thereto by opposed surfaces to be sealed, to maintain said lips in an open condition.

29. The seal of claim 28, in which the body has a groove extending along said recess and forming a cavity for the reception of sealant exuded from said recess.

30. The seal of claim 28, in which there are at least two recesses disposed longitudinally in said body for retaining supplies of viscous sealant, and means integral with said body are provided to form opposed pressure-yieldable lips which normally substantially close off said recesses.

31. A caulking seal for interposition between a pair of opposed surfaces to be sealed comprising an elongate body of resilient material, said body having recess means therein disposed longitudinally along one surface for retaining a supply of viscous sealant material, said one surface being adapted to contact one of the surfaces to be sealed, and a pair of longitudinally disposed pressure-yieldable lips extending along and normally substantially closing off said recess means, said opposed surfaces being adapted to apply pressure to said resilient body to force sealant material from said recess means along said one surface.

32. The seal of claim 31, in which said body has a pressure rib disposed longitudinally thereon and extending along a surface thereof opposite said recess means, said pressure rib being adapted to apply localized pressure to the sealant in said recess means when said seal is in sealing position between a pair of surfaces to be sealed.

33. A caulking seal comprising a body of resilient material having a portion adapted to be interposed between and compressed by a pair of flat surfaces, said body having recess means in one surface thereof for retaining a supply of viscous sealant material, said one surface being adapted to contact one of the surfaces to be sealed, said body having normally substantially closed orifice means communicating with said recess means and adapted to permit sealant to exude from said recess means and into contact with opposed surfaces to be sealed, and a pressure rib formed on said body and disposed along said recess means, said pressure rib being adapted to be compressed substantially flat into the general outlines of said body when said body is compressed between said flat surfaces whereby simultaneously to displace sealant from said recess means and distort said body in a manner to open said orifice means.

34. The seal of claim 33, in which said orifice means comprises a pair of lips defining a normally substantially closed longitudinal slit, said pressure rib is located on the side of said body portion opposite said lips and being adapted when compressed into the general outlines of said body to distort said body portion in a manner to separate said lips.

35. A sealing element for interposition between opposed surfaces to be sealed comprising an elongate body formed of resilient material and having a generally U-shaped cross section, one of the walls of said body having a longitudinal recess on one side thereof adapted to retain a supply of viscous sealant material, and said one wall having a pressure rib projecting outwardly from the general outline thereof and extending along said recess on the side of said wall opposite said recess.

36. A sealed joint comprising the sealing element of claim 35, in combination with surfaces pressed inwardly against the opposite side walls of said body and an object received between said side walls, and a supply of viscous sealant material received partly in the recess of said sealing element and partly exuded therefrom into sealing and bridging relation with said object and the said one wall of said element.

37. A caulking seal comprising an elongate body, and means in the body for retaining a supply of viscous sealant, the retaining means being substantially coextensive with said body and being deformable under pressure and means on said body adapted to deform said retaining means upon the application of pressure thereto whereby to effect the release of sealant.

38. The caulking seal of claim 37, in which the body is formed of resilient material, and the retaining means comprises a hollow in said body.

39. A sealed joint comprising a sealing element formed of an elongate body of resilient material and having a generally U-shaped cross section, said body having walls and one of the walls of said body having a longitudinal recess on one side thereof adapted to retain a supply of viscous sealant material, said one wall being deformable to deform said recess, an object received between the opposite side walls of said body, a pair of surfaces pressing inward against the outer surfaces of said body, and a supply of viscous sealant material received partly in the recess of said element, said one wall and recess being deformed by said surfaces and object to exude said sealant directly against said object and to maintain said sealant in bridging relation with said object and said one wall.

40. A sealed joint comprising a sealing element formed of an elongate body of resilient material and having a longitudinal recess on one side thereof adapted to retain a supply of viscous sealant material, said body being deformable in the regions adjacent said recess to deform said recess, a first surface pressing inward against said one side of said element, a second surface pressing inward against said element and toward said recess and a supply of viscous sealant received partly in the recess of said element, said region and recess being deformed by said surfaces to exude said sealant directly against said first surface and to maintain said sealant in bridging relation with said first surface and said element.

41. A sealed joint comprising a sealing element formed of an elongate body of resilient material and having a generally U-shaped cross section, said body having walls and one of the walls of said body having a longitudinal recess on one side thereof adapted to retain a supply of viscous sealant material, said one wall being deformable and means thereon to deform said recess, an object received between the opposite side walls of said body, a pair of surfaces pressing inward against the outer surfaces of said body, and a supply of viscous sealant material received partly in the recess of said element, said one wall and recess being deformed by said surfaces and object to maintain said sealant in bridging relation with said object and said one wall.

42. A sealed joint comprising a sealing element formed of an elongate body of resilient material and having a longitudinal recess on one side thereof adapted to retain a supply of viscous sealant material, said body being deformable in the regions adjacent said recess and means associated with said body to deform said recess, a first surface pressing inward against said one side of said element, a second surface pressing inward against said element and toward said recess, and a supply of viscous sealant received partly in the recess of said element, said region and recess being deformed by said surfaces to maintain said sealant in bridging relation with said first surface and said element.

References Cited in the file of this patent

UNITED STATES PATENTS

2,156,681	Dewhirst et al.	May 2, 1939
2,228,052	Gardner	Jan. 7, 1941
2,367,882	McKnight	Jan. 23, 1945
2,402,717	Winer	June 25, 1946
2,451,194	Braun	Oct. 12, 1948
2,693,009	Beck	Nov. 2, 1956
2,701,162	Kliger	Feb. 18, 1955
2,716,783	Fegan	Sept. 6, 1955
2,840,869	Fegan	July 1, 1958
2,910,209	Nelson	Oct. 27, 1959