March 5, 1963 G. W. CORNELL 3,079,653

ALL VINYL DOOR, WINDOW OR LIKE SEAL ASSEMBLY

Filed June 27, 1957 2 Sheets-Sheet 1

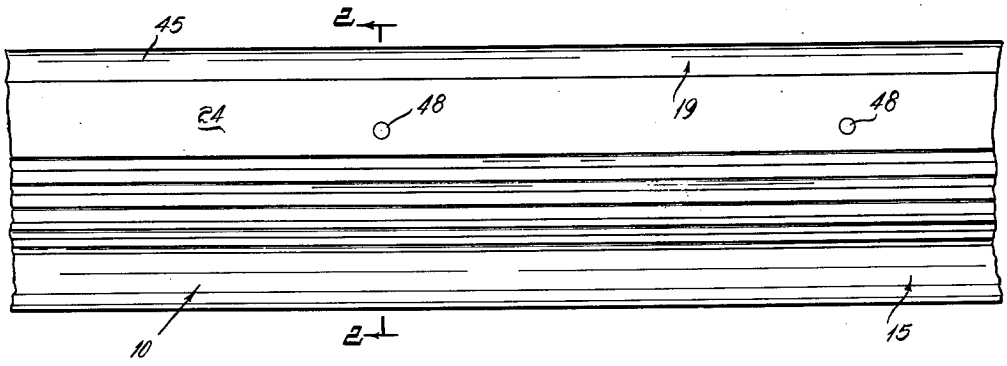


Fig. 1

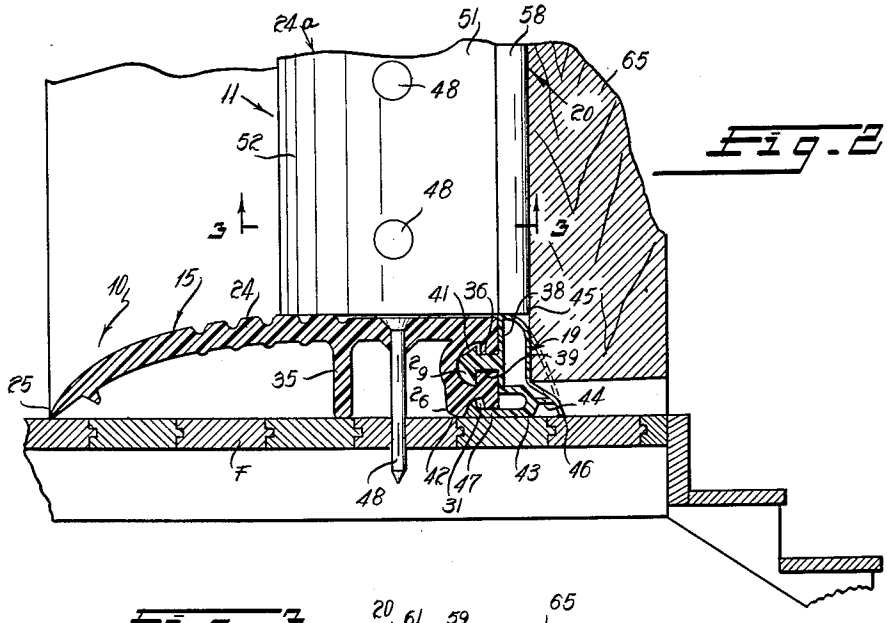
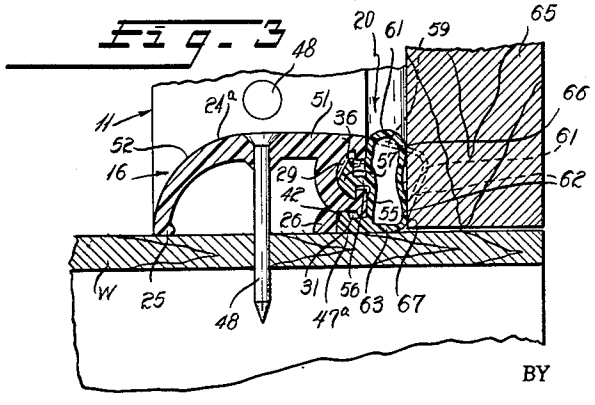


Fig. 2

Fig. 3



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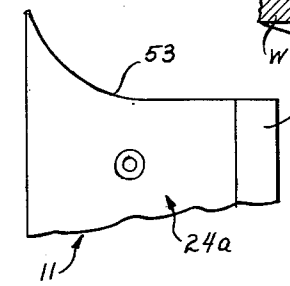
Filed June 27, 1957 2 Sheets-Sheet 2

Fig. 3A



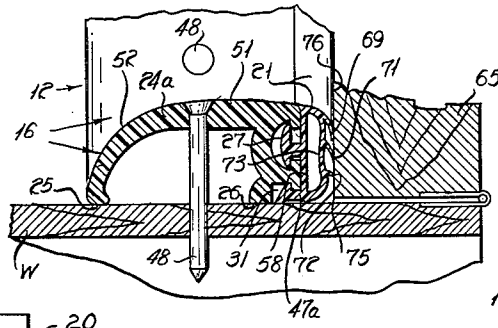


Fig. 4

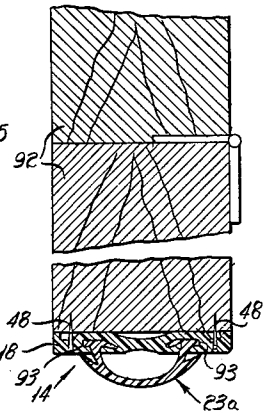


Fig. 8

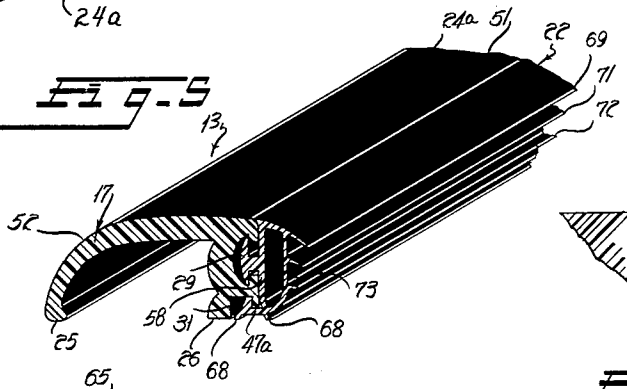


Fig. 5

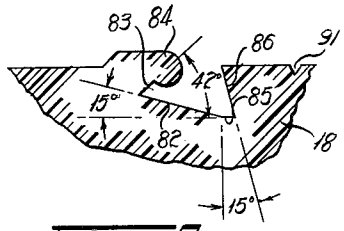


Fig. 7

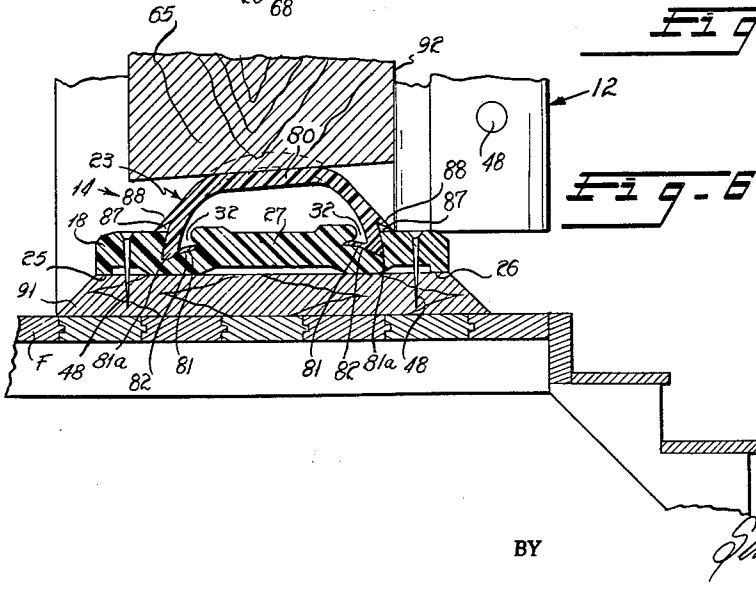


Fig. 6

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ALL VINYL DOOR, WINDOW OR LIKE SEAL ASSEMBLY

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Filed June 27, 1957, Ser. No. 668,475
8 Claims. (Cl. 20—69)

The present invention relates to positive sealing assemblies for sealing the bottom, side and top edges of door, window or like openings of home or commercial building structures against passage of air, the elements and light and more particularly to such a sealing assembly made up of an impact resistant support strip adapted to sealingly engage a support surface and a resilient and highly deformable sealing strip removably secured to the support strip in position to sealingly engage and conform to the opposed surfaces of a door, window or like closure element or the framing defining such openings.

Sealing assemblies composed of wood, metal and like rigid support strips and resilient and deformable polyvinyl chloride seal strips have been heretofore proposed and have met with much success. Examples of such successful sealing assemblies are shown in applicant's prior United States Letters Patent 2,718,677 dated September 27, 1955, and entitled Threshold and Door Sealing Construction. Such an assembly is wholly adequate as a seal and is widely marketed for original installations as well as a replacement threshold for installation by unskilled mechanics and home owners. When properly installed, such assemblies adequately serve to seal the side and top edges of window, door and like closure openings but such assemblies do not lend themselves to ready nailed attachment, do not provide a particularly satisfactory surface for painting to tie in with the general decorative color schemes of residential and commercial buildings, are subject to permanent denting impressions when struck by hammer or like blows, present installation problems when used along the hinge edge of a door or casement window not readily solvable by unskilled workmen and do not have adequate impact resistance to satisfactorily serve as a seal element for the bottom edge of overhead garage doors.

While wood support strips substituted for the metal support strips of applicant's above identified patent effects some improvement so far as nailability and paintability are concerned, the wooden support strips are also easily marred by hammer or like blows, have a tendency to absorb moisture and swell, even when painted, with incident damage to the paint and objectionable displacement of the sealing strip making opening and closing of a door or window difficult, are expensive to produce because of the need of planing and grooving to impart the desired shape and surface finish as well as to provide the seal strip retaining grooves and do not have sufficient resilience to assure a sealing engagement with the door, window or framing surfaces to which they must be attached if employed under seal strips.

It, accordingly, is a primary object of this invention to provide a weather resistant sealing assembly made up of a stiff support strip having sufficient resiliency to effectively assure direct sealing engagement with the door, window or framing surface upon which it is mounted to prevent passage of air, the elements and light between the support strip and its mounting surface and a resilient and highly deformable seal strip for sealingly cooperating with the opposed framing, door or window surfaces to prevent the passage of air, the elements and light between the sealing assembly and such opposing surfaces.

Another important object of this invention is to provide a sealing assembly made up of a nailable, high impact resistant, support strip which is impervious to moisture, free of swelling tendencies and has a low thermal expansion and contraction factor and a resilient and highly deformable seal strip for sealingly cooperating with an opposed door, window or framing surface.

A further object of the present invention is to provide a sealing assembly made up of an extruded high impact resistant polyvinyl chloride support strip having undercut groove means extending longitudinally along one face and an extruded resilient and deformable seal strip having longitudinally extending securing means for matingly interlockingly engaging in the undercut groove means to removably secure the seal strip to the support strip and provide an assembly unit and also having a protruding resilient and highly deformable sealing portion disposed for sealing engagement with an opposed door, window, or framing surface.

Still another object of the present invention is to provide door, window, or like double face sealing assemblies for encircling association with a dark room door to effectively prevent seepage of light between the door and its framing made up of an extruded pigmented high impact resistant polyvinyl chloride support extrusion and a removably attached pigmented resilient and readily deformable polyvinyl chloride seal strip.

A further object of the present invention is to provide a door, window or like seal assembly with a resilient and deformable seal strip having a longitudinally continuous body portion one face of which carries a longitudinally continuous locking head and the other face of which provides a transversely elongated deformable bulb element the exposed laterally extending wall of which has integrally formed thereon a plurality of outwardly projecting, highly flexible, thin, relatively short, transversely spaced finger elements adapted to sweepingly engage an opposed surface upon closing of a hinged door or window and be bent, upon contact with the opposed surface, into surface-to-surface sealing engagement with the opposed surface causing depression of the bulb element which, due to its resilient deformability, assures and maintains a firm surface-to-surface sealing contact of said fingers while avoiding appreciable resistance to final closing movement of said door or window.

Still other objects will appear as the following description and appended claims are read in conjunction with the accompanying drawings wherein:

FIGURE 1 comprises a fragmental plan view of one form of an abutment type threshold sealing assembly as viewed from above when nailed in place in a door or window opening to abuttingly engage the bottom edge of a door, window or like closure member hinged along a vertical edge to the opening defining framing;

FIGURE 2 comprises a transverse sectional view taken substantially along line 2—2 of FIGURE 1 illustrating the manner in which the abutment type threshold of FIGURE 1 cooperates with the floor and the lower edge of an outswinging door and also illustrating one form of vertical and top edge abutment sealing assembly provided by this invention for use in place of the conventional door stop stripping usually employed with outswinging doors;

FIGURE 3 is a transverse sectional view taken substantially on line 3—3 of FIGURE 2 and viewed in the direction of the arrows to illustrate the manner in which the abutment sealing assembly of this invention, provided to replace the conventional door stop stripping, cooperates with the door edges;

FIGURE 3*a* is a fragmental detailed view of the factory finished ends of the preferred vertical door strips provided by this invention;

FIGURE 4 is a transverse sectional view similar to FIGURE 3 taken through the hinged vertical edge of

a swinging door or window illustrating a preferred form of seal strip for use with swinging windows and doors to avoid appreciable resistance to final closing movement of swinging doors or windows;

FIGURE 5 is a perspective view of a preferred pigmented sealing assembly provided for effecting maximum light exclusion in sealing the door or window openings of darkrooms and like light tight structures;

FIGURE 6 is a sectional view similar to FIGURE 2 illustrating a further form of threshold seal assembly provided by this invention for either an outswinging or inswinging door and attachment either directly to the floor or a wooden threshold plate employed with the vertical and top edge seal assemblies of FIGURE 4 to seal and provide door stops for an inswinging door;

FIGURE 7 is an enlarged fragmental sectional view of the right hand groove structure of the support strip of FIGURE 7 illustrating the detailed groove structure; and

FIGURE 8 is a fragmental sectional view illustrating the seal assembly of FIGURE 6 applied to the bottom edge of an overhead garage door of conventional structure.

With continued reference to the drawings wherein like parts are designated throughout by similar reference characters, sealing assemblies **10, 11, 12, 13** and **14** embodying the present invention are illustrated by the various figures of the accompanying drawings. As will hereinafter appear, assemblies **10** and **14** are primarily intended for use as positive sealing threshold or bottom edge sealing assemblies whereas assemblies **11, 12** and **13** are primarily adapted for use in sealing the vertical side edges and top edges of door, window or like closures of either the swinging or sliding type.

Fundamentally, the various sealing assemblies of this invention are composed of generally non-deformable support strips **15, 16, 17** or **18** of varying construction depending upon the intended end use of the sealing assembly and flexible and deformable sealing strips **19, 20, 21, 22** or **23** also depending upon the particular end use to be made of the sealing assemblies. Since it is preferred that the support strip be susceptible of sealing cooperation with the surface upon which it is mounted and that it be attachable by suitable securing nails as well as other securing devices, such as screw fasteners requiring fastener receiving openings in the support strip structure, each of these support strips is preferably formed from a material which will not only permit a nail to be driven therethrough but will have sufficient resiliency (1) to undergo localized bending thereby assuring sealing conformance to minor surface irregularities in the mounting surfaces provided therefor and (2) to resist permanent localized deformation upon being subjected to hammer or like blows. While any subtance which exhibits the desired resiliency and impact resistance mentioned above may be employed in forming the various support strips, the present invention is particularly concerned with the provision of support strip structures formed of a synthetic plastic material that can be readily extruded in continuous lengths, subsequently cut along transverse lines into suitable marketable strip lengths and sanded to a smooth finished abutment surface and which will provide a greater affinity to paint than either wood or metal and eliminate the moisture damage inherent in wood or metal support strips currently employed in such structures. Such a substance available on the open market takes the form of what is generally known as high impact resistance, or rigid polyvinyl chloride and these terms as hereinafter used in this description and the appended claims is intended to define such material or equivalent synthetic plastic materials. One of the preferred sources of the ingredients for such a material is the B. F. Goodrich Chemical Company of Cleveland, Ohio which provides a commercially available high impact resistant, polyvinyl chloride ingredient composed of a basic polymer like that disclosed in United States Letters

Patent No. 2,646,417 dated July 21, 1953 and entitled "Rigid Thermoplastic Compositions Comprising Vinyl Halide Polymers with Interpolymers of Styrene and Acrylonitrile," combined with a sufficient quantity of rubbery material like that generally described in United States Letters Patent No. 2,753,322 dated July 3, 1956 and entitled, "Rigid Vinyl Halide Polymer Compositions Adapted for Vacuum Forming." This material is ideally suited to conventional extrusion processes. Suitably compounded extruded shapes obtainable on the open market from Industrial Vinyls, Inc. of Miami and generally designated in the trade as rigid polyvinyl chloride have the following desirable physical characteristics:

(1) a durometer hardness of the order of 78 (+ or −3)
(2) Tensile strength at 78° F. of 5000–6500 p.s.i.
(3) Compressive strength at 78° F. of 7500–9000 p.s.i.
(4) Flexural strength at 78° F. of 8500–12000 p.s.i.
(5) Izod impact factor 10–20 ft. lbs. in notch
(6) A coefficient of thermal conductivity of the order of 4.5 (B.t.u./sec./sq. ft./° F./in./10–4).

Such commercially available extruded shapes produced by conventional extrusion processes provide continuous strips of varying cross-sectional area which can be produced at very low cost and, when cured in conventional manner, provide shapes having an extremely desirable high impact resistance assuring against marring deformation when subjected to impact blows while at the same time providing a support strip that can be readily cut, sanded smooth, drilled and penetrated by conventional pointed nail-like fasteners or pre-punched to grippingly receive and temporarily retain nail or screw fasteners during the attachment of the assemblies. The resilience of these materials is such that support strips made from them exert an exceptionally strong gripping force on the nails or other fasteners employed to secure them in place, provide an unusually desirable affinity to paint coatings, particularly paints of the styrene butadiene variety such as "Spread Satin" and "Super Kemtone" and are resistant to long exposure to moisture which often causes undesirable swelling and rusting or corrosion of support strips made of metal, wood or other compositions heretofore used for door, window or like sealing assemblies and door or window stops and guides. The susceptibility of these polyvinyl chloride support strips to ready sawing or cutting by conventional saws or cutting elements without clogging the teeth or dulling the blades makes it possible to readily fit the support strip to a door, window or other framed opening for a closure member. Furthermore, the support strips made from such materials have much greater resiliency than wood or suitably heavy gauged metal heretofore employed in making such sealing assemblies assuring localized flexing enabling the support strips to sealingly conform to minor surface imperfections in the surface of mounting surfaces provided to receive them. This makes it possible to secure a close, positive sealing engagement with the mounting surfaces without special care particularly when raised surface mating formations of minimum cross-sectional area are provided on the under or abutment faces.

The present invention, accordingly, proposes high impact resistant polyvinyl chloride support strips comprising arched body portions **24** or **24***a* having laterally spaced abutment surfaces **25** and **26** of relatively slight cross-sectional width on one face or a planar-like body **27** having laterally spaced abutment surfaces **25** and **26** of slight cross-sectional width on one face. These strips are readily formed by conventional extrusion methods which permit the incorporation of suitable completely finished undercut seal strip attachment grooves **29** and **31** in a vertical edge wall or laterally spaced undercut seal securing grooves **32** in a laterally extending face of the support strip opposite that intended as an abutment face without the need of finishing operations after the strips are formed.

The location of the undercut grooves depends upon whether an abutment type or a shear type sealing element is desired.

Referring for the moment to FIGURES 1 and 2, the support strip 15 of this form of the invention is of an overall width of 2.031 inches, a maximum height of .423 inch and is primarily for use as a threshold sealing assembly of the abutment sealing type often used in sealing the bottom edge of outswinging exterior and patio doors. As clearly seen from FIGURE 2, the abutment surfaces 25 and 26 are of a thickness of about .078 inch, are widely laterally spaced and the arched body 24 is of the order of .093 inch in thickness and is provided between the abutment faces with a depending, longitudinally extending, reinforcing rib 35 of approximately .078 inch thickness. The abutment face 26 is in the form of a rib of slight width on a longitudinally continuous depending protrusion or rib forming a laterally thickened edge wall of .25 inch in thickness having longitudinally continuous undercut grooves 29 and 31 in its outer vertical wall. It will furthermore be clear from FIGURE 2 that the undercut groove 29 is formed between the upper and lower extremities of the laterally thickened edge wall and comprises a mouth portion 36 of approximately .078 inch width generally centered with respect to and of lesser width than the undercut groove 29 which measures crosswise at the widest point adjacent the undercut shoulders .187 inch and is of a depth of .109 inch measured from the rear face of the edge wall. It will further be appreciated from a consideration of FIGURE 2 that undercut groove 31 opens downwardly as well as outwardly of the laterally thickened edge wall to provide what might be defined as an undercut half groove the purpose of which will be presently pointed out. The back wall of groove 31 is about .109 inch from the front face of the edge wall and the interlock lip depends .046 inch. The support strip of this form of the invention may be provided with a resilient and deformable sealing strip of a form like that of any one of the forms designated 19, 20, 21 or 22 without materially affecting the sealing efficiency of the assembly employed as a threshold seal.

Referring first to sealing strip 19, this strip is composed of a resilient and deformable plasticized polyvinyl chloride composition of more or less conventional character and comprises a body wall 38 of approximately .023 inch thickness having integrally formed on one face a longitudinally continuous right angularly related attachment rib 39 of approximately .046 inch thickness and .093 inch length. The free edge of rib 39 terminates in an enlarged locking head 41 of generally triangular or arrow shaped configuration in cross-section measuring across the tips .125 inch. Head 41 together with rib 39 forms an interlocking attachment or support structure for matingly cooperating with undercut groove 29 and its reduced area mouth 36 to removably interlock the seal strip 19 to support strip 23 with body wall 38 in face to face contact with the vertical wall of the support strip at both sides of mouth opening 36. Wall 38 extends downwardly from mouth opening 36 to a point short of the lower support strip wall edge and there integrally joins an intersecting bottom wall portion which extends outwardly, then curves downwardly and inwardly to provide an underseal leg 47 terminating in an upstanding lip 42 disposed in the downwardly opening groove 31. Except for leg 47 which is .046 inch thick, this body wall portion is .023 inch in thickness. This resulting outwardly protruding curved wall 43 is provided at the center of its outer face with an outwardly directed rib 44 of .023 inch thickness which integrally joins a downwardly and outwardly arching, thin, highly deformable sealing wall 45 of .023 inch thickness. Rib 44 joins wall 45 adjacent its lower edge 46 to form a contact lip engageable with the floor F at a point spaced outwardly from the seal strip bottom wall 43.

The normal undeformed configuration of thin highly deformable sealing wall 45 is indicated in dotted lines in FIGURE 2 and is seen in plan view in FIGURE 1. This seal strip formation is provided to effect two purposes (1) to provide a front end reinforcement at the lower end of flexible and highly deformable seal wall 45 that will resist a collapsing of the seal wall into contact with the main wall 38 in the packaging of the seal assembly as well as in use in sealing the door or window and (2) to provide a compressible undersurface seal at 47 as support strip 15 is drawn home by its securing fasteners. The seal at 47, it will be appreciated, is effected by the gripping of the portion of bottom seal strip wall 43 between depending rib 26 and the opposed floor surface to insure a highly effective sealing contact with the floor along the edge of the assembly exposed to the elements. In addition, this novel seal strip structure provides an additional interlock for retaining the sealing strip in proper position on the support strip 15 so that the sealing strip will not pull away from the support strip in the area of contact with the floor when a door abuts and deforms the flexible and highly deformable sealing wall 45 into surface sealing contact as illustrated in FIGURE 2.

While the sealing assembly of FIGURES 1 and 2 employed as a threshold may be conveniently secured in place, after its ends are cut to properly interfit with the side door or window opening framing, by either nailing it to the flooring with a headed nail 48 as shown in FIGURES 1 and 2 or by a screw fastener entered into a suitably drilled and countersunk opening (not shown) similar to that illustrated in applicant's prior Patent 2,718,677, it is preferred that the securing of the incident assembly be effected by nailing as here illustrated. Such securing means is particularly effective with the pre-punched or pre-drilled high impact resistant polyvinyl chloride support strip of this invention since nail 48 will be tightly gripped both before and after it is driven home by reason of the resilience of the material. As a consequence, the fastening nails or screws can be pre-set in the stripping to be held in upright position ready to be driven home by a hammer or screw driver leaving the other hand of the installer free to firmly press successive areas of the strip assembly into proper relative position with respect to the surface to be sealed by the deformable seal strip.

Nail 48 can, if desired, be countersunk into the material by use of a conventional nail set to firmly secure sealing assembly 10 in place while a screw fastener can be countersunk by suitably countersinking the exposed end of the pre-drilled fastener hole with a conventional countersinking drill bit. In addition, it has been established that the hammer blows necessary to drive a nail head flush with the exposed surface of support strip 15 are ineffective to permanently indent the top surface of the strip and yet the resilience which makes this possible is not sufficient to cause any appreciable and undesirable distortion of the support strip or bouncing of the hammer as the securing nail is driven home.

While sealing assembly 10 may, if desired, be employed for sealing the vertical and top edges of the door or window opening, a better appearance is effected by use of one or another of the sealing assemblies 11, 12 or 13. These assemblies, as will be clear from a comparison of FIGURES 2, 3, 3*a*, 4 and 5 of the drawings are of lesser width and employ support strips 16 or 17 of different cross-sectional configuration designed to provide a finished appearance to the vertical and top edge or header stripping. Referring for the moment to FIGURES 3, 4 and 5, these support strips have arched body portions 24*a* the lateral edges of which form abutment surfaces 25 and 26. The latter comprises a thickened edge wall having undercut grooves 29 and 31 substantially identical in construction to that of support strip 15. Body portion 24*a* has an overall width of .719

inch which extends in a substantially transverse direction from the thickened end wall to provide a nail or other fastener receiving area 51, which can be prepunched or drilled to provide fastener openings, and then curves downwardly on a rather sharp radius beginning at a point about .390 inch from the outer face of the thickened end wall to provide a curving finished edge 52 located at a distance from the thickened edge wall of the order of .562 inch, roughly the spacing of reinforcing rib 35 of threshold strip 15. The maximum thickness of strips 21 and 22 is about .390 inch. As clearly seen in FIGURES 2, 3, and 4, support strips 11, 12 and 13 are also secured in place by headed nails 48 spaced longitudinally along the fastener receiving area 51. Undercut grooves 29 and 31 are disposed substantially in the same relationship as the corresponding undercut grooves of the previously described threshold support strip 15. It will be noted, however, that mouth 36 of these support strips is somewhat wider, measuring .093 inch across and that the back wall of groove 13 is aligned with the deepest point of the curved back wall of groove 29. While a seal strip 19 like that described for use with support strip 15 may be employed, it is preferred that a seal strip 20, 21 or 22 shown in FIGURES 3, 4 or 5 be used in lieu of the strip 19 heretofore described. Preferably the header strip is attached first, its opposite ends being straight cut transversely of the length of the strip to abuttingly engage the planar faces of the opposed vertical door or window frame members. The vertical seal members are preferably cut at one end at the factory as indicated at 53 (FIGURE 3*a*) to matingly abuttingly receive the header strip and form a neat completely sealed corner joint. The opposite or lower ends of the vertical seal members, which are provided in lengths sufficient to extend from top to bottom of the door opening to be sealed, are intended to be cut straight across as indicated in FIGURES 2 and 6 to abuttingly cooperate with the top face of the threshold strip that may be employed. It will thus be appreciated that the installer is freed from the need of making any mitered or other angular cuts to secure proper jointing at the corners of the door openings.

Referring for the moment to FIGURES 2 and 3, seal strip 20 comprises a body wall 55 of .031 inch thickness having integrally formed on one face a longitudinally continuous right angular releated attachment rib 56 terminating in an enlarged locking head 57 in all substantial respects similar in construction and function to the rib and locking head of the previously described seal strip 19. Body wall 55 in this form of seal, however, extends downwardly the full depth of the support strip edge wall face, is inclined slightly toward the locking head at each side of rib 56 and then straightens out to form a pressure contact with the support strip wall at each side of mouth opening 36 and joins a rearwardly directed underseal leg 47*a* measuring .046 inch in thickness. The free end of leg 47*a* is provided with upstanding locking lip 42 like that of strip 19. Underseal leg 47*a* and upstanding lip 42 cooperate with the downwardly opening undercut groove 31 in substantially the same way as the corresponding underseal leg 47 and lip 42 of seal 19 do. In lieu of sealing wall 45 heretofore described in connection with seal strip 19, the present seal strip comprises a resilient and highly deformable sealing wall 58 formed by an integral outwardly and downwardly sloping wall portion 59 of .031 inch thickness merging at a point approximately opposite the upper lip of locking head 57 in a rounded abutment or contact nose 61. Nose 61 in turn merges with a downwardly and inwardly inclined wall portion 62 of .023 inch thickness joined to the lower portion of underseal leg 47*a* by a narrow bottom wall structure 63 through a curved merging portion. This particular sealing wall shape presents curved abutment nose 61 for initial contact with a closure member 65.

Nose 61, due to the relative angular relationships of the wall portions 59 and 62 and the greater thickness of wall portion 59, will upon continued closing movement of the closure member move bodily downwardly and inwardly bowing the walls 59 and 62 substantially as illustrated in FIGURE 3 to establish spaced sealing contact areas at 66 and 67 with the opposed face of the closure member. Because of the thinness and high deformability of the sealing wall of strip 20, it will be appreciated that this sealing bulb formation offers only slight resistance to initial door closing movement when the stripping is properly mounted to have face to face contact with the door. The resistance to closing increases, however, as the door approaches its final fully closed position due to the fact that the bowed wall 59 and the short bottom connector wall 63 provide a substantial resistance to compression once the sealing wall 58 is collapsed into the shape shown by the full lines in FIGURE 3. As a result of this rapid build up of resistance to compression once sealing wall 58 is collapsed, the seal assembly 11 provides an ideal cushioning stop for hinged doors or windows. Such assemblies may and preferably are used in lieu of the conventional wooden or like door stops in new constructions but may be effectively used with existing stop structures of old constructions merely by mounting the assemblies on the opening defining face of the existing stops. Seal assemblies 11 when used at the hinge edge of a hinged closure member have posed a problem necessitating careful adjustment of the hinge edge stripping. This problem is caused by the fact that the hinge edge follows an extremely short radius arcuate path in its approaching contact with the sealing strip causing the leading hinge edge corner to sweep in toward and engage the wall 59 side of nose 61 and tend to pull the bulb portion of the seal away from its engagement with the support strip wall and wedge the bulb between the leading hinge edge corner and framing unless the hinge edge seal assembly is carefully adjusted by setting the hinge edge assembly 11 in place backed away sufficiently from the arcuate path of the leading hinge edge corner to assure that the leading corner will merely tip nose 61 in its initial passing movement. If properly adjusted, however, assembly 11, after contact nose 61 is engaged by the door face, will have its wall 58 pressed into satisfactory sealing engagement during the final closing movement of the door.

To overcome this problem, the present invention provides the preferred seal strip construction 21, 22 shown in FIGURES 4 and 5. In these seal strips, the underseal leg 47*a* is also preferably relieved as most clearly shown in FIGURE 5 to provide the laterally spaced, depending sealing ribs 68. In place of a bulb like that provided by either seal strip 19 or 20, seal strips 21 and 22 embody a laterally elongated shallow bulb formation having thin highly flexible contact fingers 69, 71 and 72 on its flexible and deformable wall 73. Wall 73, as in the previously described forms of the invention is of the order of .023 inch in thickness and is spaced from body wall 57 about .039 inch. As clearly seen from FIGURES 4 and 5, wall 73 is joined at its opposite ends to body wall 57 by short radius, curved wall segments. As a consequence, the major portion of wall 73 in its normal assembled relation as seen in FIGURE 5, extends substantially parallel to body wall 58 with the fingers 69, 71 and 72 projecting outwardly therefrom and curving slightly in a lateral direction toward the underseal leg edge of the strip. The several fingers preferably have a thickness of about .015 inch and when contacted by the door face are bent inwardly as seen in FIGURE 4. When this strip is mounted at the hinge edge of a door as shown in FIGURE 4, the leading hinge edge corner 75 in following its arcuate path sweeps successively across fingers 69, 71 and 72 bending them in the direction of movement of the leading edge. This bending is continued, after corner 75 passes the fingers by engagement

of a free end area of each finger by the door face 76. This engagement acting through the arched fingers tends to force the highly flexible wall 73 bodily inwardly against the resilient support provided by the curved ends of wall 73 thereby in effect slightly compressing the shallow bulb as shown in FIGURE 4. As a result, highly flexible wall 73 assumes an undulating shape as seen in FIGURE 4. Because of the resiliency of this bulb structure and the inherent resiliency of the fingers themselves, the fingers will be firmly pressed outwardly into surface sealing engagement with the closure member face 76 assuring a positive seal when the closure reaches fully closed position. In actual practice, it has been determined that this resilient fingered sealing bulb structure avoids any noticeable resistance to closing movement of the door or tendency to pull the seal strip away from the support strip due to the sweeping arcuate path of movement of closure member corner 75 and its initial shearing contact with the seal strip. It will be appreciated, therefore, that this resiliently backed finger form of the invention is peculiarly suited for proper sealing cooperation with the hinge edge of hinged closure members and at the same time assures normal abutment sealing contact when employed along the other edges of the closure member. For these reasons the structure of sealing members 21 and 22 disclosed in FIGURES 4 and 5 constitutes the preferred seal of this invention.

Polyvinyl chloride extrusions, such as proposed for the support and sealing strips of the disclosed sealing assemblies, can, if desired, be provided in many and varied colors by utilization in conventional manner of suitable pigments in the mixing of the polyvinyl chloride compositions. Therefore, it will be appreciated that the sealing assemblies of the present invention may have desired coloring imparted to them without the necessity of painting them if this should be desired. However, the stocking of varying colors of pigmented polyvinyl chloride stripping assemblies presents a dealers stocking problem which has been determined to be objectionable. For this reason, and as most homes and buildings utilize white paints for the exterior door openings and as brown or grey tints at the threshold harmonize quite well with natural hardwood floors and grey stone or cement door steps, the threshold assemblies provided by this invention are preferably supplied in neutral brown or grey shades and the usual edge sealing assemblies 11 and 12 are preferably supplied in white. Since the polyvinyl chloride stripping here proposed provides extremely smooth surface areas and is impact resistant, an ideal surface is assured for paint coatings if painting should be desired. It will also be appreciated that the normally white stripping offers little trouble from the standpoint of showing through even light colored paint coatings and that resin and rust bleeding and moisture absorption tendencies inherent in utilization of wood or metal support stripping is completely avoided by the all vinyl stripping assemblies of this invention. As a consequence, the stripping of this invention has highly desirable painting characteristics and it has been found to provide an exceptional affinity for styrene butadiene paints.

However, in attempting to provide complete light exclusion for darkroom and like usage, it was found that white vinyl plastic sealing assemblies are not truly opaque and reflect light from one side to the other side of the closure members through the space to be sealed even though they effectively seal the space against the passage of air and moisture. Because of these characteristics of white polyvinyl plastic seal assemblies, wholly satisfactory light sealing of darkrooms was found to be impossible using the customarily marketed side and top edge door seal assemblies. To solve this problem and provide a highly efficient and suitable darkroom seal, the present invention proposes a polyvinyl chloride support strip 24*a* and a polyvinyl chloride seal strip 22 composed of a jet black, pigmented polyvinyl chloride material. Such a sealing assembly is illustrated in FIGURE 5 where the black coloring is employed in the drawings to distinguish this particular and special product from sealing assemblies employing conventional polyvinyl chloride compositions. While it will be appreciated that pigmented polyvinyl chlorides between dead white and jet black will have varying degrees of translucency and reflectability with the ideal being jet black, it is contemplated by this application that the light excluding pigmentation should preferably be black or the deeper shades of other dark colors to assure maximum efficiency of light exclusion.

Referring next to FIGURE 6, the seal strip indicated by numeral 23 comprises a ribbon-like extruded strip of resilient and deformable polyvinyl chloride having a flexible and deformable wall 80 and is provided along its lateral edges with oppositely inwardly inclined tabs 81. These tabs in effect form one half of an arrowhead formation 81*a* and, when the strip is properly positioned in the undercut grooves 32 of support strip 18, are disposed in face abutment engagement with the upwardly and inwardly sloping grooved bottom walls 82 with their free inner edges disposed in the slot 83 (FIG. 7) formed by the overhanging rounded rib or bead 84 provided along the upper inner groove edges. As clearly seen in FIGURE 7, the bottom wall 82 at its lower end merges into a horizontally directed, relatively narrow corner wall portion 85 which in turn intersects the downwardly and inwardly inclined outer side wall 86. The angle of inclination of side wall 86 and bottom wall 82 with right angular planes respectively passing vertically and horizontally through the point of juncture of bottom wall portion 82 and corner wall portion 85 is preferably of the order of 15° and the angle of the side wall intersecting the rounded surface of bead 84 is preferably of the order of 42° with respect to the horizontal plane. It will further be noted from an inspection of FIGURE 6 that the seal strip face opposite that containing tabs 81 diverges progressively from the other face in both directions from the longitudinal center toward the lateral edges to points spaced inwardly from the lateral edges where it is cut back at an angle to the center body thickness as indicated at 87 to form protuberant lips 88. Lips 88 are adapted in use to overlappingly engage the upper outer edges of the body portion defining undercut grooves 32 and to provide pressure lips designed to bear upon the support strip when the seal strip is bent into assembled relation. These bearing lips resist bodily shifting movement of the seal strip relative to the support strip as the door or other closure member swings across and into sealing engagement with the seal strip. In this way, the shearing forces tending to slide the seal strip out of its grooves is satisfactorily resisted even though a single interlock lip only is provided.

These tensioning lips, particularly the one opposite the closure member engaged side of the seal strip, when forced tightly into contact with the support strip also tend to resist the turning force that would otherwise occur around the fulcrum point formed at the point of bearing of the seal strip edge at the intersection of wall portions 85 and 86 tending to twist the related tab 81 out from under its locking bead 84. It will be appreciated, therefore, that the groove and tab structure of these interrelated support seal strips assures maintenance of a proper interlock between the seal strip and support strip irrespective of the forces encountered in use.

As heretofore pointed out, the support strip of FIGURE 6 of this invention is also composed of high impact resistant polyvinyl chloride. The strip is 1.375 inches in width, .150 inch in height and the grooves are spaced inwardly from the opposite edges a distance of .281 inch to their outer edges and provide mouth openings of .078 inch in width. Therefore, suitable securing nails 48 can be employed to conveniently secure the seal assembly to the top surface of the wooden saddle plate 91 upon which this seal assembly is shown mounted in the drawings. It

is to be understood, however, that the wooden saddle plate may be omitted, if desired, and the sealing assembly of this form of the invention could then be nailed directly to the flooring. It will also be noted from FIGURE 6 that the side and top edge sealing assemblies 12 of this form of the invention are cut at their bottom edges to abuttingly fit against the floor, the angled surface of wooden saddle strip 91 and the polyvinyl chloride support strip 23 and are disposed at the outside edge of the threshold seal assembly to abuttingly engage the exposed face 92 of the inswinging door structure illustrated in this embodiment.

It will also be noted from FIGURE 7, that the upper surfaces of support strip 18 at a point approximately midway between each outer support strip edge and the adjacent groove edges is provided with a shallow longitudinally continuous groove 91 serving as a nail locating guide.

In addition to serving as an under door threshold mounted on a threshold saddle strip or under door floor surface, the seal assembly 14 is particularly adapted for attachment to the under edge of any conventional overhead garage door 92 as illustrated in FIGURE 8. Because of the high impact resistance of the support strip 18 and the ready deformability and surface conformability of the seal strip 23, this sealing assembly is particularly suitable for such service where wooden or metal support strip mounted seals would, under the impact forces encountered in the normal closing of such relatively heavy overhead garage doors be likely to splinter or be undesirably bent in use.

It will also be noted that the seal strip 23*a* of this embodiment, while substantially identical to seal strip 23 of FIGURES 6 and 7 has opposite outwardly directed lips 93 fitting into mating outwardly directed grooves in support strip 18 to further insure against twisting of the secured seal strip edges out of the support strip grooves under shear forces encountered in usage like that illustrated in FIGURE 6 and heretofore mentioned.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A seal strip for use as a weatherstrip and cushioning element of a door or like closure opening stop assembly including a support member having a longitudinally grooved wall arranged so that upon installation in said closure opening it will oppose a marginal portion of the closure member comprising an extruded resilient and readily deformable polyvinyl chloride strip composed of a longitudinally continuous tubular element having an integral longitudinally coextensive, headed flange projecting away from one side of said tubular element for interlockingly engaging in said grooved support member wall and a thin highly deformable wall portion opposite said one side of said tubular element and having a protuberant portion extending therefrom in a direction generally opposite that of said headed flange to form a resiliently backed, bendable initial contact portion adapted to first engage said marginal portion of said closure member during its closing movement and thereafter bend and retreat as the closure member completes its closing movement to form a multiple contact seal with the marginal portion of said closure member.

2. The seal strip of claim 1 wherein said protuberant portion of said highly deformable wall comprises a rounded nose portion formed between the opposed edges of said wall by a pair of respectively outwardly converging wall portions.

3. The seal strip of claim 1 wherein said protuberant portion comprises a series of longitudinally coextensive, spaced, thin, finger-like ribs.

4. In combination with a door frame having head, sill and jamb parts, the improvement which comprises: a sealing strip and means for mounting said strip adjacent any of said frame parts in parallel relation thereto, said sealing strip being constructed of resilient material and including a longitudinal base portion, a longitudinal tubular portion joined to said base portion, and an external longitudinal lip on said tubular portion, said lip projecting substantially tangentially outwardly from said tubular portion toward an adjacent portion of the door frame, and said mounting means including a longitudinally grooved bar adapted to be positioned against any of said frame parts, said base portion being anchored in said groove.

5. The structure defined in claim 4 wherein said bar is of angulated sectional configuration, one of the legs thereof being provided with said groove, and anchoring means carried by the other leg and adapted to be anchored to the door frame part to secure said mounting means and sealing strip in operative position.

6. A sealing strip and mounting means therefor comprising: a mounting member having an L-shaped cross-sectional configuration and anchoring means projecting from one leg of said mounting member parallel to and extending in the same direction as the other leg of said mounting member; the other leg having a longitudinally disposed groove on the opposite side from said one leg; a sealing strip comprising a base portion and a tubular sealing portion, said base portion being interlockingly mounted within said longitudinal groove and said sealing portion having a substantially semi-circular cross-sectional configuration and at least one integrally outwardly extending lip projecting substantially tangentially and generally in the same direction as the other leg and anchoring means of said mounting member.

7. A seal strip and stop assembly adapted for sealing the space between a door, a window or like closure member and the framing defining the closure opening comprising an elongated, rigid impact resistant, pigmented, synthetic plastic support strip of arched configuration in cross section providing a normally exposed face delimited along one edge by a depending intersecting edge wall containing a longitudinally continuous undercut groove and provided along its other edge with a longitudinally continuous, planar abutment face facing in a direction opposite said normally exposed face to provide an abutment seal when said support strip is mounted in lateral spanning relation on said opening defining framing; and a resilient and deformable, pigmented, synthetic plastic sealing strip longitudinally coextensive with said support strip edge wall and having a longitudinally continuous attachment portion shaped to matingly interlockingly engage in said undercut groove and removably secure said sealing strip to said support strip and form a marketable assembly adapted for unitary installation, said sealing strip also having a highly deformable bulbous sealing portion of a width to overlie a substantial area of said edge wall in position to sealingly cooperate with an opposing surface of a closure member provided to close said closure opening and said pigmentations of said support strip and said seal strip comprising pigmented polyvinyl chloride compositions wherein the pigmentation is sufficiently great to assure a seal strip and stop assembly which will be effective to both prevent passage of light therethrough and absorb impinging light rays thereby producing a non-reflecting light seal for photographic darkrooms and like enclosures.

8. A seal strip and stop assembly adapted for sealing the space between a door, a window or like closure member and the framing defining the closure opening comprising an elongated, rigid, impact resistant synthetic plastic

support strip of arched configuration in cross section providing a normally exposed face delimited along one edge by a depending intersecting edge wall containing a longitudinally continuous undercut groove and provided along its other edge with a longitudinally continuous, planar abutment face facing in a direction opposite said normally exposed face to provide an abutment seal when said support strip is mounted in lateral spanning relation on said opening defining framing; and a resilient and deformable sealing strip longitudinally coextensive with said support strip edge wall and having a longitudinally continuous attachment portion shaped to matingly interlockingly engage in said undercut groove and removably secure said sealing strip to said support strip and form a marketable assembly adapted for unitary installation, said sealing strip also having a highly deformable bulbous sealing portion providing a longitudinally continuous thin arched wall of a width to overlie a substantial area of said edge wall in position to sealingly cooperate with an opposing surface of a closure member provided to close said closure opening and having integrally formed thereon a series of laterally spaced, longitudinally continuous, generally right angularly protruding, thin, resiliently supported, finger-like contact elements serving to initially contact and thereafter be bent into surface sealing contact with the opposed closure member surface of a hinged closure member to be sealed thereby adapting said sealing assembly for effective use also as a nonbinding stop strip along the hinge edge of a hinged closure member, said resiliently backed finger-like contact elements of the hinge edge stop strip acting to initially engage and thereafter effectively seal said hinge edge of a fully closed closure member while avoiding any appreciable resistance to closing movement of said hinged closure member as the opposed hinge edge corner moves through the final stages of its arcuate path during closing movement.

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